

Final Report
2012 Field Demonstrations of Sorghum Forages for the California Dairy Industry

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Introduction

The San Joaquin Valley of California is home to a multi-million dollar dairy industry. The industry, like many in agriculture, is dealing with several issues that impact their bottom line. The demand for water in California is encouraging a renewed look at crops and cropping systems that conserve water and maintain both yield and quality. This is the second year of sorghum forage trials planted at the Kearney Agricultural Research and Extension Center and the Westside Research and Extension Center to evaluate thirty-eight commercially available sorghum forages.

Methods and Materials

Ten seed companies provided a total of 38 hybrids, which included traditional forage sorghums, Photoperiod (PS) forage sorghums, brown mid-rib (BMR) derivatives of both traditional and PS sorghums, and two Sudangrass x Sorghum bmr hybrids. Hybrids were planted in a randomized block design in four row plots planted on 30-inch raised beds and were analyzed as a split-plot design. Irrigation was applied using furrow irrigation, a common irrigation practice here in the valley. Fertility applications followed similar recommendation for forage sorghums for the region. The 2012 growing season was quite different than the 2011 season. Winter/spring rains were very sporadic and temperatures were very high throughout most of the growing season. Trials at both Kearney and Westside were irrigated as needed. Kearney received a total of 16.2 inches of applied irrigation, 4 inches more than the previous year. Rainfall totals from January through June, 1 2012 prior to planting at KARE were 8.04 inches, while rainfall totaled less than 1.0 inches during the growing season.

Rainfall totals from January through June 26 prior to planting at Westside were 3.94 inches. No measureable rainfall was recorded between planting and harvest at the West Side location. At the West Side REC site, pre-plant irrigation with sprinklers totaled 1.3 inches, with an additional 2.8 inches of water applied by sprinkler post-planting for early irrigation and stand establishment. Furrow irrigations (four in July, August and early September totaled an additional 15.6 inches, for a total irrigation application of 19.7 inches for the full growing season plus pre-plant sprinkling.

Each hybrid was harvested for forage yield when grain reached soft dough stage or in the case of the PS sorghum, with the last harvest of late forage sorghum producing some grain.

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Other cultural practices and study information are listed below:

Trail Location: Kearney Agricultural Research & Extension Center, Parlier
Cooperator: UC-ANR
Previous Crop: Winter forage (Oats)
Soil Type: Hanford sandy loam
Plot Size: Four, 30 inch rows by 20 ft
Replications: 3
Study Design: Split-Plot
Planting Date: June 1, 2012
Planting Rate: 100,000 seed acre⁻¹
Seed Method: John Deere Max-emerge Planter
Fertilizer: NPK 21x7x14 at 600 lbs acre⁻¹ applied on 5-31-12
Herbicide: None
Irrigation: See narrative above
Silage Harvest Date: Plots were harvested with a mechanical forage cutter on September 19, 2012

Trial Location: Westside Research and Extension Center, Five Points
Cooperator: UC-ANR Extension
Previous Crop: Winter forage (wheat grown for silage-not taken to grain)
Soil Type: Panoche clay loam
Plot Size: Four, 30 inch rows by 20 ft
Replications: 3
Study Design: Split-Plot
Planting Date: June 26, 2012
Planting Rate: 100,000 seed acre⁻¹
Seed Method: John Deere Max-emerge Planter
Fertilizer: N-P-K 21-7-14 at 600 lbs acre-1 applied pre-plant
Herbicide: None pre-plant; Prowl-H20 at layby @ 3 pts/ac
Irrigation: Sprinklers for pre-irrigation and stand establishment, gated pipe furrow irrigation subsequent irrigations – see narrative for amounts
Silage Harvest Date: Plots were harvested October 15, 2012

Data Collected:

1. Plant stands
2. Plant height (ft) at silage harvest
3. Lodging at silage harvest. Percent of fallen or significantly leaning plants per plot.
4. Moisture Content at Harvest.
5. Forage (silage) yield. The middle two rows of each plot were harvested with a John Deere forage chopper and placed into a modified weigh wagon. Yields are reported at 65% moisture in tons/acre.
6. Nutrient analysis: Samples were collected from the forage chopper in the field, weighed and then placed in forced air Gruenberg oven (Model T35HV216, Williamsport, PA) at 60° C until dried. These sub-samples were sent to Dairyland Laboratory, Inc, Arcadia, WI for analysis.
7. Key Nutrient Analysis Definitions
 - a. Crude Protein: 6.25 times % total nitrogen
 - b. TDN: Estimate of Total Digestible Nutrients
 - c. NDF: Neutral Detergent Fiber; cell wall fraction of the forage
 - d. ADF: % Acid Detergent Fiber; constituent of the cell wall includes cellulose and lignin; inversely related to energy availability
 - e. NEL: Estimate of Net Energy for lactation
 - f. NEM: Estimate of Net Energy for maintenance
 - g. NEg: Estimate of Net Energy for gain
 - h. IVTD: % In Vitro True Digestibility; positively related to energy availability
 - i. RFV: Relative Feed Value is an index for comparing forages based on digestibility and intake potential. RFV is calculated from ADF and NDF. An RFV of 100 is considered the average score and represents alfalfa hay containing 41% ADF and 53% NDF on a dry matter digestibility.
 - j. RFQ: Relative Forage Quality is an index for comparing forages. RFQ is calculated from CP, ADF, NDF, fat, ash and NDF digestibility measured at 48 hours. It should be more reflective of the feeding value of the forage. RFQ is based on the same scoring system as RFV with an average score of 100. The higher the RFQ score the better the quality.
 - k. Milk lbs/ton: A projection of potential milk yield per ton for forage dry matter.

Data was analyzed using the SAS statistical package.

Results

A summary of yield, agronomic traits and nutritional analyses are reported by types of forage sorghums grown in the two locations, Kearney and Westside in Table 1. See Tables 2 and 3 for a comparison of the different hybrids agronomic, yield, and nutritional characteristics.

Table 1. Summary of key forage characteristics by type of forage grown at two locations, Kearney and Westside.

Sorghum Type ¹	% Lodging @ Harvest ²	Tons/ac @65% Moist. ²	% Crude Protein ²	% ADF ²	% NDF ²	% Lignin ²	% Starch ²	% NDFD ²	% IVTD ²	Milk lbs/ton DM ²	Relative Forage Quality (RFQ) ²
NonBMR (13)	44.04 b	22.31 b	8.09 a	36.9 b	55.5 b	5.45 b	16.69 a	42.47 c	67.84 a	2083.0 a	92.36 a
BMR (16)	40.57 b	20.52 b	8.41 a	37.3 b	56.7 b	4.89 c	12.09 b	47.25 a	69.91 a	2190.3 a	96.28 a
PS NonBMR (6)	29.44 b	26.82 a	6.60 c	41.7 a	62.7 a	6.29 a	6.85 c	38.87 d	61.36 c	1685.7 c	66.82 b
PS BMR (3)	70.00 a	22.69 b	7.29 b	41.9 a	63.4 a	5.30 b	4.49 c	44.83 b	64.85 b	1946.1 b	74.4 b
Trial Avg.	42.32	22.30	7.93	38.23	57.78	5.34	12.24	44.10	67.45	2054.6	88.56

¹Number in parenthesis is the number of hybrids in each sorghum type. BMR = brown midrib, PS = Photoperiod sensitive.

²Means followed by the same letter do not significantly differ using LSD (P=0.01)

Forage yields for the two locations ranged from a high of 30.2 to 17.6 tons acre⁻¹ with an average of 22.3 tons acre⁻¹ (see table 2). These yields were slightly lower than yields report from last year's research and may be attributed to a smaller range of hybrids evaluated and the dry weather. Forage yields were adjusted to 65% moisture. The non-BMR Photoperiod forages were on average 4 tons acre⁻¹ more productive than their BMR counterparts, similar to finding from 2011. Planting at Kearney produced on average 1.8 tons acre⁻¹ greater yield than those planted at Westside.

Similar to 2011, lodging was a major issue in both trials. Lodging ranged from 0.0 to 100% (table 2). The Photoperiod non-BMR sorghums lodged the least of the different forage types, but even some of these forages had lodging issues. In observations of the trials, both germinated and grew quite rapidly in what could be described as ideal growing conditions, hot dry conditions with excellent water availability. Different management schemes are being contemplated to better understand the lodging issues seen at both locations. Similar to last year, little stem breakage was observed in the plots, rather the plants tended to bend over from the base of the stem. Stressing the plants early to encourage greater root penetration in the soil, better control of nitrogen applications, and throwing dirt up around the stems to support brace root development may be required to reduce the percentage of lodging in future research trials.

Digestibility as measured by ADF, NDF, IVTD, NDFD and overall forage quality as measured by lbs of milk per dry ton and relative forage quality was highest in the BMR sorghums (Table 1), though there were some excellent non-BMR forages as well (table 3). Relative forage quality and milk per dry ton were greater amongst hybrids grown at Kearney than those grown at Westside.

The top 25% hybrids were ranked in this study by taking those hybrids with the highest % IVTD and eliminating those hybrids with lodging scores of greater than 25% (table 4). Of these

hybrids, yield ranged from a low of 17.7 tons acre⁻¹ with Richardson Seed's X73366 to a high of 24.9 tons acre⁻¹ with Richardson Seed's Silo 700D BMR.

For many producers, yield is the greatest factor in their selection of sorghum forages. Table 5 highlights the top yielding hybrids that produced more than 23 tons acre⁻¹ of yield. The highest yielding forage sorghum was 1990 from Sorghum Partners, LLC at 30.2 tons acre⁻¹ followed closely SS506 from Sorghum Partners, LLC at 30.1 tons acre⁻¹. Many of these top yielding hybrids also had lodging issues at both Kearney and Westside.

Discussion

This was the second year that a wide range of forage sorghum, 38 commercially available sorghum forages, was evaluated for both yield and quality parameters in large replicated trials in two locations in California. These test results indicate that sorghum forages do have the yield and the quality to meet the needs of dairy farms in the San Joaquin valley, especially under dry environmental conditions and relatively low water inputs. It is also quite clear that additional research is needed to identify the proper planting dates, densities, fertilization, and water that will optimize sorghum forage yields and quality without lodging issues. Given the limited amount of irrigation used in these studies, low inputs and high yields, the potential does exist in sorghum forages to save both water and fertilizer, both costly inputs in the production of forages in the State. Forage selection should be a combination of factors that optimize quality, yield and standability and further research should be able to identify those forages that will benefit the farmers of California.

Table 2. 2012 comparisons of sorghum forage hybrids and locations for agronomic characteristics and yield at Westside Research and Extension and Kearney Agriculture Research and Extension Centers by seed company.

Hybrid Information ¹					Lodging, Height and Forage Yield ²		
Hybrid	Company	Type	Maturity	BMR	% Lodging	Height (cm)	Ton ac ⁻¹ 65% Moist.
Alta 7401	Advanta US, Inc.	FS	L	Y	5.0 n-o	183.0 l	19.6 h-n
Alta 7201	Advanta US, Inc.	FS	M	Y	56.7 e-f	231.7 i-k	17.6 n
Alta 7101	Advanta US, Inc.	FS	M	Y	75.8 a-e	243.8 h-j	18.0 mn
Alta 8301	Advanta US, Inc.	FS	ML	N	44.2 g-k	258.2 f-i	19.6 h-n
Alta 6402	Advanta US, Inc.	FS	ML	Y	20.0 l-p	243.9 h-j	21.1 f-n
Alta 6501	Advanta US, Inc.	FS	ML	Y	75.8 a-e	307.2 a	23.5 c-k
Alta XS6502	Advanta US, Inc.	FS	PS	Y	60.0 d-g	304.2 ab	25.0 b-g
AS781	AR-B Seeds, Inc.	FS			2.5 op	183.0 l	21.6 f-n
BH 211SBD	B-H Genetics	FS	ML	Y	6.7 n-p	227.7 j-k	24.3 c-j
BH 312FBD	B-H Genetics	FS	L	Y	10.0 n-p	177.3 l	20.2 g-n
Blackhawk 12	Blue River Hybrids	FS	M	Y	70.8 c-f	273.2 c-g	22.9 e-m
CHR-FS9x	Chromatin	FS	PS	N	40.0 g-m	292.1 a-d	28.1 a-d
CHR-FS4x	Chromatin	FS	L	N	42.5 g-l	279.6 a-g	28.6 a-c
CHR-SG1x	Chromatin	FS	PS	N	30.0 h-n	295.0 a-d	27.0 a-e
CHR-SS2x	Chromatin	FS	PS	N	20.0 k-p	274.7 c-g	26.3 a-f
Surpass bmr-6	Coffey Seed	SS		Y	12.5 n-p	238.4 ij	19.4 i-n
Surpass XL bmr-6	Coffey Seed	SS		Y	19.2 k-p	292.3 a-d	22.1 e-n
MaxiGain bmr-6	Coffey Seed	FS	PS	Y	75.8 a-e	268.7 d-h	20.9 g-n
Pacesetter BMR Red	Richardson Seeds	FS	PS	Y	74.2 b-f	278.4 b-g	22.2 e-n
Silo 700D	Richardson Seeds	FS	ML	N	10.0 n-p	198.7 l	24.5 c-i
Silo 700D BMR	Richardson Seeds	FS	L	Y	17.5 l-p	198.1 l	24.9 c-eg
9500	Richardson Seeds	FS	M	N	19.2 k-p	178.0 l	20.2 g-n
X73366	Richardson Seeds	FS	M	N	23.3 k-p	184.9 l	17.7 n
Great Scott BMR	Scott Seed Co.	FS	ML	Y	25.0 j-p	195.6 l	18.3 l-n
Great Scott Red BMR	Scott Seed Co.	FS	ML	Y	15.8 m-p	203.7 kl	18.1 mn
SSK-2074 BMR 718	Sharp Bros Seed Co	FS		Y	54.2 e-h	285.8 a-f	19.3 k-n
SXF 9116 Grazex BMR 801	Sharp Bros Seed Co	FS		Y	91.7 a-c	282.1 a-g	20.8 g-n

Table 2. continued.

Hybrid Information ¹					Lodging, Height and Forage Yield ²		
Hybrid	Company	Type	Maturity	BMR	% Lodging	Height (cm)	Ton ac ⁻¹ 65% Moist.
Sordan 79	Sorghum Partners, LLC	FS		N	96.7 ab	267.7 d-h	19.5 h-n
Sordan BMR	Sorghum Partners, LLC	FS		Y	92.5 a-c	255.3 g-j	18.3 l-n
Sordan Headless	Sorghum Partners, LLC	FS		N	26.7 i-o	299.7 a-c	28.1 a-d
Hikane II	Sorghum Partners, LLC	FS	M	N	82.5 a-d	268.6 d-h	19.4 i-n
1990	Sorghum Partners, LLC	FS	L	N	51.7 e-i	291.4 a-d	30.2 a
NK300	Sorghum Partners, LLC	FS	ME	N	0.0 p	188.2 l	23.4 d-l
SS304	Sorghum Partners, LLC	FS	ML	N	52.5 e-h	292.1 a-d	20.5 g-n
SS405	Sorghum Partners, LLC	FS	L	N	50.0 f-j	270.8 d-h	24.6 c-hf
SS506	Sorghum Partners, LLC	FS	L	N	40.0 g-m	287.0 a-e	30.1 ab
Trudan 8	Sorghum Partners, LLC	FS		N	100.0 a	258.5 e-i	18.8 k-n
Trudan Headless	Sorghum Partners, LLC	FS	PS	N	17.5 l-p	280.6 a-g	22.9 e-m
Means					42.3	254.0	22.3
CV					52.84	9.95	20.13
Location							
Kearney					35.7 b	237.2 b	23.2 a
Westside					48.0 a	264.8 a	21.4 b

¹Hybrid information provided by seed companies. SS=Sorghum-Sudangrass, FS=Forage sorghum, E=Early, ME=Medium Early, M=Medium, ML=Medium Late, L=Late, PS=Photoperiod Sensitive.

²Means followed by the same letter do not significantly differ using LSD (P=0.01)

Table 3. 2012 comparisons of sorghum forage hybrids and locations for nutrient composition and calculations at Westside Research and Extension and Kearney Agriculture Research and Extension Centers by seed company.

Hybrid Information ¹					Nutrient Composition & Calculations ²					
Hybrid	Company	Type	Maturity	BMR	% Crude Protein	% ADF	% NDF	% Lignin	% Starch	% Fat
Alta 7401	Advanta US, Inc.	FS	L	Y	8.7 a-g	35.1 k-p	53.3 n-s	4.6 l-o	17.4 d-f	2.2 a-d
Alta 7201	Advanta US, Inc.	FS	M	Y	8.6 a-h	37.5 h-o	57.1 h-q	4.7 k-n	9.1 g-k	2.0 b-i
Alta 7101	Advanta US, Inc.	FS	M	Y	9.3 ab	37.2 h-o	55.7 j-r	4.6 l-n	12.1 f-i	2.0 b-i
Alta 8301	Advanta US, Inc.	FS	ML	N	8.4 a-i	37.0 i-o	55.7 j-r	5.6 d-i	11.1 f-k	1.9 f-k
Alta 6402	Advanta US, Inc.	FS	ML	Y	8.3 a-i	36.9 i-o	56.0 j-r	4.6 l-n	9.0 g-k	2.1 a-h
Alta 6501	Advanta US, Inc.	FS	ML	Y	7.3 f-l	40.8 b-h	60.9 c-k	5.7 d-i	6.6 h-k	1.7 k-p
Alta XS6502	Advanta US, Inc.	FS	PS	Y	7.3 g-l	41.9 a-e	62.5 a-g	5.6 e-i	5.1 i-k	1.9 d-j
AS781	AR-B Seeds, Inc.	FS			9.2 a-c	34.4 m-q	51.9 q-t	4.6 m-o	19.6 b-e	2.3 ab
BH 211SBD	B-H Genetics	FS	ML	Y	8.1 a-i	37.1 i-o	56.6 i-q	4.6 l-o	10.7 f-k	2.2 a-e
BH 312FBD	B-H Genetics	FS	L	Y	9.2 a-c	34.7 l-q	52.8 o-r	4.5 m-o	17.4 d-f	2.2 a-c
Blackhawk 12	Blue River Hybrids	FS	M	Y	7.3 e-l	37.2 i-o	57.7 f-o	5.3 g-k	11.8 f-i	1.9 f-l
CHR-FS9x	Chromatin	FS	PS	N	6.0 lm	43.8 ab	66.3 ab	6.3 a-c	4.2 k	1.5 n-p
CHR-FS4x	Chromatin	FS	L	N	7.1 h-m	36.0 j-p	54.7 l-r	5.2 h-l	14.4 d-g	1.8 h-n
CHR-SG1x	Chromatin	FS	PS	N	6.3 k-m	41.8 a-e	62.8 a-f	6.5 ab	6.0 h-k	1.6 m-p
CHR-SS2x	Chromatin	FS	PS	N	7.3 e-l	43.6 a-c	64.7 a-d	6.6 a	6.3 h-k	1.6 m-p
Surpass bmr-6	Coffey Seed	SS		Y	8.2 a-i	37.9 f-m	57.7 f-o	4.7 k-n	8.3 g-k	2.1 a-g
Surpass XL bmr-6	Coffey Seed	SS		Y	8.4a-i	37.9 f-m	57.4 g-p	5.3 g-k	10.1 g-k	1.9 c-jf
MaxiGain bmr-6	Coffey Seed	FS	PS	Y	8.0 a-j	41.3 b-f	62.0 c-h	5.3 g-k	4.4 jk	1.8 i-n
Pacesetter BMR Red	Richardson Seeds, Ltd.	FS	PS	Y	6.6 j-m	42.6 a-d	65.9 a-c	5.1 i-m	4.0 k	1.8 g-m
Silo 700D	Richardson Seeds, Ltd.	FS	ML	N	7.9 b-j	33.0 pq	50.1 st	4.9 j-m	26.2 ab	2.0 c-j
Silo 700D BMR	Richardson Seeds, Ltd.	FS	L	Y	7.3 f-l	34.3 n-q	53.6 m-s	4.0 o	20.4 b-d	1.9 e-j
9500	Richardson Seeds, Ltd.	FS	M	N	9.2 a-c	31.2 q	47.1 t	4.7 k-n	29.5 a	2.3 ab
X73366	Richardson Seeds, Ltd.	FS	M	N	9.1 a-d	33.9 o-q	50.9 r-t	4.6 m-o	24.8 a-c	1.9 f-l
Great Scott BMR	Scott Seed Co.	FS	ML	Y	9.5 a	33.0 pq	51.0 r-t	4.2 no	17.6 c-f	2.3 a
Great Scott Red BMR	Scott Seed Co.	FS	ML	Y	9.3 ab	36.5 i-p	55.7 j-r	4.3 no	12.7 e-h	2.1 a-f
SSK-2074 BMR 718	Sharp Bros Seed Co	FS		Y	7.9 b-j	38.4 e-k	58.8 e-m	5.6 d-i	11.6 f-j	1.9 f-l
SXF 9116 Grazex BMR 801	Sharp Bros Seed Co	FS		Y	8.3 a-i	39.4 d-j	59.9 d-l	5.7 c-h	12.1 f-i	1.8 h-n

Table 3. continued.

Hybrid Information ¹					Nutrient Composition & Calculations ²					
Hybrid	Company	Type	Maturity	BMR	% Crude Protein	% ADF	% NDF	% Lignin	% Starch	% Fat
Sordan 79	Sorghum Partners, LLC	FS		N	7.7 c-k	40.1 c-i	60.0 d-k	6.1 a-e	13.0 e-h	1.7 j-p
Sordan BMR	Sorghum Partners, LLC	FS		Y	8.8 a-e	43.0 a-d	63.2 a-e	5.9 b-f	6.5 h-k	1.6 k-p
Sordan Headless	Sorghum Partners, LLC	FS		N	7.0 j-m	42.1 a-d	63.3 a-e	6.5 a	5.4 i-k	1.42 p
Hikane II	Sorghum Partners, LLC	FS	M	N	8.1 a-j	36.7 i-o	54.8 k-s	5.4 f-j	15.0 d-g	1.9 e-j
1990	Sorghum Partners, LLC	FS	L	N	5.7 m	45.0 a	67.5 a	6.5 ab	3.9 k	1.4 p
NK300	Sorghum Partners, LLC	FS	ME	N	8.8 a-f	34.4 m-q	52.2 p-t	5.3 g-k	21.4 b-d	1.9 c-j
SS304	Sorghum Partners, LLC	FS	ML	N	7.6 d-k	37.6 g-n	56.9 h-q	5.5 f-j	11.1 f-k	2.0 c-j
SS405	Sorghum Partners, LLC	FS	L	N	7.6 d-k	38.3 e-l	58.2 e-n	5.8 c-g	11.9 f-i	1.7 i-o
SS506	Sorghum Partners, LLC	FS	L	N	7.0 i-m	40.9 b-g	61.7 b-i	6.2 a-d	9.0 g-k	1.6 l-p
Trudan 8	Sorghum Partners, LLC	FS		N	8.9 a-d	37.2 h-o	55.0 k-s	5.9 b-f	20.6 b-d	2.0 c-j
Trudan Headless	Sorghum Partners, LLC	FS	PS	N	5.9 lm	43.1 a-c	64.2 a-d	6.6 a	4.9 i-k	1.5 op
Means					7.93	38.22	57.78	5.33	12.24	1.87
CV					16.51	8.27	7.97	9.73	51.68	13.49
Location										
Kearney					8.0	36.3 b	55.9 b	4.7 b	12.5	1.9
Westside					7.8	40.1 a	59.6 a	5.9 a	12.0	1.9

Table 3. continued.

Hybrid Information ¹					Nutrient Composition & Calculations ²					
Hybrid	Company	Type	Maturity	BMR	% TDN	48 hr NDFD	48hr IVTD	% Ca	% P	% Mg
Alta 7401	Advanta US, Inc.	FS	L	Y	58.2 b-f	49.4 a-c	73.0 a-d	0.27 a-d	0.25 a-d	0.18 f-k
Alta 7201	Advanta US, Inc.	FS	M	Y	57.0 b-i	49.1 a-d	70.8 a-g	0.27 a-d	0.22 d-i	0.19 d-l
Alta 7101	Advanta US, Inc.	FS	M	Y	56.6 c-j	49.8 ab	71.9 a-f	0.28 a-c	0.25 a-f	0.17 h-l
Alta 8301	Advanta US, Inc.	FS	ML	N	56.6 c-j	42.1 h-l	67.7 h-l	0.28 ab	0.20 h-n	0.21 a-e
Alta 6402	Advanta US, Inc.	FS	ML	Y	58.0 b-f	47.8 a-f	70.7 a-g	0.25 a-g	0.21 f-l	0.16 kl
Alta 6501	Advanta US, Inc.	FS	ML	Y	53.7 i-m	43.8 f-i	65.3 i-n	0.25 a-g	0.22 d-k	0.18 g-l
Alta XS6502	Advanta US, Inc.	FS	PS	Y	54.0 h-m	43.9 f-i	64.8 k-n	0.23 b-g	0.21 f-l	0.13 m
AS781	AR-B Seeds, Inc.	FS			58.5 b-e	49.7 ab	73.8 ab	0.28 a-c	0.26 a	0.19 b-k
BH 211SBD	B-H Genetics	FS	ML	Y	58.3 b-e	48.1 a-e	70.5 b-h	0.24 b-g	0.21 e-l	0.17 kl
BH 312FBD	B-H Genetics	FS	L	Y	58.6 b-e	49.8 ab	73.4 a-c	0.26 a-e	0.25 ab	0.19 d-l
Blackhawk 12	Blue River Hybrids	FS	M	Y	57.5 b-h	44.5 e-g	68.0 e-l	0.24 b-g	0.18 m-o	0.22 a-c
CHR-FS9x	Chromatin	FS	PS	N	52.6 k-m	38.7 k-m	59.1 r	0.24 b-g	0.17 o	0.21 b-f
CHR-FS4x	Chromatin	FS	L	N	58.1 b-fC	44.1 e-i	69.3 c-j	0.24 a-g	0.18 l-o	0.20 b-h
CHR-SG1x	Chromatin	FS	PS	N	53.3 j-m	37.7 m	60.5 o-r	0.27 a-d	0.19 j-o	0.22 a-d
CHR-SS2x	Chromatin	FS	PS	N	51.8 lm	38.4 lm	59.8 p-r	0.26 a-e	0.22 d-j	0.21 b-g
Surpass bmr-6	Coffey Seed	SS		Y	57.1 b-i	47.1 b-g	69.4 c-i	0.28 a-c	0.19 h-o	0.19 c-l
Surpass XL bmr-6	Coffey Seed	SS		Y	56.5 d-j	45.3 d-h	68.4 e-k	0.26 a-e	0.20 g-o	0.18 g-l
MaxiGain bmr-6	Coffey Seed	FS	PS	Y	52.8 k-m	45.1 e-h	65.7 i-n	0.24 a-g	0.24 a-e	0.17 i-l
Pacesetter BMR Red	Richardson Seeds, Ltd.	FS	PS	Y	54.3 g-m	45.5 c-h	64.0 l-o	0.21 d-g	0.21 g-m	0.20 b-j
Silo 700D	Richardson Seeds, Ltd.	FS	ML	N	60.3 ab	43.6 g-i	71.8 a-g	0.24 a-g	0.22 d-k	0.20 b-j
Silo 700D BMR	Richardson Seeds, Ltd.	FS	L	Y	58.5 b-e	50.3 ab	73.3 a-c	0.19 fg	0.21 e-j	0.20 b-i
9500	Richardson Seeds, Ltd.	FS	M	N	62.8 a	44.5 e-i	73.8 ab	0.22 b-g	0.23 b-g	0.17 j-l
X73366	Richardson Seeds, Ltd.	FS	M	N	59.7 a-d	45.5 c-hF	72.2 a-e	0.19 g	0.24 a-ff	0.16 lm
Great Scott BMR	Scott Seed Co.	FS	ML	Y	60.1 a-c	50.8 ab	74.9 a	0.23 b-g	0.25 a-c	0.16 lm
Great Scott Red BMR	Scott Seed Co.	FS	ML	Y	56.4 d-j	51.63 a	72.8 a-d	0.25 a-f	0.26 a	0.17 i-l
SSK-2074 BMR 718	Sharp Bros Seed Co	FS		Y	57.1 b-i	42.8 h-j	66.3 i-m	0.24 a-g	0.19 k-o	0.21 b-i
SXF 9116 Grazex BMR 801	Sharp Bros Seed Co	FS		Y	56.0 e-k	42.6 h-k	65.7 i-n	0.23 b-g	0.19 k-o	0.20 b-i

Table 3. continued.

Hybrid Information ¹					Nutrient Composition & Calculations ²					
Hybrid	Company	Type	Maturity	BMR	% TDN	48 hr NDFD	48hr IVTD	% Ca	% P	% Mg
Sordan 79	Sorghum Partners, LLC	FS		N	54.3 g-m	38.9 j-m	63.3 m-q	0.23 b-g	0.21 f-l	0.20 b-i
Sordan BMR	Sorghum Partners, LLC	FS		Y	50.9 m	43.1 g-i	63.9 l-p	0.26 a-e	0.26 a	0.19 c-l
Sordan Headless	Sorghum Partners, LLC	FS		N	51.8 lm	37.6 m	60.2 o-r	0.30 a	0.21 e-l	0.24 a
Hikane II	Sorghum Partners, LLC	FS	M	N	57.6 b-g	43.9 f-i	69.1 d-j	0.22 b-g	0.20 h-m	0.18 g-l
1990	Sorghum Partners, LLC	FS	L	N	51.6 lm	37.8 m	57.8 r	0.20 e-g	0.17 no	0.20 b-j
NK300	Sorghum Partners, LLC	FS	ME	N	59.5 a-e	44.5 e-h	70.9 a-g	0.24 a-g	0.21 f-l	0.21 b-g
SS304	Sorghum Partners, LLC	FS	ML	N	57.1 b-i	43.8 f-i	68.0 f-l	0.24 a-g	0.19 i-o	0.19 c-l
SS405	Sorghum Partners, LLC	FS	L	N	56.9 b-i	40.5 i-m	65.2 j-n	0.27 a-e	0.19 j-o	0.21 b-f
SS506	Sorghum Partners, LLC	FS	L	N	54.6 f-l	38.7 k-m	61.9 n-r	0.27 a-d	0.19 k-o	0.22 ab
Trudan 8	Sorghum Partners, LLC	FS		N	57.3 b-i	38.6 k-m	66.4 h-m	0.23 b-g	0.22 c-h	0.18 g-l
Trudan Headless	Sorghum Partners, LLC	FS	PS	N	52.4 lm	36.9 m	59.2 qr	0.21 c-g	0.20 g-o	0.18 e-l
Mean					56.28	44.10	67.45	0.24	0.21	0.19
CV					5.50	7.98	5.39	23.29	12.0	14.45
Location										
Kearney					58.4 a	48.2 a	70.9 a	0.23	0.20 b	0.20 a
Westside					54.2 b	40.0 b	64.0 b	0.25	0.22 a	0.17 b

Table 3. continued.

Hybrid Information ¹					Nutrient Composition & Calculations ²				
Hybrid	Company	Type	Maturity	BMR	% K	% S	Milk Lbs ton ⁻¹	Rel. Forage Quality	Rel. Feed Value
Alta 7401	Advanta US, Inc.	FS	L	Y	1.61 b-f	0.13 a-f	2324.4 a-d	108.8 a-f	107.8 b-g
Alta 7201	Advanta US, Inc.	FS	M	Y	1.60 c-g	0.12 a-h	2216.3 a-g	98.9 c-i	98.3 d-m
Alta 7101	Advanta US, Inc.	FS	M	Y	1.38 d-h	0.13 a-f	2238.9 a-f	102.2 b-h	101.2 d-j
Alta 8301	Advanta US, Inc.	FS	ML	N	1.22 f-i	0.12 b-i	2054.3 e-k	88.1 g-n	101.0 d-k
Alta 6402	Advanta US, Inc.	FS	ML	Y	1.42 d-h	0.11 e-j	2223.3 a-g	98.9 c-i	100.4 d-k
Alta 6501	Advanta US, Inc.	FS	ML	Y	1.49 c-g	0.10 g-k	1843.8 j-n	78.1 j-q	88.1 i-s
Alta XS6502	Advanta US, Inc.	FS	PS	Y	1.41 d-h	0.10 h-j	1915.1 h-l	74.9 k-r	84.1 m-s
AS781	AR-B Seeds, Inc.	FS			1.60 b-f	0.14 a-d	2357.5 a-c	114.0 a-c	112.2 b-e
BH 211SBD	B-H Genetics	FS	ML	Y	1.36 d-h	0.11 e-j	2279.2 a-f	99.1 c-h	99.3 d-l
BH 312FBD	B-H Genetics	FS	L	Y	1.63 a-e	0.13 a-f	2401.5 ab	112.1 a-d	109.6 b-f
Blackhawk 12	Blue River Hybrids	FS	M	Y	1.27 e-i	0.11 c-j	2172.6 b-g	89.3 f-m	96.9 f-o
CHR-FS9x	Chromatin	FS	PS	N	1.39 d-g	0.09 k-j	1697.1 l-o	59.3 q-r	77.4 r-s
CHR-FS4x	Chromatin	FS	L	N	1.18 g-i	0.11 f-k	2069.6 e-j	95.5 c-j	103.8 b-h
CHR-SG1x	Chromatin	FS	PS	N	1.49 c-g	0.10 g-k	1624.0 m-o	64.4 o-r	84.4 l-s
CHR-SS2x	Chromatin	FS	PS	N	1.57 b-g	0.12 c-i	1692.3 l-o	61.2 p-r	79.9 q-s
Surpass bmr-6	Coffey Seed	SS		Y	1.41 d-g	0.12 c-i	2229.1 a-f	92.7 d-k	96.2 f-o
Surpass XL bmr-6	Coffey Seed	SS		Y	1.31 e-h	0.12 b-i	2114.8 c-i	90.7 e-j	97.3 e-n
MaxiGain bmr-6	Coffey Seed	FS	PS	Y	1.85 a-c	0.12 c-i	1870.3 i-m	76.4 j-q	86.2 k-s
Pacesetter BMR Red	Richardson Seeds, Ltd.	FS	PS	Y	1.88 a-c	0.09 h-k	2052.8 e-k	71.9 l-r	79.0 q-s
Silo 700D	Richardson Seeds, Ltd.	FS	ML	N	1.07 ih	0.14 a-e	2213.4 a-g	108.7 a-f	118.0 ab
Silo 700D BMR	Richardson Seeds, Ltd.	FS	L	Y	1.38 d-h	0.11 f-j	2266.5 a-f	110.5 a-e	110.1 b-f
9500	Richardson Seeds, Ltd.	FS	M	N	0.92 i	0.15 a	2381.2 ab	126.2 a	129.8 a
X73366	Richardson Seeds, Ltd.	FS	M	N	1.20 g-i	0.14 ab	2193.7 a-g	110.5 a-e	116.3 a-c
Great Scott BMR	Scott Seed Co.	FS	ML	Y	1.53 c-g	0.14 a-c	2429.6 a	121.5 ab	117.3 ab
Great Scott Red BMR	Scott Seed Co.	FS	ML	Y	1.97 ab	0.14 a-c	2274.2 a-f	105.3 b-g	102.1 c-i
SSK-2074 BMR 718	Sharp Bros Seed Co	FS		Y	1.30 e-i	0.12 a-g	2124.6 c-h	83.4 h-o	93.4 g-q
SXF 9116 Grazex BMR 801	Sharp Bros Seed Co	FS		Y	1.30 e-i	0.13 a-f	2099.3 d-i	80.4 i-p	91.4 h-r
Sordan 79	Sorghum Partners, LLC	FS		N	1.44 d-g	0.13 a-g	1847.4 j-n	71.1 l-q	90.0 h-r

Table 3. continued.

Hybrid Information ¹					Nutrient Composition & Calculations ²				
Hybrid	Company	Type	Maturity	BMR	% K	% S	Milk Lbs ton ⁻¹	Rel. Forage Quality	Rel. Feed Value
Sordan BMR	Sorghum Partners, LLC	FS		Y	2.01 a	0.13 a-f	1806.1 k-n	68.9 n-r	82.2 o-s
Sordan Headless	Sorghum Partners, LLC	FS		N	1.73 a-d	0.12 c-g	1532.5 o	61.3 p-r	83.1 n-s
Hikane II	Sorghum Partners, LLC	FS	M	N	1.33 d-h	0.12 a-h	2179.9 b-g	95.6 c-j	103.8 b-h
1990	Sorghum Partners, LLC	FS	L	N	1.33 e-h	0.08 k	1601.0 no	55.2 r	75.0 s
NK300	Sorghum Partners, LLC	FS	ME	N	1.20 g-i	0.14 a-e	2297.5 a-e	106.7 a-g	112.3 b-d
SS304	Sorghum Partners, LLC	FS	ML	N	1.35 d-h	0.11 d-j	2099.1 d-h	89.7 f-l	98.2 d-m
SS405	Sorghum Partners, LLC	FS	L	N	1.30 e-i	0.12 c-i	2042.7 f-k	81.7 i-o	95.6 g-p
SS506	Sorghum Partners, LLC	FS	L	N	1.39 d-h	0.11 e-j	1834.2 j-n	69.1 m-r	87.0 j-s
Trudan 8	Sorghum Partners, LLC	FS		N	1.08 hi	0.14 ab	1976.7 g-j	84.2 h-o	102.0 c-i
Trudan Headless	Sorghum Partners, LLC	FS	PS	N	1.51 c-g	0.09 i-k	1498.6 o	59.4 qr	80.9 p-s
Mean					1.43	0.12	2054.6	88.56	97.15
CV					24.11	20.39	10.53	19.80	13.34
Location									
					1.44	0.12 a	2259.4 a	102.3 a	102.4 a
Kearney					1.42	0.11 b	1849.8 b	74.8 b	91.9 b

¹Hybrid information provided by seed companies. SS=Sorghum-Sudangrass, FS=Forage sorghum, E=Early, ME=Medium Early, M=Medium, ML=Medium Late, L=Late, PS=Photoperiod Sensitive.

²Means followed by the same letter do not significantly differ using LSD (P=0.01)

Table 4. Top 25% of hybrids in the 2012 Kearney and Westside trials based on %IVTD, lodging, and yield¹.

Hybrid	Company	Type	Maturity	BMR	% Lodging	T ac ⁻¹ 65% Moist.	% Crude Prot.	48 hr IVTD	Milk lbs ton ⁻¹	Rel. Forage Quality
Great Scott BMR	Scott Seed Co.	FS	ML	Y	25.0	18.3	9.5	74.9	2429.6	121.5
AS781	AR-B Seeds, Inc.	FS	M	N	2.5	21.6	9.2	73.8	2357.5	114.0
9500	Richardson Seeds	FS	M	N	19.2	20.2	9.2	73.8	2381.2	126.2
BH 312FBD	B-H Genetics	FS	L	Y	10.0	20.2	9.2	73.4	2401.5	112.1
Silo 700D BMR	Richardson Seeds	FS	L	Y	17.5	24.9	7.3	73.3	2266.5	110.5
Alta 7401	Advanta US, Inc.	FS	L	Y	5.0	19.6	8.7	73.0	2324.4	108.8
Great Scott Red BMR	Scott Seed Co.	FS	ML	Y	15.8	18.1	9.3	72.8	2274.2	105.3
X73366	Richardson Seeds	FS	M	N	23.3	17.7	9.1	72.2	2193.7	110.5
Silo 700D	Richardson Seeds	FS	ML	N	10.0	24.5	7.9	71.8	2213.4	108.7
NK300	Sorghum Partners, LLC	FS	ME	N	0.0	23.4	8.8	70.9	2297.5	106.7

¹The top 25% list was derived by taking those hybrids with the highest %IVTD and eliminating those hybrids that lodged by more than 25%.

Table 5. Top yielding hybrids that yielded over 25 tons acre⁻¹ averaged over Kearney and Westside trials in 2012.

Hybrid ¹	Company	Type	Maturity	BMR	% Lodging	Ton acre ⁻¹ 65% Moist.	48 hr IVTD	Milk lbs ton ⁻¹
1990	Sorghum Partners, LLC	FS	L	N	51.7	30.2	57.8	1601.0
SS506	Sorghum Partners, LLC	FS	L	N	40.0	30.1	61.9	1834.2
CHR-FS4x	Chromatin	FS	L	N	42.5	28.6	69.3	2069.6
Sordan Headless	Sorghum Partners, LLC	FS	PS	N	26.7	28.1	60.2	1532.5
CHR-FS9x	Chromatin	FS	PS	N	40.0	28.1	59.1	1697.1
CHR-SG1x	Chromatin	FS	PS	N	30.0	27.0	60.5	1624.0
CHR-SS2x	Chromatin	FS	PS	N	20.0	26.3	59.8	1692.3
Alta XS6502	Advanta US, Inc.	FS	PS	Y	60.0	25.0	64.8	1915.1
Silo 700D BMR	Richardson Seeds	FS	L	Y	17.5	24.9	73.3	2266.5
SS405	Sorghum Partners, LLC	FS	L	N	50.0	24.6	65.2	2042.7
Silo 700D	Richardson Seeds	FS	ML	N	10.0	24.5	71.8	2213.4
BH 211SBD	B-H Genetics	SS	ML	Y	6.7	24.3	70.5	2279.2
Alta 6501	Advanta US, Inc.	FS	ML	Y	75.8	23.5	65.3	1843.8
NK300	Sorghum Partners, LLC	FS	ME	N	0.0	23.4	70.9	2297.5

¹Hybrid information provided by seed companies. SS=Sorghum-Sudangrass, FS=Forage sorghum, ME=Medium Early, M=Medium, ML=Medium Late, L=Late, PS=Photoperiod Sensitive.