Seasonal Growth and Nutritional Quality of 7 Warm Season Perennial Grasses in the Texas Rolling Red Plains

Helping People Help the Land

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Introduction

Nutritional quality of forages is important to livestock producers as they make pasture and grazing management decisions based on the nutritional needs of the grazing animal. Understanding growth and nutritional quality of warm season grasses is needed in the Texas Rolling Red Plains to assist livestock producers with forage management options. Our study objective is to compare the seasonal growth and nutritional change of seven warm season perennial grasses to determine optimum forage harvest and grazing times to meet nutritional needs of different beef cattle.

Materials and Methods

The study was conducted at the USDA-NRCS James E. "Bud" Smith Plant Materials Center, Knox City, Texas on a Miles fine sandy loam soil.

Grasses were drilled in May 2006 using NRCS seeding rate recommendations for Texas.

7-ft x 22-ft plots were arranged in a randomized complete block with 3 replications. Nitrogen was applied at 5 and 60 lb/acre at the 3rd leaf stage.

Plots were divided into 8 quadrants. Each quadrant represents a monthly clipping date of April to November. Growth stage and plant height were collected prior to harvest.

Warm Season Grass Cultivars

'Earl' big bluestem (*Andropogon gerardii*)

'Lometa' Indiangrass (*Sorghastrum nutans*)

'Haskell' sideoats grama (*Bouteloua curtipendula*)

Plots were harvested in 2007 and 2008 by clipping a 50-cm x 50-cm swath from each quadrant. Biomass yield and forage quality estimates of crude protein (CP) and digestibility (in vitro dry matter digestibility (IVDMD) were collected every 30 days from April to November.

'Alamo' switchgrass (*Panicum virgatum*)

'San Marcos' eastern gamagrass (*Tripsacum dactyloides*)

'Selection 75' kleingrass (*Panicum coloratum*)

Upland switchgrass (*Panicum virgatum*)

Plant Height and Growth Stage of Warm Season Grass Cultivars

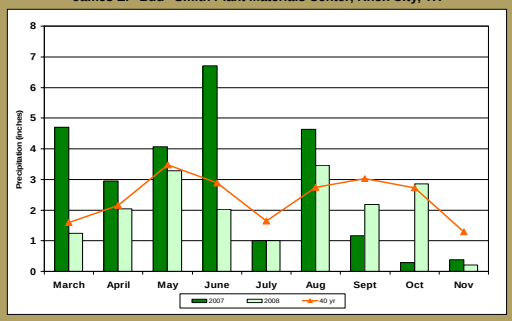
Cultivars		Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
		----------inches----------							
Alamo Switchgrass	PH[1]	27	48	58	72	75	78	82	84
	GS[2]	V	LV	LV	Bt	SD	SD	SS	S
Earl Big bluestem	PH	10	22	24	48	50	53	55	59
	GS	V	V	LV	Bt	SD	SD	SS	S
Selection 75 Kleingrass	PH	12	44	39	41	38	36	33	40
	GS	V	SD	SD	SS	S	S	S	S
San Marcos Eastern gamagrass	PH	13	33	51	66	55	40	30	27
	GS	V	LV	Bt	SD	SS	SS	S	S
Haskell Sideoats grama	PH	10	15	30	37	36	35	36	35
	GS	V	Bt	SD	SS	SS	S	S	S
Upland Switchgrass	PH	17	41	47	55	59	60	63	66
	GS	V	LV	LV	Bt	SD	SD	SS	S
Lometa Indiangrass	PH	16	28	29	41	42	42	57	60
	GS	V	V	LV	LV	LV	Bt	SD	SS

[1] **PH** = Plant height. Plant height was taken at random from 5 locations within the plot from the base of the plant to the top of the inflorescence.

[2] **GS** = Growth Stage where **V** = vegetative leaf development; **LV** = beginning of stem elongation/first or second node visible; **Bt** = boot stage/reproductive development (inflorescence beginning to emerge to post anthesis); **SD** = Seed development (seed visible to mature seed); **SS** = seed shattering, **S** = seed shattered)

2007-2008 and 40 Year Average Rainfall

James E. "Bud" Smith Plant Materials Center, Knox City, TX



Crude Protein and Digestibility Needs of Different Beef Classes (National Research Council, 1996)

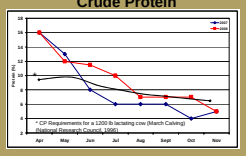
Beef Cattle Class	Age	Weight	CP	DOM
		-----lb-----	----------%----------	
Steer*	7 mo	500	15	63
Heifer*	8 mo	500	14	59
Dry cow	5 - 10 yr	1200	7	52
Lactating cow	5 - 10 yr	1200	10	58
Mid pregnant cow	5 - 10 yr	1200	9	57

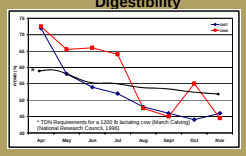
* 1.5 lb/day gain

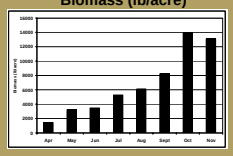
Results (2007-2008)

Crude Protein | **Digestibility** | **2008 Monthly Accumulative Biomass (lb/acre)**

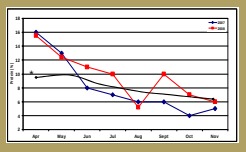
Alamo switchgrass

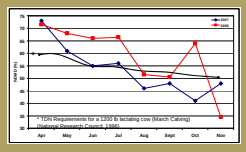


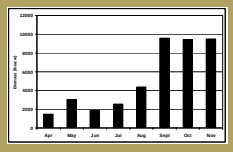




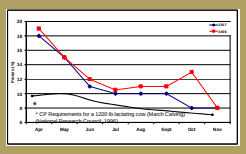
Upland switchgrass

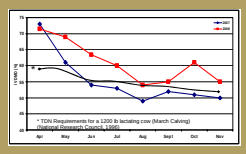


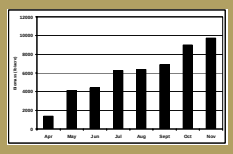




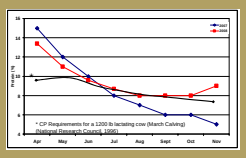
San Marcos eastern gamagrass

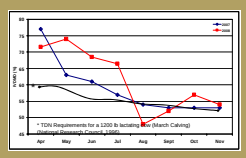


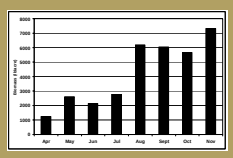




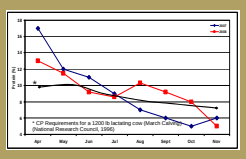
Lometa Indiangrass

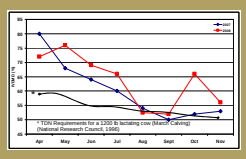


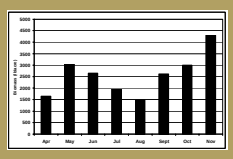




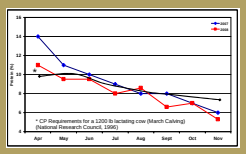
Earl big bluestem

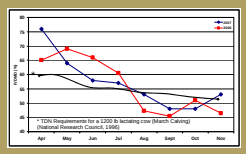


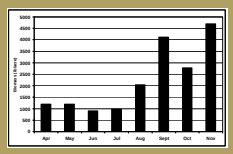




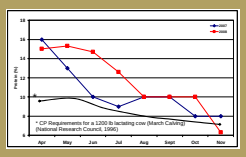
Haskell sideoats grama

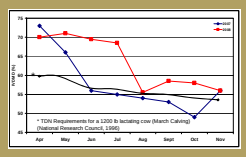


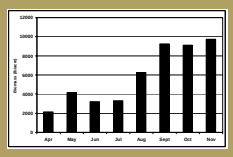




Selection 75 kleingrass







Summary

- Nitrogen fertilizer increased CP percentage in 2007-2008, and biomass production in 2008. However, the increase was minimal and not statistically significant (data not shown).
- Crude protein and digestibility decreased monthly as the phenological growth stage of the grasses changed from vegetative to seed maturity. Forage quality estimates were highest in April-July (vegetative and boot stage) and declined as the grasses reached reproductive stage.
- An increase in digestibility of the grasses in October 2008 may be explained by the increase in late summer and early precipitation which was near or above normal.
- Biomass accumulation for most of the grasses occurred early (May-July) with the highest accumulation in August and September as a result of late summer and early fall precipitation.
- All of the grasses provided all or partial minimum CP and digestibility requirements throughout the season for a 1200 lb lactating cow.
- 'San Marcos' eastern gamagrass and 'Selection 75' kleingrass provided all of the CP (2007-2008) and digestibility (2008) requirements for a 1200 lb lactating cow. These grasses also produced considerable amounts of biomass to compliment forage quality.
- Under proper utilization and management warm season grass cultivars investigated in this study can provide the nutritional needs of different beef classes, physiological status, and performance.
- Contact your local NRCS office, plant materials center or extension specialist for adaptability and planting information on these and other grasses.

Reference

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

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