Texas Cooperative EXTENSION
The Texas A&M University System

Nitrogen Fertilization Decision Tool for Pastures or Hay Meadows in North Central Texas.

Introduction

The Nitrogen fertilizer calculator for pastures is a decision tool designed to guide producers toward selecting the N fertilizer level that maximizes their profit under the risk level that they are willing to take. Two main assumptions were made. The first one is that the soil has all other nutrients (phosphorus, potassium, and microelements) in adequate amounts. The other supposition is that you are in an average rainfall year and this precipitation supports the yields shown in the table. The yields shown in the calculator correspond to Tifton 85 bermudagrass and they represent experimental data collected over a five year period at a location in Williamson County, TX.

Calculator description

The calculator has two parts: Chart 1-A and Chart 1-B. Chart 1-A, or input table, provides the Fertilizer and Hay information for the calculator; and Chart 1-B, or output table, is the calculator itself. It also has a Chart 2 where you can enter your own fertilizer type.

Chart 1-A (N fertilizer and Hay Input information): here you will enter N-fertilizer and hay type.

The 'N-fertilizer type Options' cell is a 'drop-down' menu that when clicked on the arrow shows six different N fertilizer sources commonly used in pasture and hay meadow fertilization for North-Central Texas (#1 Urea, #2 Liquid – 28% N, #3 Liquid – 32% N, #4 Ammonium Sulfate, #5 Ammonium Nitrate, and #6 Anhydrous Ammonia).

Next are the price per ton ($/ton) and the price per pound ($/lb).

The 'Hay type Option' cell is another 'drop-down' menu that when clicked on the arrow shows two options (#1 Small Square Bales, and #2 Round Bales).

Next are the Size of hay type (Lbs), the price per bale ($/bale), and the price per pound ($/lb).

Chart 1-B (Calculator): The calculator is a table with six columns: The first column is 'N Fertilizer level' (in lbs of N per acre per cut); second column is 'Yield' (in lbs of dry matter per acre per cut) for each N fertilization level; third column is 'Income' (product of selling the hay); fourth column is 'Cost' of N fertilizer (in $ per acre); fifth column is 'Profit' (in $ per acre) which is the difference of the Income minus the cost at each N fertilizer level; last column is the 'Incremental Profit' (in $ per acre) and represents the profit obtained by the difference of two consecutive levels of N fertilization. In practical terms, it is the added profit obtained for the addition of 25 lb of N fertilizer each time. For example, when applying a total of 75 lb N/acre/cut you get an added profit of $40/acre for adding 25 lb N/acre over the first 50 lb of N fertilizer applied. If you were to increase N fertilization further to 100 lb N/acre/cut, those 25 lb N over a fertilization of 75 lb N level represent an additional income of $27/acre. Increasing N fertilization by 25 lb N, from 100 lb N/acre/cut to 125 lb N, will bring an added profit of $13/acre/cut over the profit obtain for a fertilization level of 100 lb N/acre/cut.

Chart 2: In this chart you are allowed to change % of N fertilizer, fertilizer price ($/ton), and the size and price of the hay bale.

Interpretation

When the price of fertilizer goes up or the price of hay goes down, the tendency is to apply lower levels of N fertilizer for warm-season grasses. And vice-versa, when the price of fertilizer goes down or the price of hay goes up, the trend is to use more N fertilizer.

In general terms, the profitable level of N fertilizer application in pastures or hay meadows of bermudagrass is around 75-100 lb N/Acre—however, this is a function of fertilizer and hay price.