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APR 27 1990

Current Information Series No. 853

Northern Idaho Fertilizer Guide

GRASS PASTURES

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These fertilizer guidelines have been developed from research by the University of Idaho and Washington State University based on relationships obtained from soil tests and crop yield response. The fertilizer rates suggested are designed to produce above average yields if other factors are not limiting production. Thus, the fertilizer guide assumes good management.

The suggested fertilizer rates will be accurate for your field provided that (1) the soil samples are properly taken and are representative of the field to be fertilized, and (2) the crop and fertilizer history supplied is complete and accurate. For help in obtaining a proper soil sample, see University of Idaho Extension Bulletin 704, *Soil Sampling*, or consult the Extension agricultural agent in your county.

Harvested grasses remove large quantities of nutrients from the soil. Adequate fertilizer should be incorporated into the seedbed as it is prepared, and additional amounts should be broadcast applied periodically over the life of the stand to maintain optimum nutrient levels.

Established Grass Pastures

Nitrogen (N), phosphorus (P), potassium (K) and sulfur (S) are nutrients essential for plant growth that are often deficient in northern Idaho grass pastures. Conversely, deficiencies of calcium (Ca), boron (B), copper (Cu), chlorine (Cl), iron (Fe), manganese (Mn), molybdenum (Mo) and zinc (Zn) are rare in northern Idaho grass pastures. Animals foraging grass in the spring may suffer grass tetany, caused by low levels of soil magnesium (Mg).

Nitrogen

Soil sampling as a basis for N fertilizer recommendations is generally not recommended because available N is mobile in soils and can be leached beyond the root zone with spring precipitation or irrigation.

Grass pastures will usually respond to N applications in northern Idaho. Suggested N application rates based on annual precipitation are shown in Table 1. Highest recommended N application rates are on irrigated grass pastures. The rates suggested in Table 1 are yearly requirements and should be split into at least two applications for non-irrigated and three to five applications for irrigated grass pastures. The two applications on non-

irrigated land should include an initial application as early in the spring as possible (February to April) and a second application in early June. On irrigated grass pastures, the first of the three to five applications should be applied as early in the spring as possible and subsequent applications every 5 to 7 weeks.

Table 1. Nitrogen fertilizer rates for grass pastures based on annual precipitation.

Annual precipitation (inches)	Suggested N application (lb/acre)
less than 20	80 to 110
20 to 23	110 to 130
more than 23	130 to 150
Irrigated pastures	140 to 170

Phosphorus

A soil test is needed to assess the P status of grass pastures. Rates of P required for optimum forage production, as determined by soil test, are shown in Table 2. On established stands, fall or winter broadcast applications of P-containing fertilizers are preferred. Phosphorus may be applied on established stands in sufficient quantity to last for 2 or 3 years.

Table 2. Phosphorus fertilizer rates based on a soil test.

Soil test*	Rates of P ₂ O ₅ ** to apply for		
	1 year	2 years	3 years
(ppm P)	(lb/acre)		
0 to 2	50	80	100
2 to 4	30	50	70
4 to 8	0	15	30
over 8	0	0	0

* Sodium acetate extractable P in the 0- to 12-inch depth.

** P₂O₅ × 0.44 = P, or P × 2.29 = P₂O₅.

Potassium

Grass pastures remove substantial quantities of K from the soil. On established stands, fall or winter topdress applications of K are preferred. Most northern Idaho soils contain enough K for optimum forage production, but deficiencies can occur in localized areas. Potassium requirements can be effectively determined with the aid of a soil test (Table 3).

Table 3. Potassium fertilizer rates based on a soil test.

Soil test*	Rates of K ₂ O** to apply
(ppm P)	(lb/acre)
0 to 35	80
35 to 75	60
75 to 100	40
over 100	0

*Sodium acetate extractable K in the 0- to 12-inch depth.

**K₂O × 0.83 = K, or K × 1.20 = K₂O.

Sulfur

Northern Idaho soils are often S deficient. Yield and quality reductions can result from S deficiency. An S deficiency in plants appears as a yellowing of the entire plant early in the growing season. The appearance of S deficient plants is the same as N deficient plants.

Soils testing less than 10 ppm SO₄-S should receive 15 to 20 pounds of S per acre. Sulfur can be applied as gypsum or with liquid or dry fertilizer materials which contain S. Since S is mobile and subject to leaching in soils, S fertilizer applications should be made in the early spring. Fall applications of S fertilizer are not recommended.

Magnesium (Grass Tetany)

Grass tetany is a disorder of cattle and sheep caused by low blood levels of magnesium (Mg) in the animal, often resulting from low Mg in their forage. Grass tetany occurs when rapid lush growth of grass pastures takes place in areas with cool, wet springs. Low Mg levels are found in cool season grasses such as bluegrass, brome, fescue, orchardgrass and timothy. Under the cool, wet conditions of spring, these grasses contain such low levels of Mg that grazing animals may not obtain enough Mg to meet their nutritional requirements.

Grass pastures that are prone to develop low Mg levels in the spring may be improved or Mg may be supplemented by using one or more of the following practices:

1. Add legumes such as ladino and alsike clovers or alfalfa into the grass pasture.
2. Fertilize pastures with magnesium (e.g. dolomitic limestone or potassium-magnesium sulfate).
3. Avoid heavy N and K applications.
4. Supplement animal rations or water with Mg.

Micronutrients

Grass pastures rarely respond to applications of micronutrients in northern Idaho. If you are in doubt, have the soil tested and consult the Extension agricultural agent in your county.

Lime

Lime applications on highly acid soils (soil pH less than 5.1) should be tried on an experimental basis to determine if an economical response is derived. When needed, lime should be applied at a rate of 1 to 2 tons per acre, and where possible it should be mixed well into the soil. Surface applications will work but will be slow to react.

New Grass Seedings

Consider soil fertility needs before establishing new pastures. Both P and K are particularly important because these nutrients are immobile in the soil and are more available when worked into the seedbed before seeding. At establishment, 60 pounds of P₂O₅ per acre and appropriate amounts of potassium (rate based on soil test; see Table 3) should be worked into the seedbed. Sulfur should be added when a need is predicted by soil testing. Sulfur does not need to be incorporated into the seedbed because it is mobile in soils and will reach plant root zones with normal precipitation or irrigation. The addition of 20 to 30 pounds of N per acre will aid in pasture establishment at seeding. It is also advisable to add 50 percent of the recommended N rate in Table 1 during the first season.

General Comments

1. Phosphorus (P), sulfur (S) and nitrogen (N) are elements most often needed for grass pasture production in northern Idaho. In some situations, applications of potassium (K) and lime will also improve plant growth.
2. Since P and K are relatively immobile in soils, these nutrients should be worked into the seedbed before seeding.
3. Grass tetany can occur in pure grass pastures during cool, wet springs in northern Idaho counties because of low forage levels of Mg.
4. Grasses grow poorly in soils with pH values less than 5.1. Under such situations lime may be necessary to correct soil acidity. The lime should be applied and incorporated into the soil before the pasture is established.
5. When seeding, select the best adapted grass and grass varieties for your area.
6. Sulfur and nitrogen fertilization increase forage protein content, greatly improving its quality.

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