South Dakota State University
Department of Animal Science

Beef Day 2020

Cow/Calf

Heavy winter patch grazing as an alternative to prescribed burning on the Northern Great Plains

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Objective

Among management systems intended to increase heterogeneity on the landscape, patch burn grazing (PBG) is by far the most prominent and researched method. Though prescribed burning is seen as a healthy disturbance in grassland ecosystems, many landowners in the Northern Great Plains have an aversion to fire. This is due to safety and liability concerns as well as concerns over forage losses and limitations of labor, equipment, and insurance to successfully carry out prescribed burns. Therefore, there is a critical need to evaluate alternative, non-fire management strategies that will encourage rangeland heterogeneity. A study was conducted in 2017-2018 at the Cottonwood Field Station in southwest South Dakota to test the effectiveness of heavy winter patch grazing to simulate fire. The objectives of this study were to determine the extent to which WPG can serve as an alternative management strategy to patch burn grazing to 1) increase vegetation structural heterogeneity and 2) alter livestock grazing behavior to maintain structural heterogeneity through time.

Study Description

The study occurred on the SDSU Cottonwood Field Station. Following a wildfire in October 2016 at the field station, the study included three pastures each containing three treatments: a winter grazed patch (WPG), a burned patch (PBG), and an ungrazed control patch (CG). Within each pasture, WPG patches were created by intensively grazing cows during the dormant season in winter of 2016-2017 to reduce standing dead forage to mimic the effects of fire. Vegetation height transects in the spring and satellite imagery converted to NDVI were used to assess the impact of treatments on vegetation structure and greenness. Pastures were grazed by yearling steers in the summer of 2017 and 2018, a subset of which were outfitted with GPS collars to determine grazing locations. Grazing preference indexes were calculated for each treatment in each pasture. Vegetation height, NDVI, and grazing preference index data were analyzed as a random block design with pasture as a block and treatment as a factor. For grazing preference data, an additional factor of time (month) was included in the analysis to test for changes in grazing preference over a season.

Take home points

WPG significantly reduced standing dead vegetation structure by 65% compared to the CG treatment ($P < 0.001$). In 2017 and 2018, both the WPG and PBG had significantly higher NDVI values compared to the CG treatment ($P < 0.05$), however no difference was observed between

the PBG and WPG treatments in both years ($P > 0.05$). Satellite imagery results suggest similar spectral signatures were created by the PBG and WPG treatments, and the treatment effects carried over for 2 years post-disturbance. Analysis of livestock grazing preference showed a significant treatment x time interaction in 2017 ($P < 0.001$) and a significant treatment effect in 2018 ($P < 0.001$). Results show winter patch grazing was effective in creating structural heterogeneity on the landscape; however, livestock showed a higher preference for burned areas over the winter patch when given the choice. In both years the CG treatment was the least preferred area for grazing. Given the unlikelihood of having both treatments in a management strategy, results of this study show heavy winter grazing can be used as a surrogate for fire to create structural heterogeneity and shift grazing on the landscape.

Acknowledgements

This research was supported by the SD Agricultural Experiment Station and by grants awarded to South Dakota State University from the USDA NIFA-AFRI (Grant # 2017-67020-26511) and NCR-SARE (Grant # 2015-38640-23781) programs. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors(s) and do not represent the policy or position of SDAES or the USDA.

Keywords: heterogeneity, livestock grazing, patch burn grazing