NORTH DAKOTA– Drought Management Impacts on Grassland Growth & Production

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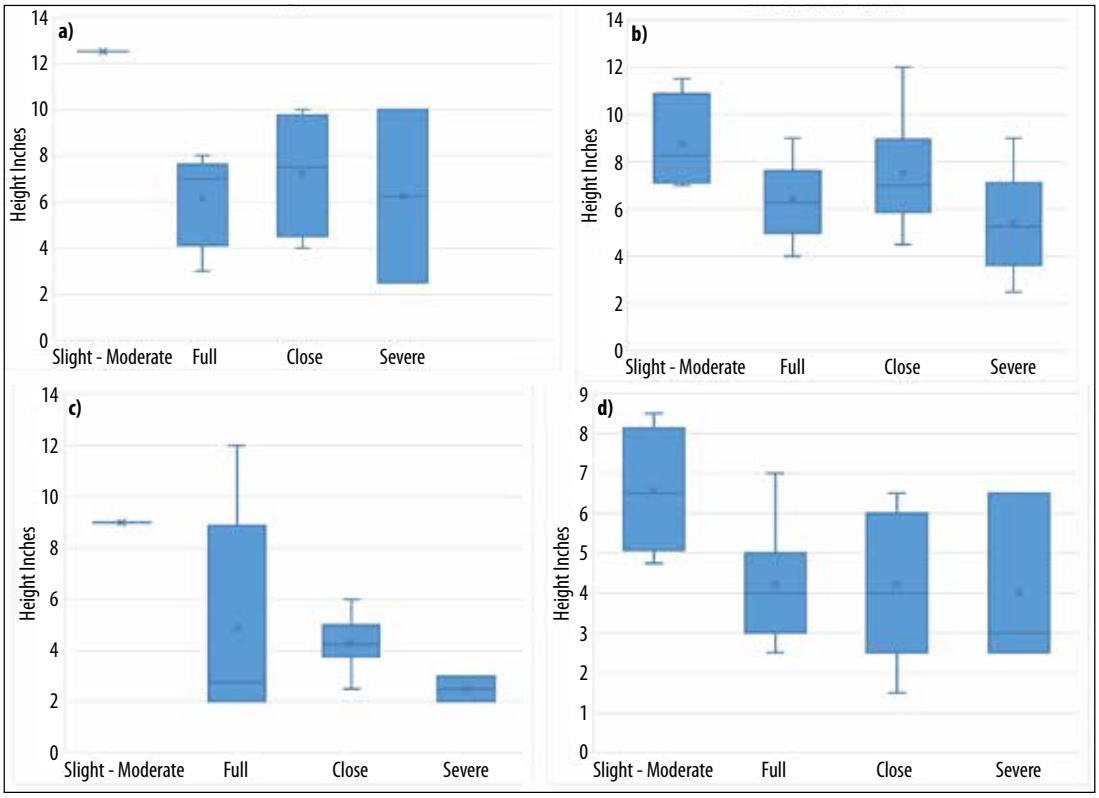
Fall grazing management can have significant impacts on forage production during the next growing season. Northern Plains grasslands are dominated by cool-season grasses (≥85%). These grasses can develop fall tillers, having a direct impact on plant growth the next year. Most tiller development takes place late August through early October, and again in April and May. Plants initiate spring growth from fall tillers. If these are eaten or die due to drought, spring growth must occur from new tillers developed in April and May. If grazed below the growing point in the fall (between bottom two leaves), they usually will not survive the winter. Drought stress affects survival, not allowing buds to come out of dormancy, or causes death to tillers that did grow. If they do not establish or survive the fall, a delay in development will occur the following season since new tillers will need to develop in the spring. Following the 2017 drought, NDSU Extension found tiller development in the spring occurs 2-4 weeks later than the previous year's carry-over tillers.

NDSU Extension launched a program evaluating impacts of grazing intensity on grassland production following the 2021 drought. The goal was to demonstrate the impact of grazing during the drought on grassland growth and development during the subsequent spring (2022) to facilitate drought planning and enhanced climate resilience.

This spring, we evaluated drought management impacts to grassland growth and production at 38 locations in 10 counties. Samples were classified based on county and degree of use. In the fall of 2021, degree of use was classified using a visual assessment adapted from Dyktserhuis (1951) that includes four categories: Slight to Moderate (<40% use); Full (40-60% use); Close (60-80% use); and, Severe (>80% use). From April 8 - June 2, 2022, growth of key grass species (crested wheatgrass, smooth brome, Kentucky bluegrass, western wheatgrass) was monitored weekly and documented as average grass height in inches. Prior to grazing initiation (May 26 - June 17), clipping to ground level was completed at 3 plots and samples were air dried and weighed to determine average production by location. Analysis was completed for growth and production at the end of the monitoring period.

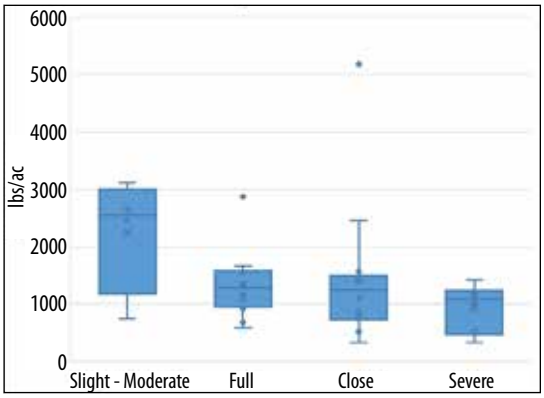
Figure 1. Growth of a) crested wheatgrass, b) smooth brome, c) Kentucky bluegrass, and d) western wheatgrass expressed as height in inches by degree of use.



Growth of key grass species was influenced by degree of use during drought. Across all species, the highest growth occurred at sites with slight to moderate use and the lowest at sites with severe use (Figure 1). Delay was likely caused by tiller mortality or a loss of plant vigor in the fall of 2021 from high grazing use that removed the growing points or reduced plant vigor of the cool-season grasses evaluated. Plants with tiller mortality are forced to use energy stored in their roots to grow new spring tillers, delaying

spring growth and negatively impacting growth and production potential. Forage production followed a similar trend (Figure 2). Slight-to-moderate-use sites had the greatest production (median of 2,548 lbs/ac). Full- and close-use sites were similar (medians of 1,275.8 and 1,250 lbs/ac, respectively). This similarity is likely due to an outlier site with close use reporting much higher production than the other sites at 5,175 lbs/ac. Severe-use locations had 57% reduction in production when compared to slight to moderate use (median of 1,090.8 lbs/ac).

Figure 2. 2022 forage production expressed as lbs/ac by degree of use.



Management decisions during drought can have long-term impacts on forage growth and production. Failure to reduce stocking rates and/or the length of the grazing period result in overuse. Severe use, especially in fall, can result in tiller mortality by growing point removal or physiological stress to cool-season grasses. Tiller mortality can delay growth of cool-season grasses the following season, and reduce growth and overall forage production. Results demonstrate the importance of a drought management plan with well-defined trigger dates to reduce long-term impacts to grazing resources and the ability to make timely decisions during a drought, reducing overall risk and related losses.