

GPS TRACKING COLLARS



Sustainable Southwest Beef
Knowledge and tools for ranch and rangeland resilience

What is Precision Ranching?

Precision ranching involves the use of smart sensors for automated monitoring of livestock, stock tanks and drinkers, rainfall, and forage growth. Precision systems are fairly common in intensive animal agriculture but their use in extensive ranching operations is still in its infancy. As sensor technologies, wireless data transmission networks, and sophisticated data analytics tools become more common and less expensive, new and exciting opportunities to develop robust and relatively low cost Precision Ranching systems are rapidly emerging. Long-range wide area networks (LoRaWAN) are systems that use long-range radio frequency communication to transmit small packets of data from several moving or stationary sensors in real-time. The method is among less expensive options to collect and transmit data from large areas of rangeland and are highly suitable for use in remote locations and on extensive ranching systems.

Benefits of GPS Tracking Collars

A well calibrated, user-friendly precision ranching system could aid ranchers in making rapid decisions to address issues of animal health or welfare, thus potentially preventing losses. A precision ranching system might also help increase the operational efficiency of rangeland cow-calf systems. For example, GPS collars provide real time geolocation for all collared cattle in a dashboard interface a rancher can access from a computer or smartphone. This type of information could reduce the time it takes to locate cattle, become aware of and find escaped cattle, identify sick or injured cattle, and potentially provide a way to more closely monitor cattle during sensitive periods like calving time. A rancher might also save on fuel costs, vehicle wear and tear and greenhouse gas emissions.



GPS tracking collar worn by a Raramuri Criollo cow.

Common Applications

- Minimize time it takes to locate cattle
- Find escaped cattle
- Identify sick or injured cattle



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

Do I need to collar every single cow?

That depends on what sort of information you want. For animal welfare uses (e.g., identify a sick or injured animal), yes, you'd need to collar every cow. If you only want to know in general where the herd is, you could probably get away with just collaring a few of the "leaders".

How does the system work?

GPS trackers affixed to collars are put on cattle. The trackers use LoRaWAN (radio frequency communication) to send data long-range to receiver stations placed strategically across the ranch to maximize coverage. Each receiver station then uses WiFi or cell-service to send the data to a centralized server and dashboard that processes and prepares it to be viewed in real time. A smartphone or computer app displays the current location of each animal wearing a GPS collar.

So it does need internet/cell-service?

While the GPS collars don't need internet/cell-service to send data to the receiver stations, the receiver stations do need either internet, WiFi, or cell-service to send data to the network server before it's accessible on the dashboard app. The cow doesn't need to be in an area of internet or cell service, but the receiver station does.

What infrastructure do I need?

You will need: 1) The GPS collars; 2) one or more solar-powered receiver stations; 3) a cloud-based network server (cellular, Ethernet, satellite, or Wi-Fi); and 4) either a cell phone or internet-enabled computer to access the data on the dashboard application. Apart from the collars, this is the same set-up needed for other complimentary real-time data devices (ultrasonic water level sensor, tipping-bucket rain gauge) and one system can support all three simultaneously.

How many receiver stations would I need?

It really depends on the ranch size and terrain. Generally, somewhere in the neighborhood of 3-5 strategically placed stations. Current receiver station designs being tested include a trailer mounted design and a tripod mounted design. Both allow the receivers to be moved around to find the best coverage for your specific needs.

How much does it cost?

As with any new technology, costs are changing all the time as the market grows. The current* figures are: GPS collar: \$77 each; solar-powered portable receiver station: \$2,600 to \$5,000 each; data storage and processing subscription: one payment of \$2,300 for up to 7 receiver stations and 200 sensors, plus an annual fee of \$290 per receiver station. Sensors serviced can be mix & match (see above note on infrastructure).

*At the time of document preparation: August 2022.

Photos of typical receiver stations (also called gateways). Left is trailer mounted, right is tripod mounted:



DIGITAL RANCHING: COMPONENTS AND FLOW

