

Precision Agriculture

Testbed Site Field Guide

Headwaters Tech Hub (HTH) Testbeds offer distinct environments, including varied terrain, controlled settings, and advanced connectivity, designed to help partners test and demonstrate near-commercial products in real-world conditions. These testbeds specialize in smart photonic sensing systems with applications in natural resource management, national defense, precision agriculture, wildfire resilience, and disaster prevention.



Ag-Tech
Validation



Sensor
Calibration



IoT Network
Testing



Crop Breeding +
Stress Analysis



20–75
Bushels/Acre



Thermal + Multispectral
Drone



Livestock
Integration



IoT + AI Platform
in Progress



12,000 MAES Acres
for Scalability

FIELD GUIDE HIGHLIGHT

Lutz Farm and Red Bluff Ranch's variability and networked expansion make them ideal for long-term ag-tech trials and climate zone replication across Montana.

LUTZ FARM & RED BLUFF RANCH

Lutz Farm

- Precision Agriculture | Sensor Development | Real-World Crop Validation
- Close proximity to Montana State University and Bozeman, MT
- Farm: 600 acres + 12,000 acres via MAES
- Irrigated and drylands, varied soils (20–75 bushels/acre)

Red Bluff Research Ranch

- Near Norris in Madison County, MT
- 10,803 acres
- Rangeland with cattle and sheep, limited hay meadows along the valley bottoms
- Varied soil & elevation 4,600- 6,200 ft



KEY CAPABILITIES

- Controlled-stress crop zones
- Precision irrigation on 40 acres
- Wildlife exclusion fencing
- LoRaWAN integration
- Wi-Fi towers
- Real-time data analytics and ML capabilities

MAES Expansion Sites Include:

- Red Bluff Ranch: Forests, meadows, 200 cattle, 500 sheep
- Northern Ag Research Center: 6,960 acres total, cold climate
- Access to world-class researchers

Lutz Farm & Red Bluff Ranch

Controlled-Stress Testing Environment

Montana State University



600-Acre Research Farm with Crop & Livestock Systems

Realistic agricultural setting for tech validation in both crop and animal agriculture, including stress zones.



Controlled-Stress Crop Environments

Perfect for validating precision ag tools and crop breeding technologies under varied growing conditions.



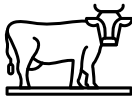
Planned LoRaWAN & Real-Time Analytics Integration

Connect, monitor, and analyze field data using IoT sensors and upcoming machine learning platforms.



UAV Remote Sensing with Multispectral & Thermal Payloads

Capture crop health and soil data from the air for precision validation and long-term research.



Integrated Livestock & Cropping Systems

Develop full-cycle agricultural technologies that account for interdependent systems and real-world complexity.



Montana Agricultural Experiment Station (MAES) Network Access

Expand research to 12,000+ acres across diverse climates—ideal for replicated trials and regional testing.

FIELD-TESTED VALUE

Lutz Farm and Red Bluff Ranch are highly adaptable agricultural testbeds focused on precision ag, crop innovation, and real-world product validation. Located close to Montana State University, the 600-acre farm and 10,803-acre ranch features diverse soil types, irrigated and dryland fields, and integrated livestock systems. With built-in stress

zones and cutting-edge remote sensing tools, Lutz Farm provides a dynamic environment for controlled experimentation. Connected to the 12,000-acre MAES network, partners can replicate trials across Montana's varied climate zones—accelerating development and regional scalability of next-gen ag technologies.




Cost offsets available for projects that benefit the regional photonic sensor ecosystem.

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