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Eastern Gamagrass Forage Performance At Jimmy Carter Plant Materials Center Americus Georgia

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INTRODUCTION

In the southeastern United States, forage producers have relied on introduced species such as, bermudagrass [*Cynodon dactylon* (L.) Pers.] for a major component of their forage programs (Ball et al., 1991). However there has been an increase in demand for native forage species for summer grazing (Burns et al.,1992), hay production and silage (Brejda et al., 1994).

One of these natives is eastern gamagrass [*Tripsacum dactyloides* (L.) L.], a native, warm season, tall perennial bunch grass that produces forage for grazing and hay production. It naturally occurs from Massachusetts, west to Michigan, Iowa and Nebraska, south to Florida, Oklahoma, and Texas. Therefore, eastern gamagrass occurs under a wide variety of growing conditions. The Plant Material Program in Georgia became interested in eastern gamagrass after researchers and cattlemen in the Midwest and Northeast had positive results grazing eastern gamagrass. This interest was amplified by a strong regional and national effort to use native plants for conservation and cattle production. A project was initiated in 1993 by the USDA, Natural Resources Conservation Service (NRCS), Jimmy Carter Plant Materials Center (PMC), Plant Materials Specialist (Georgia), NRCS, Regional Grazing Lands Specialist, Fort Valley State University, NRCS, Lamar County and the Lamar County Soil and Water Conservation District to demonstration the use of eastern gamagrass in the southeastern U.S. in a rotational grazing system.

EASTERN GAMAGRASS PASTURE ESTABLISHMENT

A 5 acre field of 'Pete' eastern Gamagrass was planted in 36-inch rows using a corn planter in the spring of 1993. This demonstration (non replicated trial) is located in the upper coastal plain of Southwest Georgia where mean annual precipitation is 49 inches.

The study area is on Lucy loamy sand located in the southern section of the Jimmy Carter PMC Americus, Georgia. The site was deep bottom plowed, and leveled with a disk harrow. The seed was planted approximately 1½ inches deep at a rate of 14 pounds pure live seed per acre.

ROTATIONAL GRAZING SYSTEM

The site was divided into ten, 0.5 acre paddocks with a single strand of electric fence wire about 35 inches high. Cattle were rotated through the ten paddocks with 2.5 – 3.5 days grazing period in each paddock for 3 to 4 grazing cycles each year. After each cycle the eastern gamagrass stand was evaluated for vigor and growth. Cattle grazed the rotational system from May – September while leaving 10 inches of plant stubble after each grazing event. Maintaining a 10 inch stubble height is critical for eastern gamagrass persistence. Severe degradation of the pasture can occur if consistently grazed to a lower height. Initial soil test recommended 600 pounds of 10-10-10 fertilizer per acre. Fifty (50) pounds of nitrogen was applied per paddock after each grazing event. Water was provided to each paddock using one-inch plastic pipe and 60 gallon water troughs. The entire demonstration area was burned each year in late winter beginning in 1999 to maintain productivity, improve the nutrient content and increase digestibility of the grass (Lewis et al., 1982).

Each year from 1999 through 2004 eastern gamagrass was grazed with 10-12 stockers weighing between 550 and 650 pounds each. Steers (1999-2000) and heifers (2001-2004) grazed the demonstration site. Demonstration was not grazed until 1999 because of lack of cattle

availability. The animals were tagged, weighed, vaccinated, wormed and treated for flies. Manure samples were taken periodically to determine crude protein of forage consumed.

CATTLE RESPONSE

During six years of grazing the study site, a stocking rate of 2.0-2.4 stockers per acre was maintained. Under the rotational grazing system, steers produced an average daily gain (ADG) of about 1-2/3 pounds (Table 1). Heifers varied from year to year but produced an ADG of about 1 pound (Table 2). Other studies have evaluated cattle response to rotationally grazing eastern gamagrass. Rotational stocking on eastern gamagrass was conducted on a bottomland site in western Oklahoma (Gillen, unpublished data). Rotational stocking used 4 paddocks, 10-day graze periods, and 30 day rest periods. Average daily gain ranged from 2.72 pounds in May to 1.45 pounds in August. On an upland loamy site in western Oklahoma, eastern gamagrass was rotationally grazed. It was also grazed in May and August. Average daily gains were 2.65 pounds in May and 1.32 pounds in August (Gillen et al. 1999).

Tests have also been conducted using continuously grazed systems. In Arkansas, Aiken (1997) stocked yearling steers continuously at 3 stocking densities until a target canopy height (12 to 15 inches) was reached. Initial stocking densities were 1.2, 2, or 3 steers per acre and the respective grazing seasons were 140, 116, and 86 days, respectively. Average daily gain ranged from 1.6 pounds in early May to no gain in late September. In North Carolina,

eastern gamagrass was stocked continuously from early May to late August (Burns et al. 1992). Stocking density was adjusted to maintain a stubble height of 8 to 13 inches. Average daily gain over the last two-thirds of the grazing period was 1.8 pounds.

The mean body condition or score of the animals starting the rotational grazing at the Jimmy Carter PMC was rated medium to good. After the rotational grazing cycles were complete, a body condition of good was given to the cattle. The body condition was maintained even during periods of drought (Table 3).

Table 1. Average Daily Gain of Stocker Steers at the USDA-NRCS Jimmy Carter Plant Materials Center Americus, Georgia, 1999-2000.

Year	-- lb head^{-1} day^{-1} --
1999	1.74
2000	1.50
Mean	1.62

Table 2. Average Daily Gain of Stocker Heifers at the USDA-NRCS Jimmy Carter Plant Materials Center Americus, Georgia, 2001-2004.

Year	-- lb head^{-1} day^{-1} --
2001	1.36
2002	1.10
2003	.96
2004	.44
Mean	.96

Table 3. Average Rainfall During Growing Season May-September at the USDA- NRCS Jimmy Carter Plant Materials Center, Americus, Georgia, 1999-2004.

1999	2000	2001	2002	2003	2004
---------- inches month $^{-1}$----------					
2.1	3.0	5.2	3.83	5.2	7.4
----------Deviation from Average since 1929 inches month $^{-1}$----------					
-1.9	-1.0	+1.2	-.2	+1.2	+3.3

EASTERN GAMAGRASS PRODUCTION and FORAGE QUALITY

Yields from previous tests conducted at the Jimmy Carter PMC have shown that 'Pete' eastern gamagrass produces 8000 pounds of dry matter per acre in spring and 3000 pounds in late summer. Other studies indicate forage production of eastern gamagrass has ranged from 7,110 pounds of dry matter per acre in western Oklahoma to 22,290 pounds of dry matter per acre in eastern Texas (Brakie 1998). Close to the geographic origin of 'Pete', it produced 7.9 tons of dry matter per acre in southern Illinois (Aiken, 1997). Nutritive value of eastern gamagrass is high during early growth with crude protein commonly above 15% (Gillen et al., 1999). Nutritive value declines rapidly and falls below 8% crude protein by mid July. By August, nutritive values are 6 to 7 % for crude protein (Aiken 1997, Gillen et al. 1999). Burns et al. (1992) reported diet crude protein levels of 19.5% and 16.5 % in May and July respectively. Fecal sample tests at the Jimmy Carter PMC indicate crude protein ranged from 14 to 11 % over the growing season. After six years of rotational grazing at the Jimmy Carter PMC the stand of 'Pete' declined 20-30%. The use of indirect measurements of forage availability such as forage height instead of direct forage measurement could account for stand loss due to overgrazing in the system.

SUMMARY

Eastern gamagrass produced somewhat lower average daily gain for cattle in the rotational system and lower dry matter production than other studies possibly because the cultivar 'Pete' is on the edge of its adaptive range in southwest Georgia. More positive results might be achieved with the use of a more adaptive cultivar. However, results suggest eastern gamagrass forage quality and quantity is adequate for typical livestock operations in the Southeastern U.S.

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