Wisconsin - Nitrogen Fertilization Rates for Meadow Fescue, Tall Fescue and Orchardgrass
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Nitrogen has a greater effect on grass growth than any other factor except moisture and temperature. As N costs continue to increase, understanding grass response to N will help determine the most appropriate application rate. Five N rates of 0, 60, 120, 180, and 240 lb N/ac were split-applied to meadow fescue, soft-leaf tall fescue, and orchardgrass in three equal applications at Lancaster and Marshfield, WI, in 2005 and 2006. Plots were harvested to a 4 in. stubble when sward height reached 10-12 in. to represent a typical defoliation scheme for managed grazing.

Annual yield and CP concentration of all varieties increased linearly as N application rate increased in all environments (Table 1). In contrast, N-use efficiency (yield/unit of N applied) increased from 15 to 20 lb DM/lb N as N rate increased from 60 to 120 lb/ac/yr, but declined as N rate increased above 120 lb/ac/yr. Although meadow fescue varieties produced less annual yield than tall fescue and orchardgrass by the 2nd year, meadow fescue varieties generally had greater cell wall digestibility at each harvest.

Table 1. *DM yield response of 5 perennial grass varieties to N application rate at 2 WI locations averaged over 2 yrs.*

N Fertilization Rate	Lancaster	Marshfield
lb N/ac/yr	*-----ton DM/ac/yr-----*	
0	1.1	0.7
60	1.5	1.1
120	2.1	1.7
180	2.6	2.0
240	3.1	2.3

In addition to application rate, timing of N application and potential recycling should be considered. While spring application of N takes advantage of rapid growth during the reproductive phase of the grass, and favorable moisture and temperature conditions; forage production may exceed animal utilization, and some forage may need to be harvested and conserved. In addition, some N is returned to the pasture in the manure of grazing animals and in senescing leaves and roots. The quantity of N and the extent to which it is available for plant growth is influenced by several factors: grazing management (stocking rate and grazing height), distribution of urine and feces, N status of the grass or presence of legumes, N losses due to leaching or volatilization, and the type and quantity of supplemental feed provided to animals.

These results also confirm previous findings that although meadow fescue is slightly less productive than tall fescue and orchardgrass, its yield and superior forage quality warrant its consideration for managed rotational grazing systems in temperate regions.