

VIRTUAL FENCING COLLARS



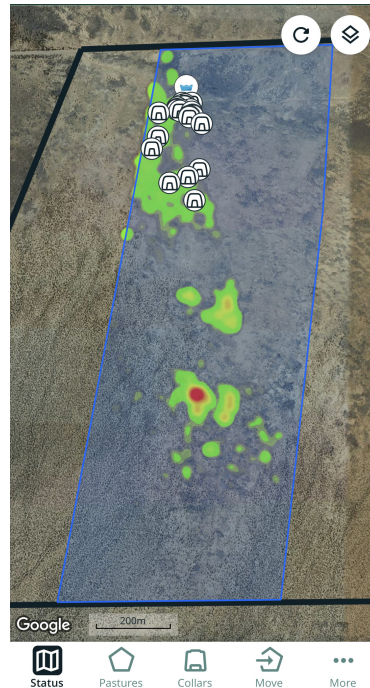
Sustainable Southwest Beef
 Knowledge and tools for ranch and rangeland resilience

What is Virtual Fencing?

With virtual fencing, boundaries for livestock containment are defined without using physical barriers but rather with GPS collars on individual cows. The cows are trained to recognize an audio tone from their collar as they approach the virtual boundary line and turn around or they will receive a minor electric pulse as they cross the virtual boundary. Over time the cows receive fewer pulses as they learn to respond to only the audio cues from the collars and stay within the designated area. A suitable training phase is essential to implement this technology successfully so that collared cows learn to respond to the audio cues from their collar, not their physical location, and thus respond well when their virtual boundaries are changed. A virtual fencing dashboard app allows ranchers to set up grazing boundaries and exclusion areas on their phone and see detailed information on each collared cow. These features include tracking where the cattle have been, where audio warnings and electric pulses have been triggered, real-time locations of cows, analysis of animal movements, and evaluation of grazing densities.

Potential Benefits of Virtual Fencing Collars

Managing livestock grazing distribution on the landscape is a critical part of sustainable rangeland management. Typical methods for influencing livestock dispersal include permanent and temporary fencing, manipulation of drinker placement, herding, and supplementation. The substantial labor and investment required often makes these practices cost-prohibitive for the expansive ranches of the Southwest. Virtual fencing collars can help reduce the cost of fencing and increase ranchers' ability to control livestock grazing distributions throughout their property right from their phone app. Virtual fencing of livestock could be implemented to help preserve creeks and streams, protect fragile riparian zones, manage fire fuels, or rest and restore rangelands impacted by fires, floods and droughts.



Example of virtual fencing interface on a smart phone.

Common Applications

- Setting up virtual boundaries to contain cattle in a specific area.
- Locating individual cows.
- Monitoring where cattle spend their time.



For more information, visit:

swbeef.org

Or contact

Santiago Utsumi
sutsumi@nmsu.edu



Funded by USDA National Institute of Food and Agriculture, Agriculture and Food Research Initiative's Sustainable Agricultural Systems (SAS) program. Grant #2019-69012-29853

FAQs

How do I train my cows?

Pen feeding trials have proven effective to train cows to virtual fence collars (see image to the right). In a first phase, cows equipped with collars with a disabled virtual fence configuration are allowed to access hay feeding areas offered on two sides of the training pen. In a second phase, a virtual boundary is activated to exclude feeding areas on one side of the training pen, allowing cows to associate a warning tone and a following electric pulse from the collar if they move out of the inclusion zone. This phase is continued for 3 consecutive days, and the process is repeated for 3 additional days with the activation of a virtual boundary over feeding areas on the opposite side of the training pen. Cows that are trained properly learn quickly to turn around and alter their trajectory as soon as a warning tone from the collar signals the edge of the inclusion zone.

If a virtual boundary is moved do the cattle avoid areas previously outside their virtual boundary?

We have not found this to be a problem in our trials. The cows are trained to respond to the audio cues from their collar and not the physical location they're at.

Do all of my cows need collars for the virtual fence system to work?

Yes, the successful containment of animals within designated areas is improved if all adult animals in a herd or flock are trained and equipped with a virtual fence collar.

Is the virtual fence system 100% effective?

No, trials* have shown the virtual fence system to be approximately 98% effective. Virtual fencing should be used to create internal boundaries. A physical external fence is recommended to ensure cows don't escape the property. If a cow breaks through the virtual boundary, as might happen when being pursued by a predator, by design she will not continue to receive electric pulses while outside the boundary. There is also no penalty for re-entry into the containment area. Further research is needed to understand the trade-offs between animal welfare and the efficacy of containment.

Does it need Internet/cell-service?†

The collars we are working with operate autonomously via GPS signal and do not require Internet or cell service for operation of the virtual fence. However, for a full experience of the cow tracking and monitoring data, as well as modifying or setting new virtual fence boundary or adding cows to a new virtual fenced pasture, each collar requires adequate connectivity through a cell signal service.

Do I have to charge the collars?†

Current testing suggests that the two built in micro solar panels in the collars allow recharging the onboard battery without requiring the collars to be taken off the cow for a full battery recharge. The user of this collar and application should consider differences in daylight and solar radiation across locations. Current estimates also indicate that the collar battery can last years without need for maintenance or replacement.

How much does it cost?†

As with any new technology, the costs are changing all the time as the market grows. At the time of this document preparation**, each individual collar costs \$285 and the subscription service for the app costs \$60 per year.

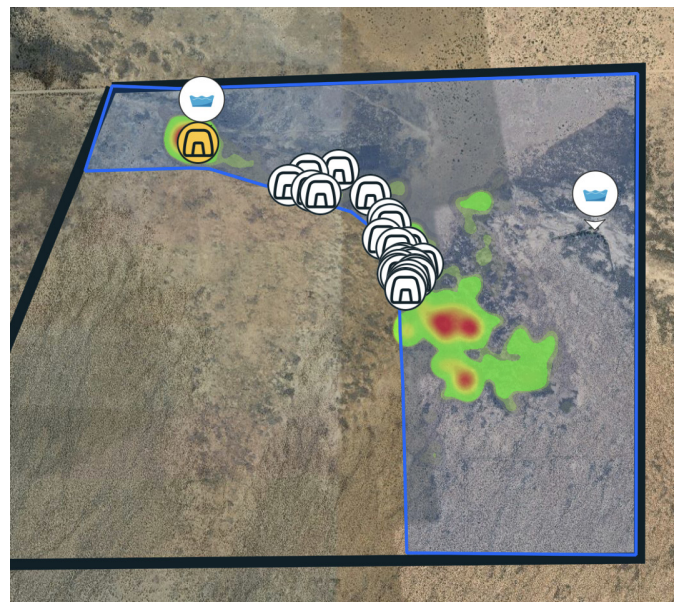
*Trials conducted at New Mexico State University's Chihuahuan Desert Rangeland Research Center

**December 2022 †Features vary by product

Short duration (3-6 day) pen feeding trials were successfully used to train and familiarize Brangus cows to the NoFence collar system:



Animal positions 24 hours before (left) vs. 24 hours after (right) activation of virtual fence show that cows quickly learned to interact safely with the virtual fence boundaries.



This is an example of utilizing a virtual fencing boundary (shaded blue) to keep cattle from grazing the southwest portion of this pasture (outlined in black). The water sources are indicated with blue symbols, individual cows' current locations are indicated by white circles, and the areas cows spent the most time in are indicated on a green to red spectrum in the colored areas.