Using Magnesium and Phosphorus Fertilization to Improve the Macronutrient Quality of Stockpiled Tall Fescue

Missouri Fertilizer and Lime Council

2006 First Year Report

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Objective: To determine if phosphorus (P) and magnesium (Mg) concentrations in leaves of stockpiled tall fescue during winter can be increased by fertilization with both P and Mg. The acreage involved makes this research important to the Missouri fertilizer industry. Missouri leads the nation in tall fescue production and is second in beef calf production (Missouri Farm Facts, 2005). Of the 13 million acres of tall fescue pasture in Missouri, much of it grows on soils low in plant available P (Bray I). Production of forage on these soils might have an impact on the macronutrient quality of tall fescue. Our previous work has shown that P fertilization of tall fescue pastures improved leaf P and Mg concentrations (Reinbott and Blevins 1997). Currently, it is recommended that cattle producers stockpile tall fescue to reduce winter feeding costs. However, there is very little information available on the macronutrient quality of stockpiled tall fescue and management practice that can be used to improve it.

Procedure: During summer 2006, an established stand of tall fescue (K31, endophyte infected) was selected at the University of Missouri Southwest Research Center near Mt. Vernon. Soil samples were taken and sent to the University of Missouri Soil Testing Lab for analysis. The soil test results were used for making the final site selection. On September 20, forage was removed from the plot area and plots of 10’ x 25’ with 5’ foot alleys were treated with combinations of 0, 50, 100, or 200 lbs P/acre (as 0-46-0) and 0 or 50 lbs Mg/acre (K-Mag). The use of K-Mag required that we add potassium (K) and sulfur (S) to all treated plots to balance K and S added in the K-Mag treatments. Each treatment combination was replicated six times. Total number of plots is calculated by multiplying 4 P treatments x 2 Mg treatments x 6 replicates of each treatment = 48 (see plot map, Fig. 1). From mid-October through mid-April, 20 of the most recently collared leaves are being harvested monthly from each plot. Samples are being dried, ground and digested in nitric acid in a microwave accelerated digestion system (CEM Corp.). Digested samples will be filtered, diluted and K will be determined by flame ionization, Mg and Ca by atomic absorption, and P by colorimetric analysis. This study will be completed after two years of harvests. Data will be analyzed by SAS and graphs will be prepared by plotting macronutrient concentrations versus month of the year and treatments. The same treatments will be applied to the same plots in September 2007 for the second year of study.

2006 Results: The site was selected, plots were established and the treatments were applied. Leaf samples are being collected monthly from each plot and these samples are being dried, ground, digested and analyzed for macro- and micronutrient concentrations.
Second year schedule: Leaf samples will be collected monthly through April 2007 and forage will be harvested for yield determination during the third week of June 2007. Forage will be harvested in early September and fertilizer will be re-applied to the same plots used in 2006. Monthly leaf samples will be collected starting in October (2007 through April 2008), and hay will be harvested for yield determinations in May. All samples will be analyzed for macro- and micronutrients and the effects of P and Mg fertilization will be determined. Of special interest will be fertilization treatment responses of leaf P and Mg concentration during the late winter months.

Budget:

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<th>Category</th>
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Individual plots are 10’ X 25’ = 250 ft², with 5’ alleys between blocks. Blocks are 25’ X 80’ = 2,000 ft². Blocks are replicated 6 times. Total area is 14,000 ft² (0.32 acres). Mg is applied at 0, & 100 lbs Mg/acre. P is applied at 0, 50, 100 & 200 lbs P/acre. Diagonal is 192.42’ from corner to corner.
Figure 2. Matt Massie, Agronomist at the University of Missouri Southwest Center (left) applying phosphorus and magnesium treatment on this study in September 2006.