



# Cattle Producer's Handbook

Miscellaneous Section

1240

## Remote Sensing, Monitoring Equipment, and Applications for Western Ranches

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Remote sensing is the science, technology, and processes of obtaining and understanding information about objects, such as Earth, from a distance. The process of remote sensing allows observers to evaluate large landscapes or small objects using rapid and repeatable methods that would otherwise not be possible with human observers on the ground.

The practice of remote sensing can generally be attributed to any measurement or observation that is made of a distant object; however, it is commonly associated with the use of instruments, such as cameras, which record images of electromagnetic energy reflected by an object. A simple picture captured with a point and shoot camera is considered remote sensing. A rancher driving by and checking his cows without physically touching them is another form of remote sensing.

Oft times, remote sensing is thought only to be used by government scientists when collecting data from the Earth or other planets via satellites, cameras, robots, or sensors. These applications are often expensive, highly sophisticated, and require special skills to operate the equipment, however, recent remote sensing advancements provide practical, cost effective monitoring solutions for common ranching issues. Remote sensing equipment and applications, which provide cost effective and convenient monitoring solutions on western ranches, is introduced below.

### Remote Sensing and Monitoring Equipment

Collecting specific data may be accomplished by cell phone, satellite radio, spread spectrum radio, and data loggers. This equipment transmits data from the monitoring site to a computer or website, which can be viewed by the rancher. Each system has its own advantages and disadvantages. Power is required at each sensing location and is provided by batteries, the local electrical company, or solar power generation.

#### Cell Phone

Cell phone remote sensing requires having a cell phone plan and, of course, mobile phone coverage in the area where the equipment will be stationed. Cell phone remote sensing technology is moderately expensive, less expensive than satellite radio, yet more expensive than spread spectrum radio. Keep in mind that cell phone plans transmitting only data are much cheaper than voice/texting plans.

#### Satellite Radio

The advantage of satellite radio remote sensing technology is the capability of installation at any location with a clear view to the sky. Satellite radio is the most expensive, but it is cost effective for many applications. Also, it may be the only option for some locations. Satellite radio is best suited to remote sites that have unreliable or no cell phone coverage and sites in rough country with no line of site between stations.

#### Spread Spectrum Radio

Spread spectrum radio is the least expensive compared to the previous two options for remote sensing. However, the major disadvantage is that data are transmitted from radio to radio and require radios to be in line of site of each other. Unfortunately, spread spectrum radio does not work well in rough terrain.

#### Data Logger

Another remote sensing system is called a data logger. Data loggers are programmed to record and store data obtained from sensors. Essentially, they are mini-computers that retrieve and store information. However, the data logger does not transmit the data to a website or computer, but rather the rancher must retrieve a report from the data logger and manually download the report to a computer (Fig. 1). Of course, the main limitation for data loggers is that the rancher must travel to the site to obtain the data. Data loggers are usually inexpensive.