Florida Pasture Management for Beef Cattle Production

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Pasture fertilization is one of the most expensive costs in beef production. With the escalating fertilizer costs and concerns of over fertilization affecting water quality there has been a need to re-evaluate fertilizer recommendations for pasture grasses. Over the past 18 years, faculty at the Range Cattle Research and Education Center in collaboration with county agents in south Florida have conducted extensive studies throughout the state on the fertilizer requirements for pasture grasses grown in south Florida. Our research findings have shown that we can eliminate phosphorus and potassium fertilization for grazed bahiagrass without reducing yields or affecting quality (both digestibility and protein content) of the grass. The reasons that phosphorus and potassium can be eliminated are that pastures are generally grazed and a substantial percentage of nutrients are actually recycled back to the plant. Additionally, most perennial grasses have deep roots which can reach the hard pan that is naturally high in nutrients which are available to the plant. This has led to major revisions in the UF/IFAS fertilizer recommendations for bahiagrass, resulting in cost savings of millions of dollars to Florida ranchers. In addition, this has had a positive impact on surface and ground water quality.

Bahiagrass

Bahiagrass is one of the most popular perennial grasses grown in Florida for cattle production. It makes up 75% of improved pastures statewide. The main reasons are that it is a low maintenance grass and is fairly easy to establish from seed. There are currently three nitrogen options to choose for forage production. These options are based on the amount of forage one wants to obtain. Fertilizer for the various options should be applied in early spring to maximize the needed spring forage. It should be noted that there are currently no micro nutrient recommendations for perennial grasses grown in Florida. The reason is that the addition of micro nutrients has never been demonstrated to produce an economic increase in forage grass production in south Florida.

A summary of the current revised UF/IFAS fertilizer recommendations for bahiagrass are as follows:

- Low nitrogen option: (for grazed pastures only) Apply 50 pounds of nitrogen per acre and no phosphorus and potassium.

- Medium nitrogen option: Apply 100 pounds of nitrogen per acre. It is also suggested to apply 25 pounds P_2O_5 per acre if the soil tests low in phosphorus and 25 pounds K_2O per acre if the soil tests medium in potassium. No potassium should be applied if the soil tests high in potassium.

- High nitrogen option: Apply 160 pounds of nitrogen per acre. It is also suggested that one applies 40 pounds of P_2O_5 per acre if the soil tests low in phosphorus and 20 pounds of P_2O_5 if the soil tests medium. It is also currently recommended to apply 80 pounds of K_2O if the soil tests low in potassium and 40 pounds of K_2O per acre if the soil tests medium. No potassium should be applied if the soil tests high in potassium.

Proposed changes to current bahiagrass fertilizer recommendations

The University of Florida currently recommends that phosphorus and potassium not be applied to bahiagrass in southern Florida. This is because all studies conducted to date in south Florida show no

economic advantage from the addition of phosphorus, potassium, or micronutrients to bahiagrass pastures. There is still the question as to how long bahiagrass can go without phosphorus and potassium, thus it may be necessary to periodically apply small levels (25 pounds per acre) of phosphorus and potassium as an insurance policy against deficiencies. These reductions in phosphorus and potassium fertilizations should result in an even greater cost savings to ranchers in tough economic times**.** Please note that when making hay, nitrogen and some potassium must be applied after every cutting.

Stargrasses

Stargrass is an excellent source of high quality forage for cattle production in southern Florida, both for grazing and hay production. Proper fertilization of stargrasses is extremely important in order to obtain high yields of good quality forage. Overall, stargrasses have very high fertilization requirements compared to bahiagrass. Thus, it is essential that a proper fertility program be maintained for stargrasses.

As a general fertilizer recommendation, for grazed pastures apply 160 pounds of nitrogen per acre, 40 pounds of P_2O_5 per acre (if soil tests low or very low in phosphorus) and 80 pounds of K_2O per acre if soil tests very low in potassium or 40 pounds of K_2O per acre if soil tests low in potassium. Both the nitrogen and potassium rates should be split with half being applied in the early spring and the other half mid season. If the soil tests medium or high in phosphorus and potassium one does not need to apply either nutrient.

If the stargrass is going to be cut for hay, apply 80 pounds of nitrogen per acre. All of the phosphorus and potassium (as described above) should be applied in early spring. Apply an additional 80 pounds of nitrogen per acre and 80 pounds of K_2O per acre after each cutting.

Limpograss (Hemathria)

Limpograss has become a very popular grass grown for winter cattle feeding in Florida. When managed properly, limpograss can be a high yielding and good quality grass. Proper fertilization of limpograss is key to its success.

Research has been conducted at the Range Cattle Research and Education Center to evaluate the phosphorus and potassium requirements of limpograss. Our results indicate that limpograss does need low levels of phosphorus and potassium for its establishment and production. As a general fertilizer recommendation for limpograss one should apply approximately 300 pounds of a 20-5-10 per acre in the early spring, with an additional 50 pounds of nitrogen applied one or two times during the growing season, especially just before stockpiling of forage begins in the fall. We hope to have a revised fertilization recommendation for limpograss in the near future.

Soil Sampling and Testing

Soil testing consists of three parts: sample taking, laboratory analysis, and interpretations based on field correlation.

Sampling

The soil sample must be representative of the field from which it was taken. This is the most error-prone part of soil testing because the soil profile is variable and people are not always careful to sample accurately. The sample is very small in comparison to the volume it represents. One consolidated sample for every 20-acre area that is uniform is recommended by most soil testing labs and consultants when traditional management methods are employed. With traditional methods, the recommendations are based on entire field average and so the application of fertilizers is based on the averaged fertility level of the entire field, which is usually at one rate of fertilizer(s). Similarly, the yield is averaged for the entire field. Taking 20 cores per 20 acres represents about one millionth of the surface area. That's like taking 15 people to accurately represent the population of the entire state of Florida which reinforces the need for extreme caution.

Laboratory analysis

The methods used by the testing laboratory must be appropriate and the analyses must be performed properly. Each method has conditions that must be

met for the results to be valid. Reputable laboratories have trained personnel who control analytical quality and assure reliable results. It is important to approach a soil test lab that has a record of consistently offering quality analyses. Similarly, access to fertilizer recommendations that are based on soil test interpretations for the soils and crop(s) to be grown should be evaluated. A high confidence in the results obtained is necessary because comparing the results and recommendations across different labs is strongly discouraged.

Results interpretation

Interpretation of test results is what makes soil fertility testing relevant and a tool for plant nutrition management. Beware of the testing lab that doesn't interpret its results. In order to interpret soil test results in terms of crop fertilization needs, the yield responses to applied nutrients under varying soil test levels and field conditions are indispensable. Calibration of test results is a long-term process that requires years of field trials. The closer the conditions of the trials resemble the production conditions the more likely the tests will correctly predict fertility needs.

Basis for fertilizer recommendations

The key part of soil sampling and analyses is the fertilizer recommendation that accompanies each soil test report. This fertilizer recommendation forms the basis for all the remaining activities involving inputs into the production cycle. Therefore, it is important to adhere to the rates of nutrients recommended. Routinely, soils are tested for only two or three nutrient elements. The macronutrients, because they are used in large quantities, are more likely to be deficient so tests for them have received the most attention. It has been difficult to develop a meaningful test for nitrogen because of the dynamic nature of nitrogen in soil. Only under carefully defined conditions at the time of sampling is the nitrogen content meaningful in terms of what will be there during the plant's growing season. As a result, nitrogen is not routinely determined in soil fertility tests.

Phosphorus and potassium are almost always tested because they are frequently deficient (Table 1). Calcium and magnesium are often tested although they are less frequently deficient. Sulfur, like nitrogen, is seldom determined because of its dynamic nature in soil. Also, chemical analysis for sulfur is quite difficult. Soil tests for micronutrients are not generally done on a routine basis. Micronutrient deficiencies are less widespread than are macronutrient deficiencies, and testing is not usually necessary. Additionally, field responses to micronutrients are more difficult to study and calibrations of micronutrient soil tests are generally poorer than are calibrations for the macronutrients. Some of the micronutrient elements require difficult test procedures and cost limits their widespread use.

The reason for fertilizing is to get a plant yield or growth response and plant response is due to individual element needs. If one essential element is lacking or not in sufficient supply, the plant will be limited by that element even though all others are in abundance. Application of the limiting nutrient or nutrients will allow the plant to reach its potential provided some other non-nutritional growth factor is not limiting. Fertilizing with a nutrient that is not limiting growth will not make up for a deficiency of a nutrient that is limiting growth.

In the example of UF/IFAS soil test report for a stargrass field (Figure 1), the determined pH of 4.6 was lower than the target pH of 5.5 and the lab determined the need for the application of a ton of lime per acre. Since magnesium status of the soil was also low it would be preferable to use dolomitic instead of calcitic lime. Both phosphorus and potassium levels in the soil (<10 ppm) were very low and based on UF/IFAS standard fertilizer recommendations for stargrass, the report suggests the application of 40 and 80 pounds per acre of P_2O_5 and K_2O, respectively.

Table 1. Current interpretation for Mehlich-1 soil test results for agronomic and vegetable crops.

	Very Low	Low	Medium	High	Very High
	----------ppm----------				
P	<10	10-15	16-30	31-60	>60
K	<20	20-35	36-60	61-125	>125
Mg	--	<15	15-30	>30	

Figure 1. UF/IFAS soil test report and standard fertilization recommendations.

UF/IFAS EXTENSION SOIL TESTING LABORATORY

Wallace Building 631 PO Box 110740 Gainesville, FL 32611-0740

Email: soilslab@mail.ifas.ufl.edu Web: soilslab.ifas.ufl.edu

Producer Soil Test

For further information contact:

TO: Adjei, Martin
Experiment Station

Ona, FL 33865

Tel: 863-735-1314

Gary, Lochrane A.3401
Hardee County Coop Extn. Service

507 Civic Center Dr

Wauchula, FL 33873-9460

Tel: 863-773-2164

Email:lagary@mail.ifas.ufl.edu

Client Identification: 1 Set Number: 1808 Lab Number: 70822

Crop: Improved perennial Grasses other than Bahiagrass Report Date: 6-Jan-05

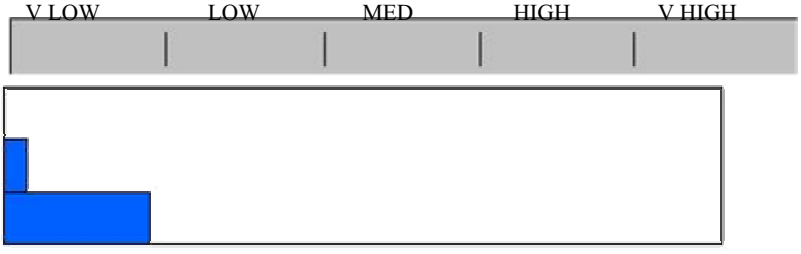
These interpretations and recommendations are based upon soil test results and research/experience with the Specified crop under Florida's growing conditions. We do not test soil for N as there is no meaningful soil test for predicting N availability. Thus, the N recommendation was developed from research that measured response of the indicated crop to applied N fertilizer. If you expect significant nutrient release from organic sources such as crop residues or organic amendments, estimate the amount mineralized and subtract that amount from the fertilizer recommendations given below to arrive at crop needs.

SOIL TEST RESULTS AND THEIR INTERPRETATIONS

Target pH: 5.5

pH (1:2 Sample:Water) 4.6
A-E Buffer Value: N/A

MEHLICH-1 EXTRACTABLE



PHOSPHORUS	(ppm P)	0
POTASSIUM	(ppm K)	3
MAGNESIUM	(ppm Mg)	0
CALCIUM	(ppm Ca)	0

LIME AND FERTILIZER RECOMMENDATIONS

Crop: Improved perennial grasses other than bahiagrass(bermuda,digit,limpo,star)

Lime: 2000 lbs per acre (1 Ton = 2000 Lbs)

Nitrogen: 160 lbs per acre

Phosphorus: (P_2O_5) 40 lbs per acre

Potassium: (K_2O) 80 lbs per acre

Footnotes are printed wherever applicable. These footnotes are an integral part of fertilization recommendations.
Please read them carefully.
See Footnote(s): 124 125 126 Print Date: 29-Mar-05

Notes: