Progress in the UGA Forage Testing Program

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The development of EPDs, the Georgia Beef Challenge and the heifer evaluation programs have allowed many beef producers to extensively test and evaluate genetic progress of their animals. While these tools help improve the efficiency of individual farms and the industry in general, it is astonishing that few producers take the time to evaluate one of the most fundamental aspects of cattle production: the forage component. Take a moment and reflect on how much operating money is spent on fertilizing or weed control in pastures and the importance of good forage management is to the bottom line is evident. In past articles, methods of establishing and grazing various forage species have been discussed. However, in most articles we have not addressed the importance of forage quality.

Beef producers can benefit from knowing the quality of their forage and matching forage quality to animal production level. This can be accomplished through forage testing and by altering management of hay and grazing operations. Submitting hay samples for testing can (1) decrease unnecessary animal supplementation, (2) define the supplementation needed to get cattle in condition to rebreed (3) indicate forages that contain toxic substances such as nitrates so that proper management can be implemented to avoid deaths and (4) provide insight into management changes that may need to be made. In the past year the forage testing program has greatly changed how samples are tested and is in the process of making the program even more accurate and timely. In this article, we will outline some of these changes and update what is on the horizon.

Forage Testing: The past…

Most forage labs in the United States currently analyze hay and forage samples using traditional "wet" chemistry. "Wet" chemistry simply means that traditional lab procedures using acids and other chemicals are used to determine plant composition. After plants have been chemically analyzed for nitrogen, cellulose, hemicellulose, minerals and other chemical compounds, these values are entered into an equation that predicts protein and energy content. Once a producer has these values, supplements can be selected to meet animal nutrient requirements and improve productivity.

There are a few problems with using wet chemistry values to predict protein and energy content of Georgia forages. First, protein prediction using routine wet chemistry typically does not account for unavailable or "bound" protein. This protein is typically associated with heat-damaged forages where the nitrogen is bound to plant fiber and cannot be digested and absorbed by cattle. To identify this unavailable protein, more intensive testing procedures are needed which increase the time and cost of analysis.

Second, because of the chemicals and labor needed to evaluate forages using wet chemistry, costs of analyzing forages were perceived as too expensive (i.e. $20-$28 per sample at the UGA lab). While this cost can easily be offset through supplement savings

or improved animal performance, most forage producers viewed it as too expensive and refused to submit samples.

Third, the current equations used to predict energy content were developed in another area of the United States using predominantly cool season grasses. These equations have been validated on warm season grasses in Georgia and Florida, and predict energy content fairly well. However, it is obvious that they are being used outside of their intended scope and an updated equation that incorporates bermudagrass and bahiagrass is needed.

Forage Testing: The present…
Many of the three "problems" above have already been addressed and solutions have been implemented in the UGA forage testing lab. Recently, it has become possible to analyze forages using near infrared (NIR) light sources and the lab was equipped with a NIR analyzer. Near infrared light is not visible to the human eye, but using different wavelengths of light in this spectrum allow the proportion of certain chemical bonds in the forage to be determined.

While this sounds complicated or difficult, the bottom line is this: the new NIR equipment allows us to predict almost all of the wet chemistry values in less than five minutes and without the costs of chemicals. This decreases the cost to farmers submitting samples and the time required for forage analysis. Cost of analysis has decreased from about $25 per sample to $10 per sample (includes crude protein, energy content and nitrate level). We are confident, based on recent testing, that the NIR measurements are as accurate as wet chemistry. Forage testing results can normally be returned to your county office the day after samples are received at the testing lab.

Forage Testing: The near future…
Current equations are fair predictors of energy, but there is certainly room for improvement. Currently equations predict the digestibility of hay directly from fiber content, regardless of forage species or variety. The current equations probably perform adequately when evaluating the same bermudagrass variety. For example, Coastal bermudagrass with a NDF content of 60% will probably contain more energy than Coastal bermudagrass hay containing 70% NDF. But problems arise when comparisons are made between different varieties or species of forages. For example, will the energy content of Tifton 85 bermudagrass that contains 60 %NDF be equal to Coastal that also contains 60% NDF? In all likelihood it will not since Tifton 85 is normally more digestible than Coastal. Also consider a bahiagrass hay sample with the same 60% NDF as the Coastal and Tifton 85 sample. Would this bahiagrass have the same energy content as these bermudagrasses? In all likelihood, it also would not, but current prediction equations cannot distinguish between these varieties or species.

To overcome these problems, we have begun to replace the current equations. Instead of measuring fiber content and using an equation to predict energy content, we are developing a direct prediction of digestibility that should be a stronger and more accurate predictor of forage quality. This equation will be useful for several warm season forages

like bermudagrass, bahiagrass, sorghum-sudan and millets and should overcome the problems mentioned above. A further benefit is that these energy prediction equations will be made using the new NIR system. This will keep costs and analysis time low. We will also test and implement a similar equation specific for cool season forages for producers who bale ryegrass and tall fescue hay or silage. Sample collection for equation development has begun. Your local county agents are intimately involved in this process so that equations will apply across Georgia and the Southeastern United States. Multiple samples that vary in species, hybrid, quality, and fertility will be needed to develop accurate equations. If you wish to contribute hay samples to this project, contact your county agent. Results received will be well worth the $10 sample fee.

As you can see, we are actively working to improve forage quality predictions from the UGA and other forage testing labs. Beef cattle and hay producers will directly benefit from this work by receiving accurate energy values that will aid in supplementation decisions and hay pricing.