Cattle grazing within virtual fence.

Virtual Fence No Longer Virtual

Halter USA's virtual fence stands out from the herd of virtual fence providers, with over 800,000 cattle collared worldwide. It offers the usual features, such as setting up virtual paddocks, tracking animals within them, and moving them remotely. It also encourages virtual fence jumpers to return. What sets it apart is its AI component, which learns from and adapts to each animal.

"We use sound as a primary function," says Theo Beaumont of Halter USA. "When a cow goes over the virtual fence, we use sound to turn her head around, so she walks back."

Dual speakers provide clear left-right sound cues that indicate which direction to walk. When moving in the correct direction, the collar delivers a reassuring vibration. As with other virtual fence systems, if she doesn't respond to the sound and vibration, she'll receive an electronic pulse to get her attention.

"The algorithm is individualized to the cow," adds Beaumont. "It sees every movement the cow makes and her interaction with the fence. If she's a fence jumper, there's a shorter grace period, and then the energy pulse will be higher. We recognize that every animal is unique, and the collar has to recognize and work with her."

The use of virtual fencing for livestock management is rapidly growing, with systems like eShepherd (Vol. 42, No. 5), now owned by Gallagher; Nofence (Vol. 45, No. 5); Corral Technologies (Vol. 47, No. 1); and Vence, now owned by Merc Animal Health.

Collars vary from battery-powered to solar-powered and from cell phone-based to tower-based systems for areas with poor cell coverage. All use app-based control, enabling herd managers to set up virtual paddocks, monitor animal movement within paddocks, and move animals and/or virtual fences.

Halter uses a solar-powered collar built for lifelong use, featuring near-bulletproof glass. It's weather-resistant and dust-sealed. Each collar maintains constant radio contact with a base station tower.

Nofence and Vence collars connect directly to the cloud via cellular coverage. Depending on cellular service, eShepherd offers either tower-based or cellular connectivity.

"We typically target large herd sizes in terrain that has no cell service," says Beaumont. "We look for a spot where cell service is available for our 30-ft. tower and then network to the collars with radio."

Most systems are designed specifically for beef, while others, like Nofence, are multi-species. Halter was initially created for the dairy industry, with collars collecting and transmitting over 6,000 data points every minute. This data included location, rumination, and health metrics to predict disease and optimal breeding times. It also reported temperature, calving recovery and more.

"Our beef system uses the same hardware but different software," says Beaumont. "It's stripped back to location and movement, functionality the rancher needs. One of our alerts is zero movement. In cases of predation, the sooner a rancher gets to the animal, the better the outlook for compensation."

Halter has expanded quickly, starting in New Zealand in 2021 and later in Australia and other regions. Its recent growth in the U.S. has been equally rapid, with Beaumont attributing much of this success to staffing and training for both cattlemen and cattle.

"We have 63 people full-time in the U.S. and deeply value service to our customers," says Beaumont. "They train the manager and the cows in a process tailored to the ranch. In the weeks before we install, we train the manager on how to use the app and work through a training plan for the two weeks post installation."

The cattle may be easier to train than people are.

"Ranchers are blown away by how quickly their animals learn," says Beaumont. "Adapting a herd to Halter is straightforward. The big thing is the trust the cow develops in the collar, even range cows that are seldom handled. There isn't a cow out there that we wouldn't collar and have total confidence that it would work effectively."

Pricing varies between systems, with some charging by the collar and all applying some type of fee. Halter differs here as well.

"We don't sell the collars," says Beaumont. "Once you buy a tower base station for $4,500, the collars are yours with a lifetime warranty. We do charge a subscription fee of $72 per collar."

Halter limits sales to herds of 100 or more. Beaumont explains that this is necessary because of the emphasis on customer service before and after installations.

"Our collars would work with smaller herds, but we couldn't cost-effectively service our customers really well and efficiently," he says.

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"We can take a farm's chemical budget and demonstrate how to spray 30% less and still get the same or more on the plant," Jayaprakash says.

AI Transforms Chemical Spraying

By Bruce Derksen, Contributing Editor

"I wanted to work on something real, and for that to happen, the problem had to be real," says AgZen's CEO, Vishnu Jayaprakash.

Growing up on an 11-acre farm in Southern India, Jayaprakash came to intimately understand the inefficiencies of chemical spraying.

"Efficiency is a huge problem as most of the spray would end up on me," he recalls, describing his experience with mango trees and backpack sprayers.

The reality of wasted chemicals and suboptimal plant coverage drove him to seek a more practical solution.

"If it turns out that the entire industry of chemical application relies on getting droplets on plants, then it's a good idea to measure how many droplets are on a plant and control that," Jayaprakash says.

AgZen's mission is to optimize every droplet and granule a farmer uses, ensuring every dollar spent on chemicals is maximized. Reception from industry stakeholders, growers, chemical company partners and retailers has been overwhelmingly positive.

"Chemical application has been done with a blindfold ever since we started spraying," Jayaprakash explains. "Our product is meant to remove that blindfold and give insight into how it's really happening."

AgZen's flagship product, RealCoverage, has already been deployed across a million acres. It's touted as the world's first and only system that measures and controls the number of droplets landing on plants, weeds or crops. The system is a bolt-on retrofit compatible with sprayers of any age. Installation takes only 2.5 hours and adds cameras and an AI-powered system that measures droplet coverage up to 3 ft. into the plant canopy at speeds up to 18 mph.

RealCoverage provides instant feedback on speed, gallons per acre, boom height, pressure, nozzles and adjuvants. The goal is to achieve the coverage the grower wants, prove it, and do so with minimal chemical use. Jayaprakash says this technology has enabled farmers to spray 30% to 50% less chemical while improving weed, disease and insect control.

RealCoverage works with all major chemistries, including pesticides, herbicides and fungicides, across row crops such as soybeans, cotton and corn, as well as wheat, rice, grapes, strawberries, potatoes, squash and beets.

Rather than controlling nozzles like multi-camera-equipped spot sprayers, the platform uses only two cameras, one on the boom tip and another above the wheel tracks. These areas are prone to coverage issues due to bouncing and aerodynamic disturbances. The system samples thousands of measurements along each row, providing a representative picture.

"Our units pick up the mass of how many droplets are on a leaf, so it's not just about size. It's assessing numbers, area covered, which ones shattered, what their lifetime was, all of it," Jayaprakash says.

In-cab screens deliver actionable advice, recommending boom heights, speed changes, pressure adjustments, and nozzle swaps tailored to current conditions. The AI automatically starts new measurements when nozzles are changed, calculating in real time how much chemical can be safely reduced while maintaining or improving coverage.

"The beauty of machine learning and AI is that every acre we're on, we're learning what every parameter combination does in combination with whatever is going on with the environment," Jayaprakash explains. "It removes the guesswork."

Extensive testing with agricultural universities and commercial farms, including research at MIT, has shaped the learning algorithm, which adapts to diverse conditions and provides recommendations for every acre.

"We're understanding how a farm in Australia's data can help a farm in Iowa. It's learning so quickly, with a million acres' worth of data to make those recommendations, but the powerful thing is we have an extremely accurate measurement tool."

Additionally, farmers can access their historical data through AgZen's RealPerformance platform, available on the web, on a phone, or on a tablet. Unlike conventional tools that report only gallons per acre sprayed, RealPerformance provides detailed leaf-by-leaf measurements, empowering farmers to decide what, when and how to spray.

"The long and short of it is, we can take a farm's chemical budget and demonstrate how to spray 30% less and still get the same or more on the plant," Jayaprakash says. "That's the return from a dollar-per-acre standpoint."

For a 5,000-acre farm, the immediate savings are about $100,000 per year, with 2026 unit costs set at $97,500. The technology delivers a one-year payback and offers additional benefits, including fewer passes, elimination of resprays, and improved weed and disease control.

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