

# How Does Grazing Management Affect Pasture Productivity, Plant Morphology, and Persistence?

## Part 1 - Extent of Grazing



WISCONSIN GRAZING LANDS CONSERVATION INITIATIVE GRANT PROGRAM

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### Research Brief

#### #4

How does grazing using the “take half-leave half” rule actually affect both annual pasture productivity? How does productivity change when mature grasses are “mob-grazed”, a management alternative to grazing at a vegetative stage? What are the potential impacts on future grass growth (both above- and below-ground) and persistence?

A range of grazing management systems at the U.S. Dairy Forage Research Center was implemented on existing 1.0 acre paddocks of orchardgrass, meadow fescue, reed canarygrass, and quackgrass that had been rotationally grazed for two years. Within each paddock, two experiments were conducted in 2009 and 2010. One investigated how time of grazing (spring, summer, and fall) effects grass growth and a second investigated how the extent of grazing effects grass growth. This paper will report on the extent experiment.

In the extent of grazing experiment (for only those plots in which 50 or 100% of the biomass was removed), environmental factors such as soil temperature, soil moisture, available light (LAI), inorganic nitrogen concentrations, and net N mineralization rates were also measured throughout the growing season. These environmental factors were later evaluated as potential mechanisms for significant differences in productivity (both above- and below-ground net primary productivity, ANPP and BNPP, respectively) across each management strategy. Below-ground growth was measured in these plots with the use of root in-growth cores (installed in spring and removed in the fall). Thus, both annual forage yield and root growth were collected.

Considerable differences were found to exist among them in both their production potential and general response to management-intensive rotational grazing techniques. While changes in extent of defoliation had no significant effect on above-ground production of orchardgrass and reed canarygrass, mature grasses produced significantly more forage annually than vegetative grasses. Maturity at grazing by extent of defoliation interactions on aboveground production were found for both meadow fescue and quackgrass. Root growth also varied across species, with no effect of treatment on root growth of orchardgrass and quackgrass.

While changes in extent of defoliation had no significant effect on ANPP of orchardgrass and reed canarygrass, leaf developmental stage at grazing resulted in mature grasses producing significantly more forage annually than vegetative grasses. Leaf stage at grazing by extent of defoliation interactions on ANPP were found for both meadow fescue and quackgrass. BNPP also varied across species, with no effect of treatment on BNPP of orchardgrass and quackgrass. Leaf developmental stage did have an effect on BNPP of meadow fescue, however, with the grazing of mature grasses producing significantly more root biomass annually than vegetative grasses. Both leaf stage and extent of defoliation affected the BNPP of reed canarygrass.

Several environmental factors were significantly affected by grazing management, but only one environmental factor presented as a possible mechanism for annual productivity changes. This factor was soil moisture, which could help explain significant changes in above-ground production and root growth for reed canarygrass, but not for other species. Reed canarygrass typically thrives in high-moisture environments, and thus favors a high soil moisture content although it is capable of tolerating a wide range of soil moisture regimes.

The Grazing Lands Conservation Initiative Grant Program is a partnership between the private sector GLCI Steering Committee, the USDA Natural Resources Conservation Service and the WI Department of Agriculture, Trade, and Consumer Protection. This series of research briefs summarizes projects funded by this program. Our mission is to expand the use of profitable, grazing-based livestock production systems that foster environmental stewardship. This is accomplished through high quality technical assistance to owners and operators of private land, university and producer coordinated research, and educational programs. For more information on the program or on the research in this Brief, contact: Laura Paine, Grazing and Organic Agriculture Specialist, WI Department of Agriculture, Trade, and Consumer Protection, (608) 224-5120, [laura.paine@wi.gov](mailto:laura.paine@wi.gov); or Rhonda Gildersleeve, Extension Grazing Specialist, University of Wisconsin-Extension, (608) 723-6243, [rhonda.gildersleeve@ces.uwex.edu](mailto:rhonda.gildersleeve@ces.uwex.edu). This summary was written by Ken Barnett with University of Wisconsin-Extension.