



# Texas Agricultural Extension Service

The Texas A&M University System

## Fertilization Effects on Grazing and Hay Operations

Donald J. Dorsett

*Associate Professor and Extension Forage Specialist*



Soil fertility is the one element that most producers control in a pasture production system. Without fertile soil, coastal bermudagrass, common bermudagrass or any of the improved pasture grasses will produce just about the same amount that native pastures will produce. Some of the improved pastures will actually recede and die under a non-fertilization program. As long as improved pastures are going to be used some type of increased fertility system must be applied to keep plants in active production.

Research and demonstrations have shown that one ton of forage from almost any grass requires around 50 pounds of actual nitrogen (N), 12 to 15 pounds of phosphate ( $P_2O_5$ ), and 40 pounds of potash ( $K_2O$ ). Therefore, if a native grass pasture will produce 1½ to 2 tons of forage per acre per year, an improved pasture will produce at least that same amount. Higher production per acre will require additional nitrogen, phosphorus and potassium. A fertilizer application that totals 50-15-40 will normally be required for every ton of additional production. Soil tests will indicate which of these nutrients must be applied through a fertilizer program.

Many times producers say they are going to plant legumes in their pastures so they won't have to apply fertilizers. This statement is misleading and inaccurate. Legumes require phosphorus and potash for optimum production. Because of their ability to fix nitrogen from the atmosphere, legumes can put nitrogen into a pasture system; however, during establishment, legumes use most of the nitrogen they fix for their own growth. Once the legume has been in the pasture several years, there is a definite recycling and addition of nitrogen to the entire system and other grasses begin to benefit from legumes being in the pasture. It should be remembered that legumes are not cheap as far as the pasture fertility program is concerned because of the higher amounts of phosphorous and potassium that must be added to keep the legume in the pasture.

Hay can be produced from almost any type of forage grown — grass or legume. The basic principle behind good, high quality hay production is to cut the plant at the stage of growth when it is high in protein and digestibility. All grasses and legumes will be high quality until seedheads begin to form.

Texas Agricultural Extension Service • Edward A. Hiler, Interim Director • The Texas A&M University System • College Station, Texas

Educational programs conducted by the Texas Agricultural Extension Service serve people of all ages regardless of socioeconomic level, race, color, sex, religion, handicap or national origin.

Then the plant changes style of growth, quits making new leaves and begins a fiber buildup which decreases digestibility and percent crude protein. Any plant that goes to full seedhead is considerably lower in protein and digestibility than it would be if cut in the boot or early head stage. This principle of plant maturity has more to do with the quality of the plant than the fertilization program (Table 1).

A fertilization program is required for high production in a grazing or haying operation. Almost any forage plant will respond to moderate-to-high levels of added fertility with increased production (Table 2).

Soil fertility will increase the amount of plant protein and total pounds of protein per acre, but the

effect of fertilization on protein is not as significant as plant age (maturity).

Soil fertility has a much higher impact on total production per acre. Coastal bermudagrass will produce up to 12,000 to 14,000 pounds of hay per acre with around 300 pounds of total nitrogen per acre. The relationship between plant production and soil fertility is almost direct as long as growing conditions are adequate.

Research has shown that any of the modern hay making methods will do an adequate job of protecting the quality of hay; however, none of these new packages will improve the quality. Moderate fertilization, cutting at the proper stage of maturity and proper curing and packaging will result in hay quality improvement.

**Table 1. Effect of cutting frequency on yield and quality of Coastal bermuda hay. (Georgia Coastal Plains Station)**

Clipping Freq. (wks.)	Tons per acre	% Crude Protein	% Crude Fiber	% Leaf
3	9.7	19.0	27.7	86.0
4	10.0	16.9	29.5	83.0
6	11.9	13.6	33.2	62.0
12	11.6	9.7	35.0	51.0

**Table 2. Effect of different nitrogen rates on yield and protein content of Coastal. (Texas A&M)**

Lbs./N/Acre	Yield in Tons	% Protein
0	2.67	7.9
100	4.38	9.1
200	5.93	10.5
400	8.59	11.7
600	10.65	12.4