

# Successful BMR Sorghum Management



# Forage Selection Criteria

- Adapted to grower's harvest system
- Appropriate for producer's soils
- Produces high quality forage
- Can fit grower's harvest schedules and management style
- Does it fit nutrient management needs for manure utilization

# SORGHUM TYPES for FORAGE

- FORAGE SORGHUM – A direct, one cut system for chopped silage.
- SUDANGRASS – A multiple cut system for silage, balage ,dry hay and grazing
- SORGHUM X SUDANGRASS - A multiple cut system for silage, balage and grazing.

# What is Brown Mid-Rib ???





# What is Brown Mid-Rib ???

## ***What Is a BMR?***

The brown midrib trait (BMR) is a visual marker for a genetic trait, which causes the plant to create less lignin. Lignin is the component of the plant cell wall that is the limiting factor in forage fiber digestion. The addition of the BMR trait has shown marked reductions of lignin thus improving palatability and digestibility. Research has proven that BMR hybrids have noticeably better digestibility than standard forages when immature and huge advantages in digestibility when very mature. This can be the difference between an acceptable hay product and poor quality hay when harvest cannot occur during optimum conditions because of weather and other factors.

- Significant 40 to 60% Decrease in **Lignin**.
- Significant 15 to 30% Increase in **Palatability**.
- Significant Increase in **Digestibility**.
- Significant Increase in **Efficiency**.

# Lignin

Lignin is the component of plant cell walls that is generally regarded as the primary factor ***limiting the extent of forage fiber digestion by ruminants.***

Lignin in plants is not only practically indigestible but also decreases the availability of other constituents.

# BMR 6 SORGHUM FORAGES

- Superior nutritive value compared to conventional sorghum and often times equal nutritive value of corn.
- High Energy Fiber.
- Extremely High Palatability
- They make Milk and Meat

# BMR Gene 6 Sorghum Sudan



# Sorghum Sudan Review

## ***BMR SORGHUM SUDAN AGRONOMIC MANAGEMENT***

**SEED RATE:** ..... 50 to 60 lbs/A by drill. (Low end for hay, high end for grazing)

**SEEDING DEPTH:** ..... 0.5" to 1.5" depending on moisture and temperature. Deep in dry weather.

**PLANTING DATE:** ..... After soils have warmed to 60°F and warm weather forecasted.

**FERTILIZER:** ..... Utilizes manure nutrients very well. P, K, and other nutrients similar to corn silage. Apply manure prior to seeding. Commercial nitrogen is best between cuttings. Manure applications between cuttings can cause severe stand thinning due to wheel traffic and potential crop disease problems. If crop is light green or yellowish either not enough nitrogen was available or soil conditions were too wet.

**HARVEST HEIGHT:** ..... 32" to 44" is ideal. Leave 6" stubble height for regrowth. When mowing make a wide swath to remove water as quickly as possible. Wide swathing makes a huge difference with Sorghum Sudan. Growth of Sorghum Sudan is very rapid once it reaches 2 feet tall or so. Rates of 4" a day are common. To avoid missing your harvest window, we recommend putting a post with a bright flag in an area of the field so that crop height can be easily observed on a daily basis.

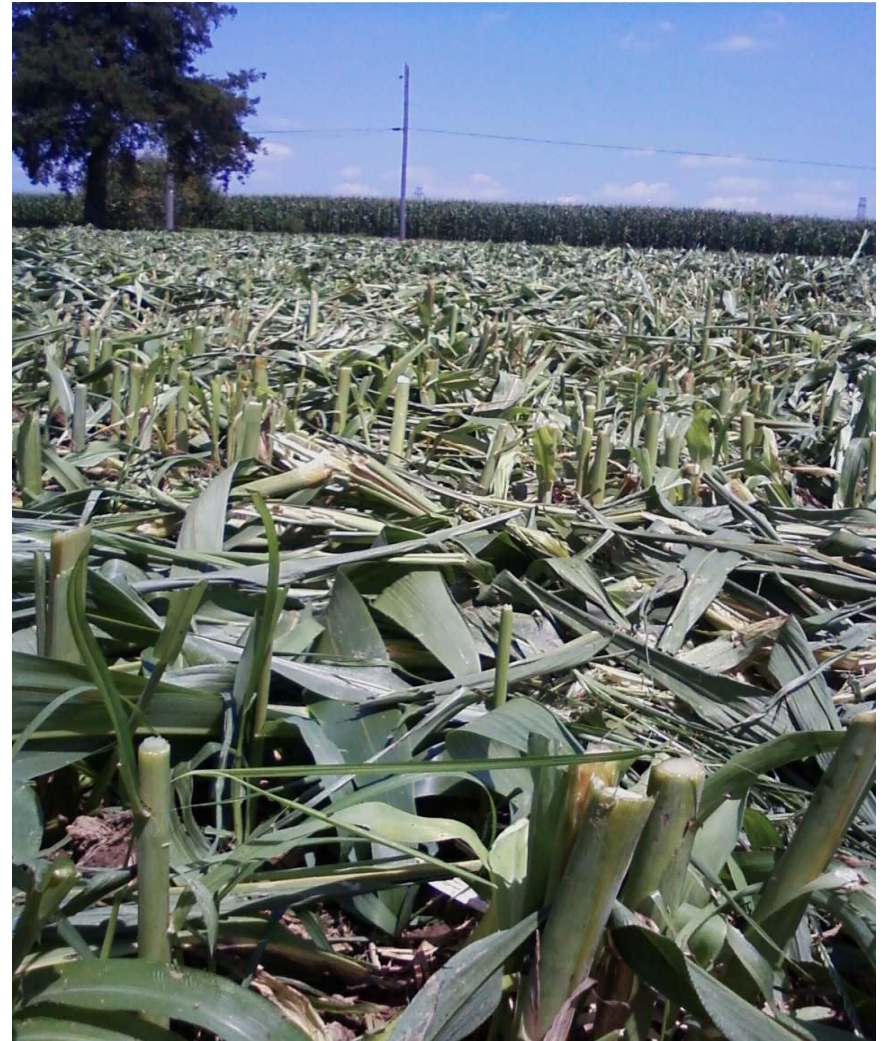
**HARVEST METHODS:** ... Grazing, Baleage, and Haylage. For haylage, longer chop length is needed for effective fiber.

### **REGROWTH**

**MANAGEMENT:** ..... Poor regrowth has been reported in some situations. Most of these regrowth problems are due to a fusarium, a plant disease. Summer Prince is our most disease tolerant hybrid. Conditions to avoid include: Seeding in wetter soils, excessive seeding rates, leaving too little stubble when cutting (2 nodes or 6 inches is best), excessive wheel traffic, manure applications between cuttings, crop being harvested at very tall heights and laying out for several days before harvest during high humidity/rainy weather. Sharp blades and clean cutting enhances regrowth.



# Cutting Sorghum Sudan





# Cutting Sorghum Sudan





# Wide Swathing Sorghum Sudan



# Wrapped Sorghum Sudan Baleage





# Sorghum Sudan Haylage









# Grazing Sorghum Sudan





# Grazing Sorghum Sudan



07/10/2008







# AS 6201

## AS 6201

A gene 6 hybrid that is **economically priced**. It is a medium – early maturity with very good drought tolerance. It has good seedling vigor and excellent re-growth. It has excellent palatability with high digestibility. AS 6201 works very well when harvested as haylage, balage or grazed. Recommended seeding rate is 50 to 70 lbs/acre.

# AS 6401

## AS 6401

A gene 6 hybrid that has exceptional disease resistance. It **has the best disease resistance** of all the sorghum sudans in our lineup. It has very good drought tolerance, good seedling vigor and excellent re-growth. It has excellent palatability with high digestibility. Although all sorghum sudans do not like wet soil conditions this hybrid will tolerate these conditions better than our other sorghum sudans. AS 6401 works very well when harvested as haylage, balage or grazed. Recommended seeding rate is 50 to 70 lbs/acre.

# AS 6402

## AS 6402

A gene 6 hybrid that has a unique growth habit, it **is a brachytic dwarf sorghum sudan**. It has a high leaf to stem ratio with superior standability. It has very good seedling vigor with fair drought tolerance. Because of its shortened internode length it perform excellent under grazing system and can tolerate a little lower mowing height than our other sorghum sudans. It is excellent for grazing but can also be used for haylage and balage. Recommended seeding rate is 40 to 60 lbs/acre.

# Brachytic Dwarf Internode length





# Dwarf verses Standard



# AS 6501

## AS 6501

A gene 6 hybrid that has a unique growth habit, it **is a photo period sensitive sorghum sudan** that gives you an extended harvest window. It is our most drought tolerant sorghum sudan. Like our other sorghum sudans it has excellent palatability and high digestibility. It very good seedling vigor and excellent re-growth. It can be used for balage, haylage or grazed. Recommended seeding rate is 50 to 60 lbs/acre.

# New for 2012 – AS 6503

## AS 6503

A new gene 6 hybrid that **is higher in sugar content and is a photoperiod sensitive sorghum sudan** that gives you an extended harvest window. Like our other sorghum sudans it has excellent palatability and high digestibility. It very good seedling vigor and excellent re-growth but is sensitive to low mowing or grazing which could reduce re-growth. It can be used for balage, haylage or grazed Recommended seeding rate is 50 to 60 lbs/acre.



# Trial Data 2011

	Cut 1	Cut 1		Cut 2	Cut 2		Cut 1 & 2	Cut 1 & 2
Variety	Yield	DM		Yield	DM		<u>Yield</u>	<u>DM</u>
	65%	Tons		65%	Tons		65%	Tons
AS6201	4.37	1.53		4.13	1.44		8.49	2.97
AS6401	5.82	2.04		3.76	1.32		9.59	3.36
AS6402	5.10	1.78		2.27	0.79		7.36	2.58
AS6501	5.42	1.90		2.99	1.05		8.41	2.94
Leafytop	7.26	2.54		3.28	1.15		10.54	3.69
Quick Cover	7.85	2.75		2.95	1.03		10.80	3.78
AS9301	7.08	2.48		2.43	0.85		9.51	3.33
Millet	3.72	1.30		3.92	1.37		7.64	2.68
<b>Average</b>	<b>5.83</b>	<b>2.04</b>		<b>3.22</b>	<b>1.13</b>		<b>9.04</b>	<b>3.16</b>

# Trial Data 2011

		Cut 1 & 2	Cut 1 & 2		Cut 3	Cut 3		Cut 1,2,3	Cut 1,2,3
Variety		<u>Yield</u>	<u>DM</u>		Yield	DM		<u>Yield</u>	<u>DM</u>
		65%	Tons		65%	Tons		65%	Tons
AS6201		8.49	2.97		8.37	2.93		16.87	5.90
AS6401		9.59	3.36		8.21	2.87		17.80	6.23
AS6402		7.36	2.58		4.41	1.54		11.77	4.12
AS6501		8.41	2.94		5.70	2.00		14.12	4.94
Leafytop		10.54	3.69		4.81	1.68		15.35	5.37
Quick Cover		10.80	3.78		5.46	1.91		16.26	5.69
AS9301		9.51	3.33		6.35	2.22		15.86	5.55
Millet		7.64	2.68		6.11	2.14		13.75	4.81
Average		9.04	3.16		6.18	2.16		15.22	5.33

# Sudangrass



# AS 9301

## AS 9301

A new gene 6 hybrid sudangrass. **It has a drier stalk than sorghum sudan and dries faster.** It is possible to make dry hay with 3-4 good drying days. Like our other sorghum sudans it has excellent palatability and high digestibility. It has very good seedling vigor and superior re-growth. It can be used for balage, haylage or grazed Recommended seeding rate is 25 to 30 lbs/acre.



# New for 2012 - HayKing

## HayKing Sudangrass

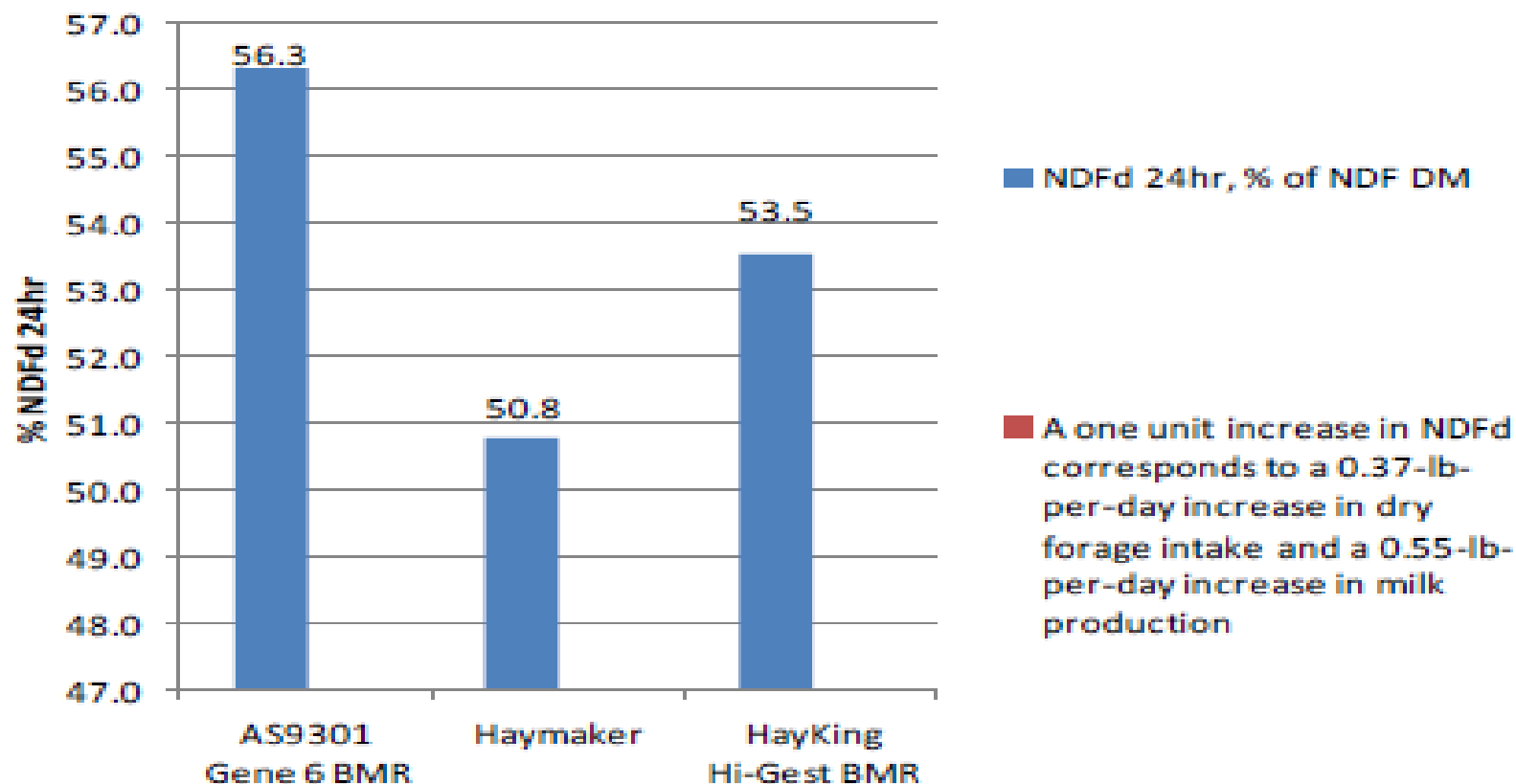
A gene 12 hybrid sudangrass **that is economically priced**. It has a drier stalk than sorghum sudan and dries faster. It is possible to make dry hay with 3-4 good drying days. It has good palatability and slightly lower digestibility than AS 9301. It has very good seedling vigor and superior re-growth. It can be used for balage, haylage or grazed Recommended seeding rate is 25 to 30 lbs/acre.

# Trial Data

Variety	Plant Height in Inches	Wet Matter (tons/A)	Dry Matter (tons/A)	% Crude Protein DM	% Neutral Detergent Fiber	NDFD 24hr, % of NDF DM
AS9301 BMR	57.1	17.8	2.9	12.9	62.1	56.3
Haymaker	58.1	17.8	3.0	12.3	64.2	50.8
HayKing	64.5	20.6	3.3	12.8	63.5	53.5
3 Variety Average	59.9	18.8	3.1	12.6	63.3	53.5

# Trial Data

**2009 King's AgriSeeds - Sudangrass Evaluation Summary of 2 harvests at 2 locations in Pennsylvania**





# BMR Gene 6 Forage Sorghum





# BMR Gene 6 Forage Sorghum

## BMR FORAGE SORGHUM AGRONOMIC MANAGEMENT

### SOIL ADAPTATION:

This crop is best suited for soils that are well drained. Forage sorghum is 30 to 50% more water efficient than corn making it an excellent choice for soils and regions that are drought prone. Do not plant in poorly drained soils.

### USES:

**Direct cut silage at soft dough stage:**

**Haylage and Baleage cut and wilt at boot stage:**

**Seed with Corn for Silage:** Can be mixed with corn to help with deer damage.

This combination makes excellent silage; however, management can be difficult.

### ESTABLISHMENT :

**Seeding Date:** After soils are 60°F (7:00 AM at 2") and long term forecast is warm.

#### Seeding Rate:

For direct cut: Approximately 100,000 seeds per acre. Approximately 6 to 9 lb per acre.

Adjust to seed count is important!

For cut and wilt at boot stage: Approximately 200,000 seeds per acre or 12 to 18 lb per acre.

With Corn: Approximately 25,000 seeds per acre. Reduce corn to 2/3 population.

**Depth:** 1" to 2". Plant to moisture. (Do not plant into dry soil)

**Weed Control.** Forage sorghum, unlike sorghum sudan, requires weed control beyond tillage or burndown herbicides.

Options:

Pre-emerge Atrazine, and metalachlor

(Dual) if seed is treated with Concep

Post emergence 2,4-D and dicamba

(check labels for proper timing and rates)

Cultivation

### SOIL FERTILITY:

100 - 120 units of N including ALL other nitrogen contributions. Do not apply too much nitrogen as lodging and/or high nitrates can be a problem. P,K, Ca and S similar to corn silage.

## Forage Sorghum Seeding Rate for Row Planting and Direct Harvest

- 6 – 8 lbs/A based on seeds per pound
- 12,500 seeds per pound x 8 pounds per acre = 100,000 seeds per acre
- 30" rows = 1 seed every 2 inches
- 15" rows = 1 seed every 4 inches
- 14" rows = 1 seed every 4 1/2 inches
- 12" rows = 1 seed every 5 inches
  
- SEED COST \$2.60 - \$3.20/lb = \$18 - \$20 per acre

# Recommended Planting Equipment

- Corn Planter
- Better plant spacing and seed placement
- For finger type planters you will need to modify to plant sorghum with the purchase of a sorghum cup and bowl similar for soybeans.
- Costs approximately \$50 per row unit.
- Meter Units cost approximately \$100
- It is possible to block off a drill and but you do not get good plant spacing



# Drilled Sorghum with Taped out Rows



07/14/2011



# Proper Seeding Rates





# Proper Seeding Rates





# Proper Seeding Rates





# Improper Seeding Rates / Too Much Fertility





# Proper Stand and Fertility





# Proper Stand and Fertility





# Proper Stand and Fertility



10/20/2011

# New for 2012 - AF 7101

## AF 7101

AS 7101 is a gene 6 BMR forage sorghum that has a drier stalk allowing for a direct harvest similar to corn silage. Approximate height can be eight feet. The standability and forage quality of this hybrid are excellent. Typical maturity is 80 to 85 days to soft dough.

### **Haylage and Balage cut and wilt at boot stage:**

Under typical growing conditions, boot stage will occur in approximately 55 days. At this stage of harvest protein should be higher than a direct cut if fertilized properly. However, sugar will be higher and starch will be very low. Note: Harvesting at this stage of growth would be similar to harvesting two cuts of a sorghum sudan.

# AF 7201

## AF 7201

AS 7201 is a gene 6 BMR forage sorghum that has a drier stalk allowing for a direct harvest similar to corn silage. Approximate height is eight feet. The standability and forage quality of this hybrid are excellent. Typical maturity is 90 to 95 days to soft dough.

### **Haylage and Balage cut and wilt at boot stage:**

Under typical growing conditions, boot stage will occur in approximately 60 days. At this stage of harvest protein should be higher than a direct cut if fertilized properly. However, sugar will be lower and starch will be very low. Note: Harvesting at this stage of growth would be similar to harvesting two cuts of a sorghum sudan.



# AF 7301

## AF 7301

AS 7301 is a gene 6 BMR high sugar ***male sterile*** forage sorghum that can be direct harvested similar to corn silage. Approximate height is eight feet. The standability and forage quality of this hybrid are excellent. Typical maturity is 100 to 105 days.

### **Direct cut silage at soft dough stage:**

This forage sorghum is more difficult to determine when moisture content correct for direct harvest because of the absence of pollinated seed. Check for proper moisture for ensiling by harvesting a sample and checking moisture content with a Koster tester or by the microwave method.

### **Haylage and Balage cut and wilt at boot stage:**

Under typical growing conditions, boot stage will occur in approximately 70 days. At this stage of harvest protein should be higher than a direct cut if fertilized properly. However, sugar will be lower and starch will be very low. Note: Harvesting at this stage of growth would be similar to harvesting two cuts of a sorghum sudan.

# AF 7401

## AF 7401

AS 7401 is a gene 6 BMR ***Brachytic Dwarf Forage*** sorghum that can be direct harvested similar to corn silage. Approximate height is 5 to 6 feet. The standability and forage quality of this hybrid are excellent. Typical maturity is 110 to 112 days to soft dough.

### **Haylage and Balage cut and wilt at boot stage:**

Under typical growing conditions, boot stage will occur in approximately 80 days. At this stage of harvest protein should be higher than a direct cut if fertilized properly. However, sugar will be lower and starch will be very low. Note: Harvesting at this stage of growth would be similar to harvesting two cuts of a sorghum sudan.

# Non-Dwarf Structure









# Brachytic Dwarf Internode length











10/10/2011



# Planter Skip or Lower Population





# Planter Skip or Lower Population







10/24/2011



# **Improper Seeding Rates / Too Much Fertility and Non-Dwarf Forage Sorghums**







10/10/2011



# AF7401





# Checking Maturity for Soft Dough





# Soft Dough





# Nutritional Comparison of Sorghums

Forage Type	CP	ADF	NDF	STARCH	NDFD-30	NEL	LIG	K	Total Sugar
Forage Sorghum Boot Average	10.2	33.2	57.0	1.3	49.1	0.67	2.5	3.6	5.7
Sorghum Sudan Average	14.2	34.5	62.0	1.1	56.6	0.68	2.8	4.3	3.8
Forage Sorghum Soft Dough Average	7.5	27.6	46.2	16.4	40.6	0.69	2.4	2.0	7.1
Typical Corn Averages	8.8	28.5	49.0	38.5	48.8	0.70	3.5	1.6	2.5

# Trial Data 2009

- 2009 King's AgriSeeds Forage Sorghum Trials
- 4 locations
- Lancaster County, Cumberland County, Perry County, Fulton County
- 17 BMR Forage Sorghum – 9 entries were taller types ranging 9 to 7 feet tall.
- 8 entries were dwarf types ranging 7 to 5 feet tall.
- 2 Corn Master's Choice hybrids were included.
- Plots were planted from 6/15- 6/26 and harvested 9/28 – 10/12.
- Cool Summer and Early Fall weather.
- Maturities were delayed



## Quality Characteristics of Different Forages.

Forage Type	Forage Quality Parameters				
	CP %	ADF %	NDF %	Lignin %	IVTD %
Conventional Forage Sorghum N=25	8.3	29.9	49.1	4.4	75.5
Brown Midrib 6 Forage Sorghum N=20	9.2	27.6	45.9	3.6	81.3
Corn N=4	9.0	23.9	41.2	3.5	82.7

Bean, et al. 2001. Texas Cooperative Extension.

## Quality Characteristics of Different Forages.

Red Font are results from King's Agriseeds 2009 Research

Forage Type	Forage Quality Parameters				
	CP %	ADF %	NDF %	Lignin %	IVTD %
Conventional Forage Sorghum N=2	6.3	28.5	46.1	3.3	73.4
Brown Midrib 6 Forage Sorghum N=17	6.8	27.9	45.8	2.5	74.5
Corn N=2	6.9	27.5	48.2	3.0	77.1



# Boot Stage



# Trial Data 2011

Planting Date 6/2/11

							<b>Yield</b>	<b>DM</b>
<b>Hybrid</b>							<b>65%</b>	<b>Tons</b>
7201 Boot			One Cut	27-Jul			<b>11.12</b>	<b>3.89</b>
7301 Boot			One Cut	5-Aug			<b>9.95</b>	<b>3.48</b>
7401 Boot			One Cut	26-Aug			<b>10.56</b>	<b>3.69</b>
MasterGraze			One Cut	27-Jul			<b>11.93</b>	<b>4.17</b>
7201 Boot			2nd Cut	22-Sep			<b>7.36</b>	<b>2.58</b>
7301 Boot			2nd Cut	22-Sep			<b>4.87</b>	<b>1.71</b>
<b>Hybrid</b>							<b>Yield</b>	<b>DM</b>
							<b>65%</b>	<b>Tons</b>
7201 Soft Dough		One Cut	30-Aug				<b>23.52</b>	<b>8.23</b>
7301 Soft Dough		One Cut	22-Sep				<b>23.69</b>	<b>8.29</b>
7401 Soft Dough		One Cut	10-Oct				<b>25.62</b>	<b>8.97</b>



# Trial Data 2011

	Cut 1	Cut 1		Cut 2	Cut 2		Cut 1 & 2	Cut 1 & 2
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<b>Average</b>	<b>5.83</b>	<b>2.04</b>		<b>3.22</b>	<b>1.13</b>		<b>9.04</b>	<b>3.16</b>

## Effects of Different Forage Sources on Dairy Cow Performance

Forage Type	DMI lbs/day	NDF Intake lbs/day	Milk Production lbs/day	Milk Fat %	Milk Protein %
Conventional Sorghum	51.04	22.88	68.20	3.57	2.89
BMR 6 Sorghum	55.44	19.80	75.02	3.89	2.89
BMR 18 Sorghum	51.98	21.78	70.84	3.77	2.98
Corn	53.46	19.80	74.36	3.88	2.97

Oliver, et al. 2004. Journal of Dairy Science