

Grazing Practices Foster Diverse Grassland Habitat



In Brief: Targeted forage utilization goals, decreased stocking density, and larger pastures can produce diverse (heterogeneous) grassland structure, which many grassland-dependent wildlife species require to meet their seasonal habitat needs. A new study tests the effect of these grazing strategies on lesser prairie-chicken habitat selection. The results suggest that heterogeneity-based grazing management has the potential to balance the objectives of livestock operations with lesser prairie-chicken conservation.

Adjust Grazing Strategies to Produce Good Lesser Prairie-Chicken Habitat

Research has shown that pyric herbivory, more commonly called patch-burn grazing, is a critically important, cost-efficient management tool for creating the diverse grassland structure that lesser prairie-chickens need. But in the semi-arid southern Great Plains, range managers need a variety of strategies in their toolbox to adapt effectively to the region's extreme weather conditions, such as high winds and drought, which may interrupt or preclude prescribed fire.

Past research has shown that intensive grazing management (standardized forage utilization goals, smaller pastures, and short-duration grazing periods) can harm grassland ecosystem function (Fleischner 1994), and that producers can increase grassland structural diversity by adjusting stocking density, pasture size, and deferment length. A recently released study is the first to assess whether these heterogeneity-producing grazing strategies have a significant effect on lesser prairie-chicken habitat selection.

The new research shows that non-breeding lesser prairie-chickens preferred grasslands with 35-45% forage utilization and that use steadily declined when forage utilization topped 50%. Breeding females placed all nests in pastures with less than 40% forage utilization, and the greatest number of nests



Livestock on one of the Kraft et al. study sites. Past research has shown that reduced stocking density, increased pasture size, and shorter deferment periods can increase grassland structural diversity (Adler and Lauenroth 2000, Fuhlendorf and Smeins 1999, Barnes et al. 2008). The new research by Kraft et al. tests whether lesser prairie-chickens utilize the diverse habitat these practices create. Photo: John Kraft.

were placed on sites with forage utilization between 0 and 20%. As grazing pressure increased, daily nest survival fell.

Using computer modeling, researchers then investigated how lesser prairie-chickens utilize grasslands managed with grazing strategies known to increase structural diversity. They found that, regardless of the forage utilization value, lesser

prairie-chicken habitat use increased significantly with lower stocking densities, and that larger pasture sizes increased habitat use. The influence of deferment during the growing season is likely dependent on site-specific characteristics, such as plant species composition and precipitation. Their findings have important implications for range management within the lesser prairie-chicken's active range in the southern Great Plains.

Defining Terms

Stocking density is the concentration of grazing animals in a given area.

Grazing pressure is relationship between the number of grazing units, the allotted acreage for each grazing unit during a grazing period, and the length of the grazing period.

Forage utilization is the portion of available forage consumed or trampled by livestock in a given area.

Example: If you have 100 cows on a 100-acre pasture, the stocking density is 1 cow/acre. If that pasture is divided into 10 paddocks of 10 acres each, and all the animals placed within one paddock, stocking density increases 10-fold. The ultimate determinate of grazing pressure is length of the grazing period.

Key Grazing Strategies

The research team, led by John Kraft of Kansas State University, focused on two study sites in western Kansas—one within the shortgrass prairie/CRP mosaic ecoregion in northwest Kansas, and the other within the mixed grass prairie ecoregion in southwest Kansas.

The team found that applying two interrelated grazing practices—decreased stocking density and increased pasture size—can encourage the kind of structural diversity lesser prairie-chickens need. It appears that both long and short deferment periods offer advantages to lesser prairie-chicken habitat quality, depending on geographic location. Researchers hypothesize that shorter deferment periods are more advantageous in areas with relatively high annual biomass production and greater plant species diversity.

Stocking density is the most significant ecological driver in this process. When lightly stocked, livestock don't compete for high-quality forage and avoid low-quality forage, resulting

in a variety of vegetative structure across the pasture. High stocking densities have the opposite effect, reducing vegetative structural diversity.

Larger pastures compound the beneficial effect of lighter stocking density on grassland structural diversity. The larger the pasture, the greater the inherent variability in soils, plant communities, and so on. These variations naturally encourage greater vegetative structural diversity. Because lesser prairie-chickens have varied habitat needs, increasing pasture size increases the chance that the pasture will meet particular seasonal requirements for nesting, brood rearing, or over-wintering habitat. Researchers believe there may also be compounded habitat benefits when relatively large pasture size and low stocking density are implemented in unison within the same pasture.

Ranch managers on Kraft's study sites generally rotated cattle through various pastures while keeping herd size and forage utilization goals constant. In such a management scenario, the larger pastures, by default, experienced lower stocking densities and required longer grazing periods (decreased deferment) to meet forage utilization goals. However, results also indicated benefits of short grazing periods (longer deferment). Researchers believe there could be negative impacts to habitat if rangeland is managed long-term without the incorporation of longer deferment events. Due to the relatively short duration of the study, these effects could not be investigated.

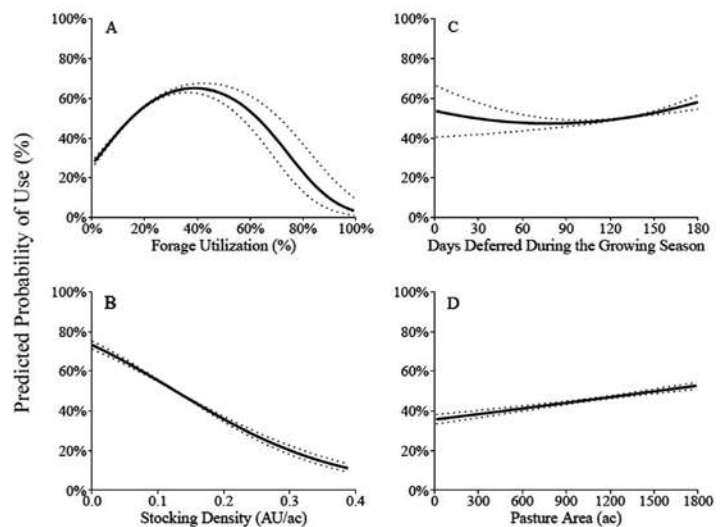


Figure 1. Relative probability of use response curves for non-breeding habitat selection by female lesser prairie-chickens within monitored rangelands grazed by cattle, 2013-2015 in western Kansas (Kraft et al. 2018). B and D show that lesser prairie-chickens were more likely to use habitat with decreased stocking density, increased pasture size, and both short and long deferment periods.

Overall, the research team’s results suggest that lesser prairie-chickens select a gradient of grazing disturbance ranging from light (0-25% forage utilization) to moderate (25-50% forage utilization). Ecological needs, such as nesting structure or brood foraging, dictate which level of grazing disturbance is superior at a given time. Due to these variable habitat needs, grazing management that maintains structural diversity is important.

Results also indicate that lesser prairie-chicken nest success declines when grazing pressure increases beyond moderate forage utilization across the range. Researchers believe this pattern can be alleviated by maintaining structural diversity and lightly grazed habitat through heterogeneity-based grazing strategies and a mix of light-to-moderate grazing pressure objectives across pastures.

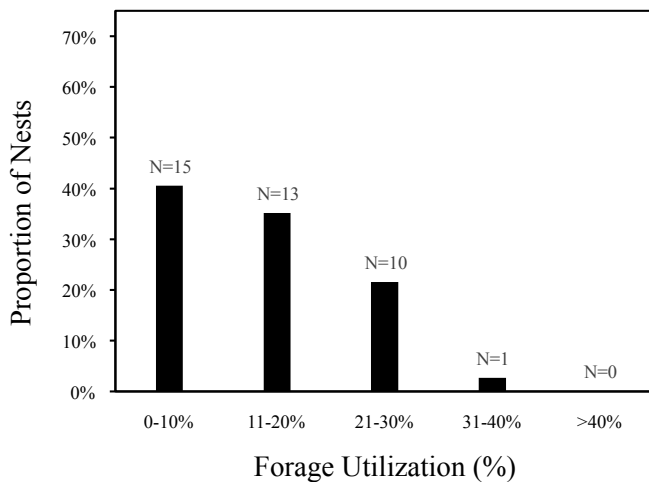


Figure 2. In the Kraft et al. study, female lesser prairie-chickens were most likely to nest in sites with 15-25% forage utilization.



Female prairie-chickens nest in habitat with tall, dense vegetation, then move their broods to habitat with more insect-rich forbs and more bare ground, which allows for greater mobility for chicks. When range management does not create adequate grassland structural variety to meet changing seasonal needs, lesser prairie-chicken populations decline (Hagen and Elmore 2016). Photos: David Haukos.

Implications for Management

Heterogeneity-based grazing management, when done carefully, can balance livestock production and lesser prairie-chicken conservation.

Stocking density is a crucial indicator for maintaining or improving lesser prairie-chicken habitat. Many ranchers have adopted intensive grazing management practices in which pastures are subdivided into smaller paddocks. This increases stocking density and reduces the quality of the resulting habitat for lesser prairie-chickens. Range managers can reduce stocking density by selectively removing cross fencing to make pasture areas bigger, shifting toward a continuous grazing system. While there is much debate on the merits of rotational and continuous grazing systems, the superiority of one system over another in terms of livestock production and ecosystem health is not widely accepted among professionals.

In rangelands that already have the diverse vegetative structure that lesser prairie-chickens require, range managers can maintain large-scale (i.e., across pastures) heterogeneity through a mix of low-to-moderate forage utilization goals between pastures. Small-scale heterogeneity (i.e., within pasture) can be maintained by implementing low stocking densities, greater pasture areas, and shorter deferment periods. In rangelands where vegetative structure suitable for nesting is limited, or where the most important grass species for nesting are also among the most palatable, longer deferment and rest-rotation may be needed to restore or create advantageous vegetative structure. Further, periodic, year-long deferment is likely essential to maintain the integrity of grazed lands regardless of plant community composition.

Management Recommendations

Note: These recommendations are drawn from the body of existing research on lesser prairie-chicken ecology and response to grazing management, including but not limited to the Kraft et al. research. The average forage availability within the Kraft et al. study’s field site was approximately 2,600 lbs/acre. Please use this context when considering the recommended forage utilization values below.

Lesser prairie-chicken habitat varies widely across the four eco-regions of the southern Great Plains. Grazing management strategies must be developed and implemented site specifically with locally relevant information on forage availability, precipitation, plant species composition, etc.

Goal: Create/Maintain grassland structural variation (heterogeneity) in rangelands

- Forage utilization should vary across ranch pastures to encourage vegetation heterogeneity that will meet lesser prairie-chicken seasonal habitat needs.
- Stocking densities should be kept as low as infrastructure and resources allow.
- Pasture size should be as large as resources and grazing management objectives allow.
- Forage utilization should not exceed 50% in any pasture, regardless of stocking density or pasture area.
- Potential negative impacts of long grazing periods associated with low stocking densities and large pastures should be mitigated via adaptive management (e.g., periodic year-long deferment, uniform distribution of water/mineral).

Objective: Improve Nesting Cover for Lesser Prairie-Chickens

- Nesting females seek habitat with tall, dense vegetation that offers good hiding cover. Aim for 10-25% forage utilization in areas capable of producing nesting structure.
- If the potential for nesting structure is limited or inconsistent due to the plant community or precipitation, preserve available nesting habitat through targeted deferment or forage utilization <15%.
- While preserving available nesting habitat, heavier grazing elsewhere on a property may be a necessity to grazing operations. Relatively intense forage utilization objectives (>40%) should be periodic (no more than every other year). Heavily grazed pastures should be monitored carefully and negative impacts to the plant and soil community should be avoided.
- In regions similar to the Kraft et al. study area, grazing pressure of 0.31 AUM/acre should favor above-average nest success and will encourage a stable or growing population. To reduce grazing pressure, reduce stocking density by increasing pasture size and adjusting deferment duration.

Objective: Improve Brood-rearing Habitat for Lesser Prairie-Chickens

- Females with chicks utilize grassland habitat with greater disturbance, more open understory, and more forbs than on nesting sites. Aim for 30-45% forage utilization.
- Utilize heterogeneity-based grazing strategies to create structural diversity and a matrix of brood habitat interspersed with nesting cover.
- Avoid aerial herbicide applications that limit the presence of “weeds” in pastures. Instead, use spot-spray techniques for invasive plant species management.

Source

Kraft, J.D., D.A. Haukos, M.R. Bain, M. Rice, S. Robinson, D.S. Sullins, C.A. Hagen, J. Pitman, J. Lautenbach, R. Plumb, J. Lautenbach. 2018. In review. Sparser Herds, Larger Pastures, and Imperiled Birds: Heterogeneity-Based Grazing Management is Essential for a Heterogeneity-Dependent Grassland Bird.

Additional Resources

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Barnes, M.K., B.E. Norton, M. Maeno, and J.C. Malechek. 2008. Paddock size and stocking density affect spatial heterogeneity of grazing. *Rangeland Ecology and Management* 61:380-388.

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Suggested Citation

Lesser Prairie-Chicken Initiative Science to Solutions Series Number 6. *Grazing Practices Foster Diverse Grassland Habitat*. 2018. 4pp.

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Learn More

The Lesser Prairie-Chicken Initiative, led by the USDA's Natural Resources Conservation Service, is a partnership-based, science-driven effort that uses voluntary incentives to proactively conserve America's western rangelands, wildlife, and rural way of life. To learn more, visit www.lpcinitiative.org.