Evaluating Virtual Fencing and Satellite Imagery for Precision Grazing

Funded by the Montana Ag Experiment Station

Project Overview

This project will explore use of satellite imagery to estimate biomass availability in rotationally grazed rangelands, with cattle grazing managed by a virtual fencing (VF) system.

Technology Used

Virtual Fence – Halter™ system

- GPS-enabled collars to control cattle movement within virtual fence boundaries drawn in software
- Collars deliver auditory, vibration, and electrical cues to contain and move cattle in pastures
- Base station to transmit and receive data between software and collars

Remote sensing for biomass estimation

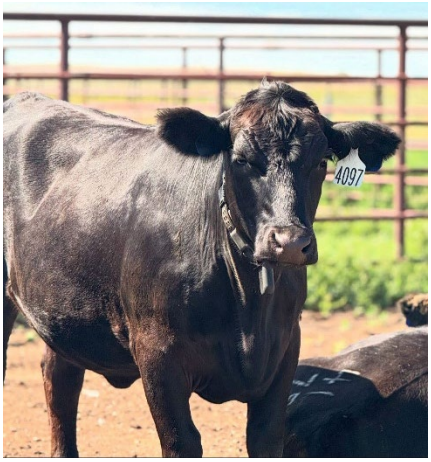
- **Satellite imagery**
  - Used to estimate biomass on large areas of land
  - Two sources with differing resolution used: PlanetScope and Sentinel-2
- **Drone imagery**
  - Greater resolution than satellite images, will be used to see if biomass estimates are improved

Benefits of Virtual Fence

- **Land**: Protect sensitive areas of pasture, designate access point to water to reduce bank erosion
- **Livestock**: Improved animal welfare with real-time monitoring
- **Producer**: Reduced labor requirements associated with physical fence; greater control and flexibility of livestock movement
- **Wildlife**: Improve movement through landscape by removing physical fence barriers

Study Design:

- 46 yearling heifers equipped with Halter VF collars
- Duration: 25-day period, 5 days in 5 paddocks each
- **Data collection:**
  - Forage samples from grazed/ungrazed pastures for biomass measures
  - Imagery from PlanetScope, Sentinel-2, and drones
  - Forage data will be used to calibrate biomass estimation models



Heifer wearing Halter™ virtual fence collar. Photo: Paige Browning, Research Associate

Project Objectives:

- Develop a biomass prediction model using satellite imagery
- Assess forage use and grazing patterns with virtual fence system
- **Future goal: Integrate virtual fence and satellite imagery for precision grazing management**

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