Grazier's Notebook

Wisconsin TEAM Forage

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Fertilizer Management of Pastures

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Introduction

Whether or not to apply fertilizers to pastures to increase production raises questions that graziers need to ask. Some of these questions are 1) what are the production needs for the animals grazed; 2) when are the forages needed in the grazing season; 3) what species are present; and 4) what are the expected methods of management? The answers to these questions will help determine if you use fertilizer/manure and the amount used.

Soil Testing

Since a regular nutrient management program has been an often-neglected practice for grazing, soil tests should be used to accurately determine phosphorus, potassium, and lime needs. Soil testing helps you apply fertilizers where they are needed, and avoids areas where they are not needed. Also, soil testing helps to prevent developing excessive levels of phosphorus and potassium. Phosphorus can runoff into streams and lakes, fueling algae blooms. Excessive levels of potassium can contribute to grass tetany or milk fever in grazing cattle.

For field crops, sampling the soil once every 3 to 4 years or once in a rotation is sufficient. Fields where high value specialty crops are grown and those that are more susceptible to changes in nutrient levels, such as those with sandy soils, should be sampled more frequently. Take soil samples at any convenient time. Studies examining that effect of sampling time on soil test results suggest that test values for pH, phosphorus (P), and potassium (K) are typically slightly higher in early spring samples than in fall samples. To receive your recommendations early enough to enable you to apply the lime and fertilizer needed, it may be best to sample in the fall. Another benefit of fall testing is that fertilizer prices are more likely to be discounted then. Regardless of when you sample, it is best to be consistent from one year to the next.

Phosphorus and Potassium

A grazing situation is different than a haying situation. Each ton of dry matter removed per acre from the field as alfalfa hay also removes about 12 to15 pounds of P_2O_5 and 55 to 60 pounds of K_2O. To maintain optimum soil fertility, a producer would want to use fertilizers or manure to replace these nutrients.

In an intensively grazed pasture, on the other hand, over 80% of the nitrogen, phosphorus and potassium are recycled back to the pasture. The fertilizer recommendation for a legume-grass pasture with a yield of 4.1 to 5.0 tons of dry matter per acre is 60 pounds of P_2O_5 and 240 pounds of K_2O. Thus, due to nutrient recycling, each ton of dry matter removed per acre from a legume-grass pasture actually removes about 2 pounds of P_2O_5 and 10 pounds of K_2O. Therefore, based on estimated dry matter removal, fertilize accordingly to maintain optimum levels of phosphorus and potassium. Since the timing of phosphorus and potassium applications is not critical, they can be applied separately, together, or in combination with nitrogen fertilizer.

Taking a cutting of hay on some of the pasture acres to help regulate growth is a normal practice for many graziers. Each ton of dry matter removed per acre from a legume-grass pasture will also remove

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about 12 pounds of P_2O_5 and 48 pounds of K_2O. To maintain optimum soil fertility, a producer would want to use fertilizers or manure to replace these nutrients.

Since legumes are desired in pastures, special care should be taken to ensure adequate phosphorus and potassium levels. Grasses are more competitive for phosphorus and potassium than are legumes. Thus, lower levels of phosphorus and potassium would give grasses a competitive advantage and would decrease the legume portion of the pasture over time.

Sulfur and Boron

An intensively grazed pasture may also require sulfur and boron. To determine sulfur needs, do a soil test. A sulfur availability index (SAI) is calculated by estimating the sulfur released from organic matter, sulfur in precipitation based on location, subsoil sulfur, and sulfur in manure if applied. If the SAI is 40 units or more, response to added sulfur is unlikely. If the index is between 30 and 40, the sulfur need should be confirmed by plant analysis. If the index is less than 20, sulfur should be added.

A legume-grass pasture has a high requirement for boron. If a soil test has a low reading for available boron or if a deficiency appears, topdress 2 pounds of actual boron per acre every 3 years. For a legume-grass pasture on sandy soils, topdress 0.5 to 1.0 pounds of actual boron per acre annually. This annual application will minimize the leaching effect with boron.

Nitrogen

If your current pasture production is less than desired, applying nitrogen fertilizer can increase pasture yields dramatically. Measured pasture yield increases of 400% or more have been noted in past research. Nitrogen and moisture are the main factors which limit pasture growth. If you have noticed lush, dark green growth surrounding manure and urine spots in your pastures, this is an indication of nitrogen deficiency.

A 30 percent stand of legume in the pasture can supply 30 to 50 pounds of nitrogen per year to the grasses in the pasture. The cycling of nitrogen from urine, manure, dead plants, etc. may supply an additional 15 to 30 pounds of nitrogen per year depending on cow numbers and frequency of grazing. While this is significant, recent University of Wisconsin research showed a positive economic return with up to 100 pounds of nitrogen fertilizer per acre applied to mixed pastures (http://www.uwrf.edu/grazing/PNNitrogen.pdf).

Fertilizing with nitrogen is a short-term management tool since its effect is usually immediate and does not last more than one grazing cycle. Additions of nitrogen fertilizer may cause a shift to more grass content in the year of application and beyond.

Soil pH

Last, but not least, do not forget about the soil pH. If there are mainly grasses present in your pastures, a soil pH of 5.8 to 6.0 should be adequate. A slightly higher soil pH of 6.3 to 6.5 is desired if you have mixed grass/legume pastures. This higher pH will help the legumes persist longer in the pasture.

Before establishing a pasture, apply lime at the recommended rate and incorporate into the plow layer at least six months to one year before pasture seeding. Although working the lime into the plow layer is the most desirable, this is not practical for many pasture situations. Topdressing lime to your established pastures will still be beneficial over time. Surface application of lime without incorporation will only move about 1/4 to 1/2 inch per year through natural processes. The rate of movement depends on the soil texture and fineness of the lime applied. Use as fine a grade of lime as you can obtain. You may need to topdress lime every few years until the desired soil pH is reached.

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