

Warm Season Grass Trial

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Introduction

The cool season species commonly used in foothill and valley irrigated pastures are not very productive during the hot summer months. Only dallisgrass, a warm season grass, remains productive during July and August. Warm season grasses, being of tropical origin, have a high optimum temperature for growth and therefore do quite well under hot summer temperatures. Additionally, several warm season grasses are drought tolerant, producing green forage with as little as three inches of precipitation per month.

The objective of this study is to test several warm season grasses for their adaptability to foothill irrigated pastures during the summer and to determine yield response to adequate and reduced irrigation. The irrigation treatments are not reported in this progress report.

This project was initiated with a grant from the California Cattlemen's Association and seed from the USDA Soil Conservation Service Plant Material Centers.

Procedure

The trial is being conducted at the UC Sierra Foothill Range Field Station in Yuba County at an elevation of 1000 feet. Land preparation was conducted from summer, 1984, through spring, 1985. On June 10, 1985, treble superphosphate (0-40-0) was applied at the rate of 400 lbs/a. Six replications of 20 plots each were laid out. Irrigation water delivery was delayed until late July 1985.

On July 25, 1985, 16 of the 20 entries were seeded. On August 13, 1985, the buffelgrass entry was seeded and the stoloniferous entries were transplanted.

Sudangrass was the first entry to emerge and required clipping on August 15, 1985. All entries were mowed and fertilized with ammonium nitrate at the rate of 40 lbs/a of nitrogen on September 20, 1985. All warm season grasses were dormant by early December.

The buffelgrass and sudangrass entry did not survive the winter of 1985-86. On May 20, 1986, the buffelgrass and sudangrass entries were replaced with Verde kleingrass and laurisagrass. All replications were irrigated weekly. The trial was fertilized twice each year in the spring and summer with approximately 50 lbs of N as ammonium nitrate.

On May 20, 1986, the plots were mowed for weed control purposes. Yield was measured in 1986 on June 10, July 9, August 15, and September 25 and in 1987 on May 15, June 16, July 15, August 18, September 15, and October 15.

Results and Discussion

Table 1 reports the dry matter yields for 18 entries that were harvested on all four harvest dates in 1986. Table 2 reports the total yield for the last two harvest and includes the yield of Verde kleingrass and laurisagrass that were added to the trial in June 1986. Tables 3-6 report protein, ADF, NDR, and ash on four harvest dates in 1986. Table 7 reports the yields for 1987 except for perennial ryegrass which died early in the summer. Neutral detergent residue (Table 5) is an indicator of digestibility. As NDR increases digestibility decreases.

In 1986 switchgrass was the most productive over four harvests followed by indiangrass, sand lovegrass, and side-oats grama. Sand lovegrass is an exotic used in the southwestern states where summer rainfall occurs naturally on these rangelands. The other three are natives of the North American Prairie. In 1987 indiangrass, big bluestem, Lehmann's lovegrass, little bluestem, and Boer lovegrass were most productive.

The cool season grasses, tall fescue, perennial ryegrass and orchardgrass, were least productive over four harvests in 1986 and six harvests in 1987. The stoloniferous entries, bermudagrass and limpograss, were among the least productive of the warm season grasses in both years. Perennial ryegrass died during the summer of 1987.

Table 1 Total forage dry matter yield for the warm season grass trial at UC Sierra Foothill Range Field Station harvested monthly from June - September, 1986

Common Name	Variety	Yield (lbs/a)	
Switchgrass	Kanlow	9620	A
Indiangrass	Osage	9216	AB
Sand Lovegrass	Bend	8684	ABC
Sideoats Grama	El Reno	8512	ABC
Lehmann's Lovegrass		7768	BCD
Little Bluestem	Aldous	7760	BCD
Kleingrass	Selection 75	7720	BCD
Dallisgrass	Common	7572	BCD
Big Bluestem	Kaw	7200	CDE
Boer Lovegrass	Catalina	7144	CDE
Bermudagrass	Coastcross 1	6700	DEF
Bermudagrass	Tifton 68	6572	DEF
Bahia grass	Pensecola	6108	DEF
Bermudagrass	NK Pasto Rico	5520	EF
Limpograss	Bigalta	5432	F
Tall Fescue	Fawn	3760	G
Orchardgrass	Akaroa	3476	G
Perennial Ryegrass	Ariki	2444	G

Yields followed by the same letter are not significantly different ($p=0.05$).

Table 2 Total forage dry matter yield for the last two harvests of the warm season grass trial at UC Sierra Foothill Range Field Station in August and September, 1986.

Common Name	Variety	Yield (lbs/a)	
Kleingrass	Verde	4450	A
Lehmann's Lovegrass		4218	AB
Sand Lovegrass	Bend	3976	ABC
Switchgrass	Kanlow	3958	ABC
Sideoats Grama	El Reno	3718	ABCD
Kleingrass	Selection 75	3642	ABCD
Bermudagrass	Coastcross 1	3636	ABCD
Indiangrass	Osage	3564	ABCD
Laurisegrass		3454	ABCD
Limpograss	Bigalta	3186	ABCD
Little Bluestem	Aldous	3140	ABCD
Bermudagrass	Tifton 68	2990	BCDE
Big Bluestem	Kaw	2950	BCDE
Dallisgrass	Common	2908	BCDE
Boer Lovegrass	Catalina	2656	CDE
Bahia grass	Pensecola	2536	DEF
Bermudagrass	NK Pasto Rico	2468	DEF
Tall Fescue	Fawn	1770	EFG
Orchardgrass	Akaroa	1304	FG
Perennial Ryegrass	Ariki	804	G

Yields followed by the same letter are not significantly different ($p=0.05$).

Table 3 Protein (%) on four harvest dates in 1986.

Common Name	Entry	June	Jul	Aug	Sept
Bermudagrass	Coastcross 1	5.01	7.27	8.52	8.80
Bermudagrass	Tifton 68	10.24	8.56	9.72	9.07
Bermudagrass	NK Pasto Rico	6.29	7.23	7.92	6.66
Limpograss	Bigalta	7.20	8.11	8.33	7.05
Big Bluestem	Kaw	6.79	7.06	7.78	7.86
Sideoats Grama	El Reno	-	5.80	8.08	6.76
Boer Lovegrass	Catalina	10.85	5.01	7.32	6.60
Lehmann's Lovegrass		4.32	6.55	7.50	7.08
Sand Lovegrass	Bend	3.84	5.80	8.61	7.90
Kleingrass	Selection 75	5.58	7.01	7.90	8.58
Switchgrass	Kanlow	10.12	6.57	9.72	8.75
Dallisgrass	Common	6.64	7.21	7.99	7.58
Bahiagrass	Pensecola	7.71	7.25	12.49	8.31
Indiangrass	Osage	4.29	6.88	9.49	7.51
Little Bluestem	Aldous	8.46	7.34	9.09	8.98
Laurisagrass				8.63	8.02
Kleingrass	Verde			10.33	8.95
Orchardgrass	Akaroa	5.07	10.74	15.23	14.20
Tall Fescue	Fawn	6.91	11.05	15.68	13.27
Perennial Ryegrass	Ariki	7.45	9.29	11.51	16.84

Table 4 ADG (%) on four harvest dates in 1986.

Common Name	Entry	June	Jul	Aug	Sept
Bermudagrass	Coastcross 1	37.65	39.18	38.42	38.03
Bermudagrass	Tifton 68	37.00	41.00	37.62	38.86
Bermudagrass	NK Pasto Rico	36.36	37.23	36.00	36.94
Limpograss	Bigalta	34.83	38.68	35.67	38.64
Big Bluestem	Kaw	36.92	41.63	37.59	39.48
Sideoats Grama	El Reno	38.30	42.96	39.28	42.45
Boer Lovegrass	Catalina	39.51	43.19	40.57	43.11
Lehmann's Lovegrass		41.82	45.85	44.31	45.15
Sand Lovegrass	Bend	34.74	36.00	36.55	40.37
Kleingrass	Selection 75	33.62	34.67	36.52	35.33
Switchgrass	Kanlow	36.32	36.47	35.13	36.06
Dallisgrass	Common	42.45	44.80	43.21	43.66
Bahiagrass	Pensecola	37.07	40.75	39.79	40.20
Indiangrass	Osage	41.41	44.51	42.32	44.17
Little Bluestem	Aldous	40.54	43.51	40.63	41.70
Laurisagrass		.00	.00	37.33	39.28
Kleingrass	Verde	.00	.00	37.33	35.48
Orchardgrass	Akaroa	37.65	38.48	34.76	35.03
Tall Fescue	Fawn	35.35	35.67	35.08	33.71
Perennial Ryegrass	Ariki	38.63	42.96	33.05	32.47

Table 5 NDR (%) on four harvest dates in 1985.

Common Name	Entry	June	Jul	Aug	Sept
Bermudagrass	Coastcross 1	23.51	23.57	22.35	24.62
Bermudagrass	Tifton 68	20.94	24.30	22.90	24.31
Bermudagrass	NK Pasto Rico	25.13	27.17	27.25	29.18
Limpograss	Bigalta	16.71	16.10	19.98	19.18
Big Bluestem	Kaw	18.59	20.77	26.22	20.32
Sideoats Grama	El Reno	22.15	25.68	41.56	32.21
Boer Lovegrass	Catalina	33.05	47.08	38.06	42.13
Lehmann's Lovegrass		27.69	36.38	28.98	29.51
Sand Lovegrass	Bend	22.97	35.30	26.05	32.75
Kleingrass	Selection 75	23.20	24.27	27.93	26.78
Switchgrass	Kanlow	31.00	29.76	26.91	34.74
Dallisgrass	Common	22.36	22.85	23.66	26.58
Bahiagrass	Pensecola	24.49	28.50	40.00	31.44
Indiangrass	Osage	20.12	19.77	24.82	25.69
Little Bluestem	Aldous	24.22	23.28	40.53	27.25
Laurisagrass		.00	.00	42.83	28.65
Kleingrass	Verde	.00	.00	27.33	24.21
Orchardgrass	Akaroa	22.70	19.74	16.67	16.20
Tall Fescue	Fawn	21.08	24.02	17.97	18.18
Perennial Ryegrass	Ariki	26.59	29.24	26.03	15.96

Table 6 Ash (%) on four harvest dates in 1986.

Common Name	Entry	June	Jul	Aug	Sept
Bermudagrass	Coastcross 1	11.71	12.06	10.92	12.17
Bermudagrass	Tifton 68	14.42	16.48	12.30	13.80
Bermudagrass	NK Pasto Rico	10.43	13.00	10.98	11.73
Limpograss	Bigalta	14.12	12.81	10.32	12.88
Big Bluestem	Kaw	9.23	10.18	8.96	10.28
Sideoats Grama	El Reno	10.36	11.35	10.77	12.70
Boer Lovegrass	Catalina	8.78	10.32	8.47	9.51
Lehmann's Lovegrass		8.23	8.97	7.91	8.71
Sand Lovegrass	Bend	7.33	8.67	8.21	8.08
Kleingrass	Selection 75	9.77	9.84	8.80	10.77
Switchgrass	Kanlow	8.31	10.12	8.03	8.76
Dallisgrass	Common	11.92	11.69	10.89	10.97
Bahiagrass	Pensecola	11.45	10.64	10.26	10.21
Indiangrass	Osage	10.02	11.27	9.97	15.13
Little Bluestem	Aldous	9.25	10.49	8.71	10.64
Laurisagrass		.00	.00	14.70	16.38
Kleingrass	Verde	.00	.00	10.66	11.76
Orchardgrass	Akaroa	12.97	15.80	12.95	12.47
Tall Fescue	Fawn	14.75	17.16	13.57	14.56
Perennial Ryegrass	Ariki	11.24	13.12	11.85	13.87

Table 7 Total forage yield for the six harvests of the warm season grass trial at U.C. Sierra Foothill Range Field Station in 1987.

Common Name	Cultivar	Yield (lbs/a)
Indiangrass	Osage	7849 A
Big Bluestem	Kaw	7632 AB
Lovegrass	Lehmann's	7456 ABC
Little Bluestem	Aldous	7025 ABCD
Boer Lovegrass	Catalina	6873 ABCDE
Kleingrass	Selection 75	6520 BCDEF
Switchgrass	Kanlow	6450 BCDEF
Sand Lovegrass	Bend	6341 CDEF
Sideoats Grama	El Reno	6171 CDEF
Bahagrass	Pensecola	6023 DEFG
Kleingrass	Verde	5882 DEFGH
Bermudagrass	Coastcross 1	5586 EFGH
Laurisagrass		5459 FGHI
Dallisgrass	Common	4890 GHI
Bermudagrass	NK Pasto Rico	4724 HI
Limpograss	Bigalta	4708 HI
Bermudagrass	Tifton 68	4596 HI
Tall Fescue	Fawn	4289 IJ
Orchardgrass	Akaroa	3363 J
Perennial Ryegrass	Arki	- -

Yields followed by the same letter are not significantly different ($p=0.05$).

Warm Season Grass Grazing Preference Trial

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Introduction

Warm season grasses are frequently higher in fiber and lower in protein than cool season grasses. The warm season grass trial in the preceding report contains a wide array of species with different growth habits. Some have a high leaf to stem ratio, some have very coarse stems, some keep their stems close to the ground, and some maintain a higher tissue moisture content. These characteristics will influence animal preference. This is a report of observed animal preference.

Procedure

The morning following plot harvest (see preceding report) three heifers were allowed to graze the unharvested forage remaining in each plot. Following overnight fasting, the heifers were grazed the warm season grass plots for two

hours. The same heifers were used on each of five grazing dates on June 17, July 16, August 19, September 16, and October 16, 1987.

Each heifer was assigned an observer who recorded the time spent grazing in each plot. Only the time spent actively grazing and chewing was recorded.

Results and Discussion

Table 1 reports total time spent grazing each entry by the three heifers. Over the entire summer season dallisgrass was most preferred followed by orchardgrass, limpograss, T68 bermudagrass, tall fescue, Pasto Rico bermudagrass, and CC 1 bermudagrass. Tall fescue and orchardgrass reached their greatest preference level in September and October. Limpograss was preferred through September, but lower preference in October lowered its total preference score.

On a dry matter ranking basis, the most preferred entries tend to be among the less productive half of the entries (see preceding report). In the past recommendations might have been made on the basis of yield trial only. Clearly, animal preference and performance must be included in the forage trial process, especially on plant materials that are reputed to be of lower quality than traditional cool season grasses.

Table 1. Time (min.) Spent Grazing 20 grass entries by three heifers on 5 dates in 1987 at UC Sierra Foothill Range Field Station

Grass Entry	6/87	7/87	8/87	9/87	10/87	Total
CC1 Bermudagrass	14.95	23.98	5.69	27.3	7.9	79.82
T68 Bermudagrass	11.63	34.19	5.38	17.1	22.76	91.06
Pasto Rico Bermudagrass	18.72	23.08	3.45	18.5	17.72	81.47
Bigalta Limpograss	21.53	24.18	10.63	30.5	5.47	92.31
Kaw Big Bluestem	3.	.75	4.36	1	6.11	16.07
El Reno Sideoats Grama	0	.35	.62	1.13	2.6	4.7
Catalina Boer Lovegrass	.75	2.17	6.38	2.71	12.96	24.97
Lehmann's Lovegrass	.33	0	.2	.6	1.22	2.35
Bend Sand Lovegrass	.5	.87	0	0	.87	2.24
Selection 75 Kleingrass	3.13	5.12	3.95	9.1	19.8	41.1
Kanlow Switchgrass	0	.97	1.8	.23	4.38	7.38
Dallisgrass	21.02	60.61	15.87	38	29.82	165.32
Pensacola Bahiagrass	0	3.2	1.58	0	.93	5.71
Osage Indiangrass	0	0	0	1.12	3.67	4.79
Aldous Little Bluestem	1.32	1.12	9.83	.62	.58	13.47
Laurisagrass	.88	1.97	3.07	3.56	7.05	16.53
Verde Kliengrass	2.5	10.36	4.15	12.3	5.22	34.53
Akaroa Orchardgrass	16.52	13.97	11.38	47.5	31.32	120.69
Fawn Tall Fescue	4.89	9.32	7.2	41.5	18.89	81.8
Perennial Ryegrass	14.12	4.65	0	0	0	18.77
Totals	136.64	220.86	95.54	252.77	199.27	905.08