Focus on Forage

Wisconsin TEAM Forage

Pasture Fertilization

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Introduction

Unlike fertilization of most field crops, where the decision as to the amount and type of fertilizer to apply is largely driven by trying to achieve optimum production, pasture fertilization should be more controlled by careful consideration of the individual goals for the pasture. Factors to consider include: 1) production needed for the animals; 2) time of forage needs; 3) species present; and 4) expected methods of management.

Lime considerations

The need for lime on Wisconsin pastures can be considerable, especially on some central and northern soils derived acidic parent materials. Long-term repeated nitrogen fertilizer applications can also significantly acidify the surface layer of pasture soils. The lime need of pastures is largely determined by the species present (presence and specific type of legume) and the grower's desire to maintain the legume-grass mix. In general, pasture grasses and some legumes can do very well at pH 5.7 to 6.0; however, if alfalfa is present and is to be maintained, then a somewhat higher pH is needed (6.5 to 6.8). Once a desired pH has been achieved, it will typically last for several years.

Lime also serves as the primary source of calcium and magnesium to pastures. On some soils (low exchange capacity sandy soils where long-term potassium applications have been made), especially in north-central Wisconsin, dolomitic lime should be used to avoid the possible occurrence of grass-tetany. Where possible, lime should be incorporated throughout the plow layer when renovating the pasture.

Nitrogen considerations

Pastures can dramatically respond to fertilizer nitrogen applications. Yield increases of 400% or more have been measured. However, because of species and forage needs considerations the actual amount of N that should be used may vary from 0 to over 200 lb N/acre/year.

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Legumes present? Where legumes are present, the legumes can transfer about 30 to 50 lb N/acre/year to the grass mostly by mineralization of below ground plant components. Even in this situation if maximum production is the goal, research has shown that about 80 to 100 lb/acre of added N is needed. However, this will tend to give the grass a competitive advantage and the legume will eventually be lost. If the goal is to maintain the legume in the stand, then the grass must be kept slightly nitrogen deficient. If the stand is greater than one-third legume, then no nitrogen is recommended.

Yield potential? Even where grass is dominant in the pasture, the N rate used should be based partly on the actual species present, with about 80 to 100 lb N/acre recommended for bluegrass, but up to 160 lb N/acre for improved pastures dominated by tall grasses.

Time of application? Research has shown that split applications of nitrogen will generally maximize yields. General practice is to apply some N in late fall or early spring and again in early June and early August. A midsummer application is usually not recommended since growth is generally poor at this time of year for most cool season grasses. However, where the goal is to even out production throughout the season, some producers will make an application in late June or early July to stimulate summer growth. Success is partly dependent on having adequate moisture and not having excessive heat.

Nitrogen form? One limitation of urea is its potential for some nitrogen loss when it is surface applied. Losses are largest when plant residue is present, there is no rainfall, and temperatures are high. Wisconsin research showed that where rainfall was not received within 5 days of urea applications to pastures nitrogen losses could be as high as 20%. However where as little as 0.25 inch of rainfall occurred within the fourth day, losses were less than 5%. Choice as to N fertilizer form to apply should be based on price differential, rainfall probability, and flexibility of application date.

Phosphorus and potassium considerations

Pasture forages remove about 12 lb P_2O_5/T and 55 lb K_2O/T of dry matter harvested. However, in a grazing situation because of the nutrient cycling by the manure and urine only about 15% is actually removed from the field. Unfortunately, the redis position is often concentrated near waterers or other parts of the pasture where the animals tend to congregate. Recent studies have shown that deposition tends to be more uniform on rotationally grazed pastures.

Since pastures have historically been a neglected part of a systematic nutrient management program, soil tests should be used to accurately determine P and K needs. Where legumes are present, special care should be taken to ensure adequate K is applied since grasses are more competitive for K than are the legumes. It is recommended that soil tests not drop below about 15 ppm Bray P1 and 100 ppm K. These nutrients will also enhance disease resistance, winterhardiness and longer stand life.

Secondary and micronutrients

In general, the need for pasture fertilization with secondary or micronutrients is quite small because of the recycling by the animals. Potential problems to watch for include: magnesium problems on high grass, acid, high K situations; boron shortages if legumes are the dominant species (especially for alfalfa and birdsfoot trefoil); sulfur on well-limed, sandy, low organic matter soils in northern Wisconsin and molybdenum on acid soils if legumes are present.