APPLICATION OF GROWTH CURVES AND NUTRITIONAL QUALITY OF FORAGES IN GRAZING MANANGEMENT TOOLS TO MEET ANIMAL NEEDS

Joel L. Douglas[1], Charles R. Stanley[1], Homer Sanchez[1], Kenneth E. Spaeth[1], Arnold J. Norman[1], George L. Peacock[1], Gary L. Rea [2], Robert D. Ziehr[2]

ABSTRACT: The Ecological Site Information System (ESIS) database contains information on rangeland and forestland ecological parameters. These parameters are collected by the USDA-Natural Resource Conservation Service (NRCS) from selected field sites over multiple years, landscapes, and locations to develop Ecological Site Descriptions. One parameter of interest is the collection of growth curve data on species inventoried on different ecological landscapes. Growth curve data is collected on an annual production by month and year basis, and stored in the NRCS, ESIS database. This data is harvested from ESIS and used in decision making tools such as the Grazingland Spatial Analysis Tool (GSAT) to assist producers in developing livestock stocking rates based on forage inventories and needs of the grazing animal. Therefore, having access to annual growth curve data of specific vegetation is imperative in the decision making process. Nutritional Analyzer Balance (NUTBAL) is another management support tool that livestock producers can use to better understand livestock nutritional needs. We will illustrate how production and quality estimates from a recent growth curve study of 'Selection 75' kleingrass (*Panicum coloratum* L.) and 'San Marcos' eastern gamagrass [*Tripsacum dactyloides* (L.) L] is stored, displayed and utilized in decision support tools such as Grazing Land Spatial Analysis Tool (GSAT) and for determining nutritional needs of livestock using NUTBAL reports.

Keywords: Ecological Site Information System, Grazing Land Spatial Analysis Tool, Nutritional Analyzer Balance, growth curves, eastern gamagrass, kleingrass

Introduction

Forage growth curves are used to make decisions on stocking rates and timing of grazing rotations based on plant growth and animal demands. Growth curves of forages reported in ESIS database are collected annually by month over multiple years, locations and landscapes (USDA, NRCS, 2003). This data is used in developing ecological site descriptions, and in decision support tools to assist livestock producers in managing forages to meet the needs of grazing animals. GSAT and NUTBAL are examples of decision support tools used by the USDA-NRCS to aid grazing managers in achieving production goals.

'Selection 75' kleingrass and 'San Marcos' eastern gamagrass are warm season perennial grasses released by the USDA-NRCS James E. "Bud" Smith Plant Materials Center (PMC), Knox City, Texas in cooperation with AgriLife, College Station, Texas. Growth curves of these two forages are currently being developed through monthly clippings on replicated plots at the PMC. In addition to biomass, forage quality estimates of crude protein (CP) and *In* vitro dry matter digestible is being collected monthly. We will illustrate how the data collected from the study is stored and displayed in ESIS and how it is used to produce growth curves in GSAT. Nutritional Analyzer Balance reports can be generated and used by grazing managers to make grazing management decisions.

[1] USDA/Natural Resources Conservation Service, 501 West Felix St., Bldg 23., Fort Worth, Texas 76115, tel.: 817-509-3419 joel.douglas@ftw.usda.gov, charles.stanley@ftw.usda.gov, homer.sanchez@ftw.usda.gov, kenneth.spaeth@ftw.usda.gov, arnold.norman@ftw.usda.gov, george.peacock@ftw.usda.gov [2] USDA/Natural Resources Conservation Service, 3776 Farm Rd. 1292, Knox City, Texas 79529, tel.: 940-658-3922, gary.rea@tx.usda.gov, robert.ziehr@ftw.usda.gov

Discussion

The Ecological Site Information System is the repository for data collected from forestland and rangeland plots. Data collected from kleingrass and eastern gamagrass was entered into ESIS as a percentage of the total production by month beginning in April and ending in November (Figure 1). The Grazing Land Spatial Analysis Tool extracts monthly production from the ESIS database to produce an annual growth curve. The growth for kleingrass is shown in Figure 2. This growth curve can be used to develop a Forage-Animal Balance, which ensures that kleingrass forage produced or available meets the forage demand of livestock and/or wildlife (Figure 3).

Forage quality estimates of CP and digestibility of kleingrass and eastern gamagrass in April-November are presented in Figures 4-5. Also presented are CP and digestibility needs of a 1200 pound lactating cow (NRC, 1996). With NUTBAL reports, grazing managers have access to their animal's nutritional needs, choice of the most cost efficient feed alternative, along with the amount to feed, and costs per day, feed value for forages, and a better understanding of the nutritional needs of their livestock as they change throughout the year.

Conclusion

Knowledge of growth curves and nutritional values of forages, coupled with grazing management tools such as a GSAT and NUTBAL, are important parameters needed by grazing managers to meet their specific livestock needs and achieve production goals.

References

National Research Council. 1996. Nutrient requirements of beef cattle. 7th ed. National Acad. Press, Washington, DC.

USDA-NRCS. 2003. Ecological Site Information System. http://esis.sc.egov.usda.gov/ESIS/, accessed 8 December 2009.

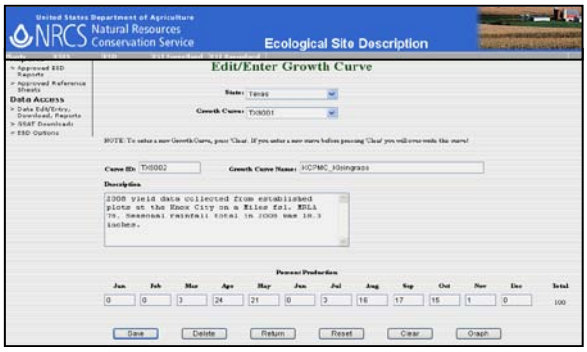

Figure 1. Percentage of biomass production of kleingrass from March-November.

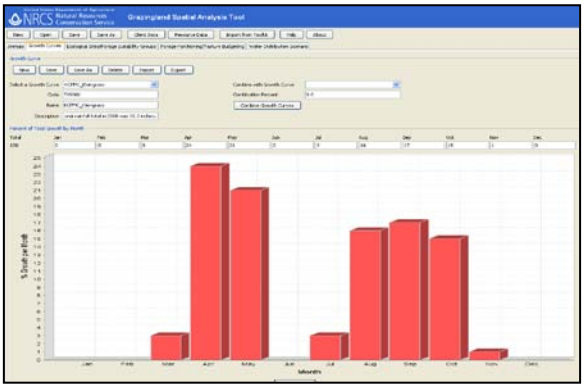

Figure 2. Growth curve of kleingrass produced in GSAT.

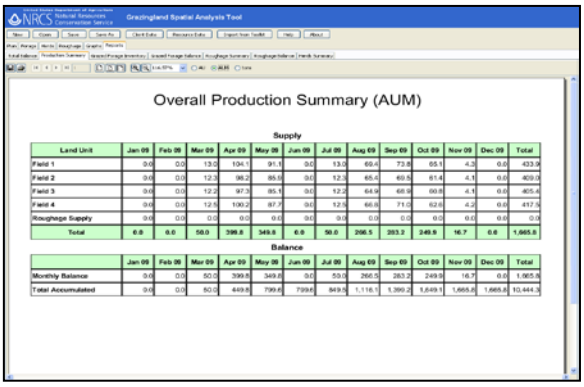

Figure 3. Animal unit month report in GSAT for kleingrass based on growth curve in figure 2.

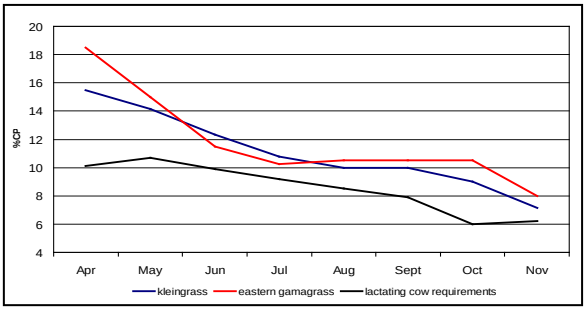

Figure 4. Crude protein of kleingrass and eastern gamagrass from April-November and the crude protein needs of a 1200 pound lactating cow (March calving) (NRC 1996).

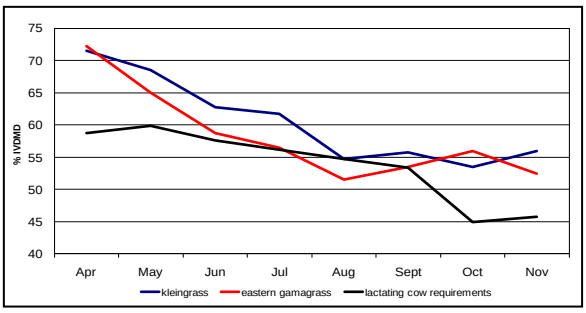

Figure 5. Digestibility of kleingrass and eastern gamagrass from April-November and digestibility needs of a 1200 pound lactating cow (March calving) (NRC 1996).