

**Grass or Grass / Clover Pastures**

**Management Highlights**

- Target pH: **6.0**
- Monitor soil P and K levels. It is more economical to maintain soil fertility than to re-establish the stand.
- High levels of soil P and K will encourage legume growth in mixed grass and legume pastures.

**Yield Goals**

Forage yield of grass or grass/clover pasture is dependent upon many factors: the cultivars selected, seeding date, age of the stand and degree of establishment, stand composition, soil type and water-holding capacity, nutrient and water availability, weed, insect and disease pressure, crop and grazing management practices. Table 1 shows typical yield goals for grass or grass/clover pastures grown on Delaware soils.

**Table 1. Grass or grass/clover pasture yield goals as a function of stand age.**

Stand Age	Forage Yield
	----- tons / ac -----
Year following fall seeding	4.0 - 5.0
Year of spring seeding	2.0 - 3.5
Subsequent years	3.0 - 3.5

**Soil pH and Liming**

The target pH for grass or grass/clover pastures on most Delaware soils is **6.0**. If the soil pH is **5.3 or lower**, the soil is too acidic for good growth of grass or grass/clover pastures. Apply the recommended rate of lime and allow the soil pH to increase before attempting to plant.

When seeding over-seeding a field, thorough incorporation of the recommended rate of lime is most effective in correcting soil pH problems.

On established fields, lime can be topdressed although results may be somewhat less effective than those achieved by incorporation of the limestone.

The lime recommendation for a specific grass or grass/clover pasture field is calculated from the soil pH and buffer pH measurements using the steps outlined in *Calculating the Lime Requirement -- Chapter 3, Section 3.4*. Use care to avoid over-liming in order to prevent micronutrient deficiencies.

In most cases, the lime requirement can be met by either calcitic or dolomitic limestone.

*Dolomitic limestone* is recommended if:

- soil test Mg is less than 50 FIVs, or
- soil test Mg is between 50 and 100 FIVs *and less than soil test Ca.*

*Calcitic limestone* is recommended if:

- soil test Mg is greater than 100 FIVs, or
- soil test Mg is between 50 and 100 FIVs *and greater than soil test Ca.*

**Nitrogen Management**

The nitrogen (N) requirement of grass or grass/clover pastures is dependent upon stand age and composition. Clover is a leguminous plant and, once established, capable of fixing sufficient N to meet crop needs. All stands should receive an application of N at seeding to aid in establishment. Seed mixes containing clover should be treated with a suitable inoculum to ensure that N fixation will occur. In subsequent years, stands containing high percentages of clover require less N once established than those dominated by grass. Over application of N to stands high in clover increases the competitiveness of the grass species and will result in loss of the clover.

Table 1 gives a summary of recommended N rates

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for grass or grass/clover pasture as a function of stand age and composition. At planting, the higher N rate should be used on sandier soils to compensate for greater leaching losses. That rate can be reduced or eliminated when planting into a legume cover or when manure has been applied prior to planting. To adjust N rates, see *Nitrogen Rate Adjustments -- Chapter 3, Section 3.5.1.2*. On established stands, N should be applied after each grazing period to encourage stand recovery and subsequent growth.

**Table 2. Recommended N rates for grass or grass/clover pastures.**

Stand Status	N Rate
	---- lbs / ac ----
Seeding - grass/clover mix	0 - 30
Seeding - grass only	40 - 60
Established stand :	
0 - 25% clover	50/grazing period
25 - 50% clover	25/grazing period
>50% clover	0/grazing period

### Phosphorus Management

Yield-limiting phosphorus (P) deficiency is rarely a concern on Delaware soils. Long-term applications of fertilizers and manures have resulted in P accumulations in many soils that are capable of supplying crop needs for many years with no further additions.

Adequate concentrations of soil test P are important to grass or grass/clover pasture production and stand longevity. To determine whether P fertilization is necessary for a specific field, conduct a routine soil test. University of Delaware P recommendations for grass or grass/clover pasture are dependent upon stand age and soil test P value. A summary of P recommendations for Delaware grass or grass/clover pasture are given in Table 3.

**Table 3. Phosphorus recommendations for grass or grass/clover pastures.**

Stand Status	P Index Value						
	0	10	20	30	50	70	90
	----- lbs P <sub>2</sub> O <sub>5</sub> / ac -----						
Seeding	120	109	97	86	63	40	13
Subsequent years	120	104	88	74	50	17	0

### Seeding

When soil test P is *Low* or *Medium (50 FIVs or less)*, P should be broadcast and plowed down prior to seeding. When soil test P is *Optimum (51 FIVs or greater)*, P can either be broadcast and incorporated prior to planting or topdressed prior to or shortly after planting.

### Topdressing Established Stands

*If soil test P is Low (less than 25 FIVs), satisfactory growth of grass or grass/clover pasture is unlikely. Few, if any, legumes will survive. Grass yield and longevity will be poor. Do not attempt to correct the problem by topdressing P. Instead, broadcast the recommended rate of P, plow down and re-seed to obtain optimum yields.*

When soil test P is *Medium* or *Optimum (greater than 25 FIVs)*, topdressing the recommended rate of P should be effective in meeting crop needs.

### Potassium Management

Potassium (K) is very important to grass or grass/clover pasture growth and stand longevity. The need for K fertilization of grass or grass/clover pasture is best determined by the use of a routine soil test. Potassium recommendations are based on crop status (new seeding or established crop) and the soil test K index value. A summary of University of Delaware K recommendations for grass or grass/clover pasture is given in Table 4.

**Table 4. Potassium recommendations for grass or grass/clover pastures.**

Stand Status	K Index Value						
	0	10	20	30	50	70	90
	----- lbs K <sub>2</sub> O / ac -----						
Seeding	180	163	146	129	94	60	20
Subsequent years	180	165	150	135	105	75	45

**Seeding**

When establishing a new field, K should be broadcast before or immediately after planting. Incorporating K by disking or plowing down will decrease potential salt effects from higher application rates.

**Topdressing Established Stands**

If the recommended K rate is **90 lbs K<sub>2</sub>O/ac or less**, potash can be broadcast in a single application. When the recommended rate is **greater than 90 lbs K<sub>2</sub>O/ac**, apply K in two applications: one in June after the first or second grazing period and one in August or early September after the late summer grazing period.

To decrease the potential for grass tetany, avoid K overfertilization on pastures that are predominantly grass species. Waiting until after the first grazing period to apply K helps to reduce the potential danger.

**Calcium and Magnesium Management**

Calcium (Ca) and magnesium (Mg) needs of grass or grass/clover pasture are usually met through routine liming. **Magnesium application is recommended if the soil test Mg value is less than 38 FIVs.** If liming has been recommended, use dolomitic limestone to raise soil pH and increase soil Mg. If, however, liming is not necessary but Mg is still indicated, apply Mg as Mg sulfate or Mg chloride to increase soil Mg. Appropriate application rates are given below in Table 5.

**Table 5. Application rates for soluble Mg as a function of Mg fertility index value.**

Mg Index Value								
0	5	10	15	20	25	30	35	40
----- lbs soluble Mg / ac -----								
80	70	60	50	40	30	20	10	0

**Boron Management**

Pastures containing legumes such as clover should be fertilized with **0.5-1.0 lbs boron (B)/ac** each year. Prior to seeding, apply B in a blended, broadcast fertilizer or as a soil spray and incorporate into the soil. On established stands, B can be topdressed in a blended, broadcast fertilizer or applied as a foliar spray, generally in late May or June.

**Caution:** *Although B is required for maximum productivity of pastures, even slight over-application of B can be toxic to the crop. When applied as a foliar spray, be certain to apply the correct rate.*

**Manganese Management**

Manganese (Mn) deficiency may occur in grass or grass/clover pastures on Delaware soils, most often as a result of overliming soils that are naturally low in Mn. The University of Delaware Soil Testing Program uses an availability index based on the soil test Mn value and soil pH to predict the likelihood of Mn deficiency. That availability index is calculated using the equation:

$$MNAI = 101.7 - (15.2 \times pH) + (2.11 \times ST-Mn)$$

where:

- MNAI = Mn availability index
- pH = water pH of the soil
- ST-Mn = soil test Mn in lbs/ac.

Table 3-14 in **Chapter 3, Section 3.5.5.2 (Manganese Management)** gives a summary of MNAI values for various soil pH-soil test Mn combinations. Interpretations of the Mn availability index for grass or grass/clover pastures are given below in Table 6.

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**Table 6. Interpretation of the Mn availability index for grass or grass/clover pastures.**

MnAI Value	Interpretation
Less than 12	Mn deficiency is likely at this soil pH and Mn concentration.
12 or greater	Mn deficiency is unlikely.

Suspected Mn deficiency can be confirmed by tissue analysis. Confirmed deficiency situations can be corrected in season by foliar applications of Mn of 1-2 lbs/ac of actual Mn as Mn sulfate, Mn oxide or Mn chelate. If deficiency is predicted by the availability index or was observed during the previous growing season, it can be prevented by a broadcast application of 20-30 lbs/ac of actual Mn in the fertilizer band. Broadcast applications of acid-forming fertilizer, which lower soil pH in the area of plant roots, may correct Mn deficiency without the addition of Mn fertilizer but may be less effective than applications of Mn.

### Other Nutrients

No other nutrients are known to be limiting to grass or grass/clover pasture production in Delaware.

### Additional Information

See Soil Test Notes 1, 3, and 4 (Appendix 7) for additional information concerning fertilization of grass or grass/clover pasture.