DORMANT SEASON GRAZING TO REDUCE CHEATGRASS AND PROMOTE PERENNIAL BUNCHGRASSES

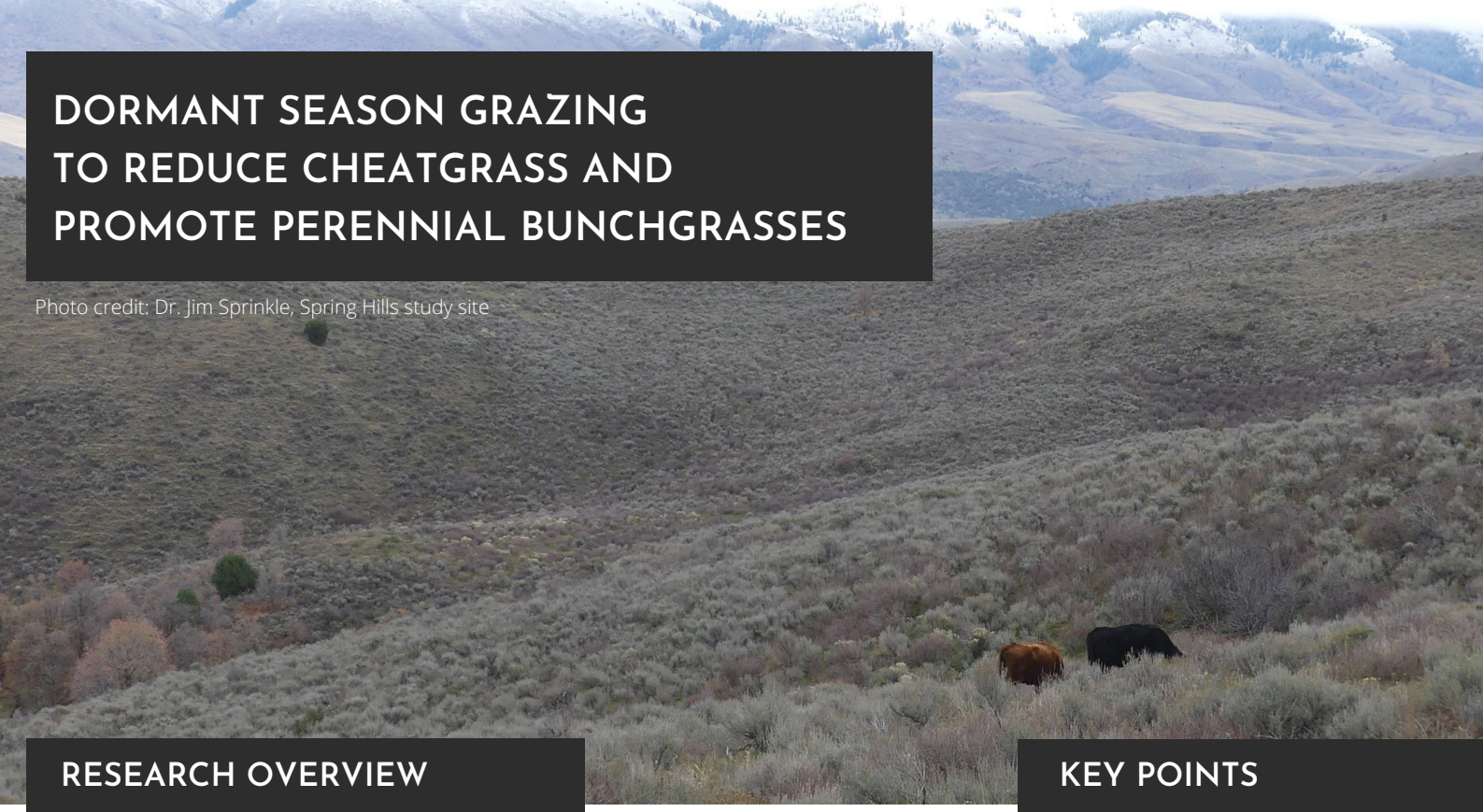


Photo credit: Dr. Jim Sprinkle, Spring Hills study site

RESEARCH OVERVIEW

The sagebrush steppe is an ecosystem that dominates western landscapes and faces many threats including non-native annual grass (e.g., cheatgrass and medusahead) invasion and increased frequency and size of wildfires. Livestock grazing has been suggested as a tool to reduce invasive grasses and promote sustainable native plant communities on rangelands. Additionally, livestock grazing has been shown to change the structure (e.g., reduce the amount of litter found within the bunchgrass plant) and spatial arrangement of fuel loads, leading to altered fire spread within a landscape.[1,2]

During the growing season, defoliation reduces photosynthetic tissue and excessive use may alter competitive interactions between grazed and non-grazing plants. Dormant season grazing, which occurs when the perennial herbaceous vegetation is not actively growing has been shown to have little or no impact on perennial bunchgrasses and other native plants.[3] Winter annual grasses, such as cheatgrass and medusahead, often germinate in the late-fall, winter, and/or early spring when native perennial vegetation is dormant. Hence, by using dormant season grazing it may be possible to negatively influence invasive annual grasses by reducing photosynthetic tissues hindering the development of seed and reducing plant litter, ultimately shifting the competitive balance to favor native perennials.

This on-going research examines the value and impact of rangeland management through dormant season grazing practices, along with the benefits and costs to apply dormant season grazing.

KEY POINTS

- Dormant season grazing which occurs when the perennial herbaceous vegetation is not actively growing has been shown to have little or no impact on perennial bunchgrasses and other native plants.[3]
- Because of the massive scale of annual grass invasion, current management techniques such as herbicide application, are economically and ecologically limited. Hence, grazing has been suggested as a viable tool to increase resilience to fire and resistance to invasive annual grasses.[4,5]
- **This research will examine the value of dormant season grazing to restore degraded rangelands and identify grazing methods that have both ecological and economic value.**

STUDY SITES AND EXPERIMENTAL DESIGN

The study sites are located in the Mink Creek drainage three miles south of Pocatello (Lead Draw) and approximately three miles northeast of Malad City (Spring Hills), Idaho (Fig. 1). The plots (14 total) are laid out to accommodate four different grazing treatments (Fig. 2) that were randomly assigned within each plot and include: 1) non-grazed, 2) spring grazed, 3) fall grazed, and 4) spring + fall grazed. Non-grazed plots will serve as the control. Spring grazed are only grazed during the spring, fall grazed are only grazed during the fall, and spring + fall grazed occur during both seasons. The plots are 50 x 50 m with each treatment being 25 x 25 m. Electric netting fencing is being used to exclude cattle according to the treatment prescription. The sampling area is buffered from the outside edge to limit disturbance effect of the fencing.

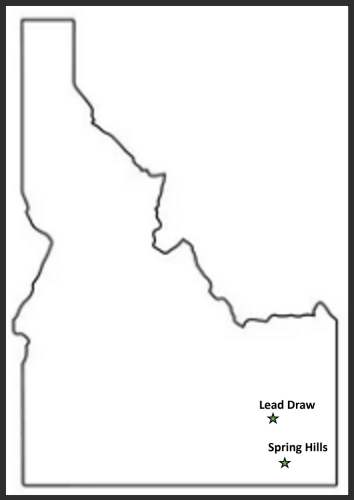


Figure 1. Study sites

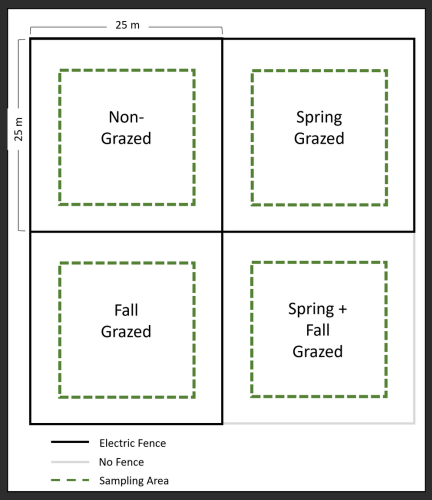


Figure 2. Plot diagram with the four treatments, sampling area, and fencing design

RESEARCH OBJECTIVES AND UPDATES

Objective 1: Determine if dormant season cattle grazing can be used to: 1) reduce the abundance of invasive annual grasses, 2) reduce fine fuels and subsequently lower fire risk benefiting less fire-adapted native plant species, and 3) promote the recruitment of perennial bunchgrasses by taking advantage of phenological differences between native and invasive annual grasses.

Research Updates: Vegetation and fuels data (plant cover, density, frequency, gap, and herbaceous biomass) were collected during the summer of 2020 and 2021. Below is a summary of perennial bunchgrass and annual grass biomass (Fig.3). Please note that with only two years of data we cannot contribute positive or negative change to livestock management and/or climate patterns.

At Lead Draw, perennial bunchgrass was not different between 2020 and 2021. However, in the spring grazing treatment there was a decrease in perennial bunchgrass biomass of 114 lbs/ac. At Spring Hills, perennial grass biomass increased by an average of 40 lbs/acre across all treatments. At Lead Draw, annual grass biomass decreased in all treatments. Annual grass biomass also decreased at Spring Hills in the no graze, spring grazed, and spring+fall grazed plots but increased in the fall grazed plots.

It is interesting to consider that the changes in perennial grass and annual grass biomass are consistent whether grazed or not grazed. Multiple variables (e.g., precipitation and timing) will be included in all future analyses.

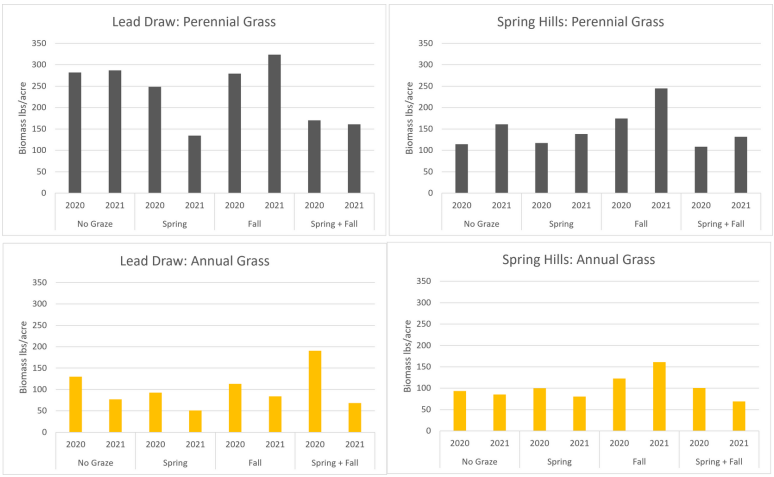


Figure 3. Perennial grass (grey) and annual grass (yellow) biomass at Lead Draw and Spring Hills by treatment (no graze, spring, fall, and fall + spring) for two years (2020 and 2021).

Data will continue to be collected through 2024.

Literature Cited

1. Davies, K.W., C.S. Boyd, J.D. Bates, and A. Hulet. (2015) Dormant season grazing may decrease wildfire probability by increasing fuel moisture and reducing fuel amount and continuity. International Journal of Wildlife Fire 24:849-856.
2. Launchbaugh, K. and J. Walker. (2006) Targeted grazing—a new paradigm for livestock management. Targeted grazing: a natural approach to vegetation management and landscape enhancement. Centennial, CO, USA: American Sheep Industry Association. P 2-8.
3. Davies, K.W., A.M. Nafus, C.S. Boyd, A. Hulet, and J.D. Bates (2016) Effect of using winter grazing as a fuel treatment on Wyoming big sagebrush plant communities. Rangeland Ecology and Management 69:179- 184.
4. Schmelzer, L., B. Perryman, B. Bruce, et al. (2014) CASE STUDY: Reducing cheatgrass (Bromus tectorum L.) fuel loads using fall cattle grazing. Applied Animal Science 30:270-278.
5. Svejcar, T., J. James, S. Haregree, and R. Sheley. Incorporation plant mortality and recruitment into rangeland management and assessment. Rangeland Ecology and Management 67:603-613.

Objective 2: Develop measurable metrics that will be used to indicate when livestock grazing should be initiated and discontinued to accomplish management objectives.

Research: To develop metrics to better manage dormant season grazing, efforts are being made to predict cheatgrass green-up using localized weather (ambient air temperature and precipitation) and soil (soil temperature and soil moisture) data (Fig. 4), photographs, and remotely sensed large-scale NDVI predictions.

Figure 4. Weather station and soil sensors.

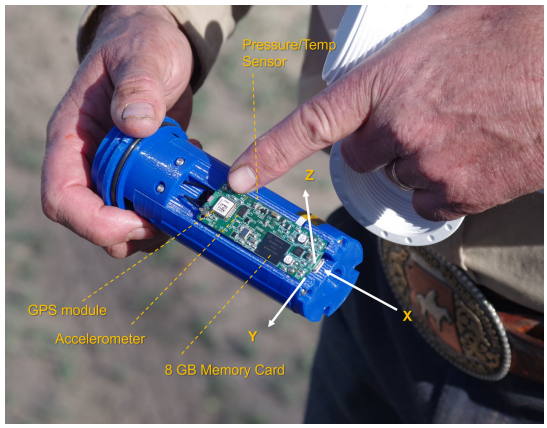


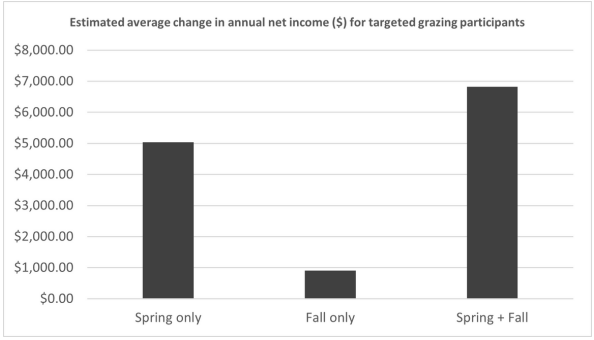
Figure 5. Example of cattle collar.

Cattle Behavior: To better understand how cattle are utilizing the Spring Hills pasture, 34 cows of various ages were collared in October 2021 with GPS units to track real-time locations within the allotment, and accelerometers (Fig. 5) to monitor cattle behavior, including resting, grazing, and walking. Cattle utilized a large portion of the pasture (including research study sites). This work will be repeated in fall 2022.

Objective 3: Determine economic outcomes for individual users of public lands using a ranch-level economic model to determine the trade-offs faced by: 1) participants in early- and late-season grazing, and 2) summer allotment permittees.

Objective 4: Determine how ecological conditions translate into ecosystem service value for multi-use public lands. Estimate the changes in long-term net benefits and provisioning of public goods as a result of targeted grazing outcomes.

Research Updates: To estimate the economic outcomes to producers who participate in spring and fall grazing we simulated a ranch-level economic model parameterized to represent economic conditions faced by producers in southeastern Idaho, dormant season forage availability, and relevant costs of participating in targeted grazing. We estimate that dormant season grazing can increase annual income, but the magnitude of our results vary by timing (spring versus fall).



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