

**Nitrogen Fertilizer on Pasture**  
**Craig Saxe**  
**Agricultural Agent - Juneau County**  
**University of Wisconsin-Extension**



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Multiple or split applications of nitrogen have long been recommended on rotationally grazed pastures. A typical removal rate of one-half ton of pasture from a single grazing event takes out somewhere around 30 to 40 lbs of nitrogen per acre. Nitrogen applied in excess of this amount is lost through volatilization or leaching and is thus not captured in pasture re-growth. Allowing for volatilization loss, nitrogen applications in excess of approximately 50 units per acre for a single application are probably not warranted. Consequently, split applications are usually recommended. The exact timing of these applications however, are still somewhat in question.

To better address this issue, Dennis Cosgrove, UW-Extension Forage Specialist, conducted a nitrogen rate and timing study at the University of Wisconsin-River Falls Campus in 2004 and 2005. The three grass-legume mixtures used in this study were: Kentucky bluegrass (KB) and white clover, smooth brome grass (SB) and alfalfa, and orchardgrass (OG) and red clover. Nitrogen treatments were a mix of both single or multiple applications of 50 units per acre of nitrogen (as urea) on May 1, June 15 and August 1.

Results of the Trial showed that:

- 1) Kentucky bluegrass responded very poorly to nitrogen fertilization. This is likely due, in part, to significant levels of white clover in these plots. White clover is a very efficient nitrogen fixer and may have been providing adequate levels of nitrogen.

- 2) The highest overall dry matter yield resulted from three split applications of 50 units of nitrogen each or a single 50 unit application on May 1.

3) The greatest dry matter increases per pound of nitrogen applied resulted when single applications of 50 units of nitrogen were applied on either May 1 or August 1.

4) The lowest dry matter increase consistently resulted from the single 50 unit application on June 15.

5) The greatest returns per dollar spent on nitrogen were realized with the May application and the three-50 unit application. The lowest was from the June 15 single application.

6) Reductions in legume content due to nitrogen fertilization were not great. The largest reduction came from two consecutive years of three-50 unit applications.

Maximum growth rates for perennial cool-season grasses occur when temperatures are in the mid to high seventies. It stands to reason then that the greatest response to nitrogen application would come during times of relatively cool temperatures and adequate soil moisture. Based on the results of this study, the optimum time to apply nitrogen is early May and early August. Mid-June applications are not productive because grass growth is slowed by heat and drought. It is important to realize that, in early May pasture growth may already be greater than the animals ability to utilize it. In order to capture this increased growth from added nitrogen, pastures will likely need to be mechanically harvested or stocked with more animals. It's also important to recognize that this work was done at a single location in west-central Wisconsin. Application timing may need to be adjusted for pasture growth rates in other locations.

The source of this article was a factsheet entitled "Nitrogen Fertilizer Management on Rotationally Grazed Pastures" written by Dennis Cosgrove and Ken Barnett, University of Wisconsin-Extension. Ken Barnett has also created a spreadsheet based on this factsheet's data, which can be used to estimate the potential return on nitrogen fertilization at various urea costs. That spreadsheet can be viewed at: [www.uwrf.edu/grazing](http://www.uwrf.edu/grazing) (click on "Software" link).