LA CROSSE SEED

SUMMER SELECT™

Summer Annuals

MANAGEMENT GUIDE | EDITION 1

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SUMMER SELECT™

The utilization of summer annuals across the Midwest is nothing new to most U.S. livestock producers. These products have been used with great success in forage production and as cover crops for decades. Moreover, sorghums continue to garner attention from a variety of places – shifts in overseas requirements, the rising interest among consumers for gluten-free ingredients, and changes in weather patterns that encourage the use of water-friendly crops. The sorghum industry has long argued the benefits of integrating warm season crops like sorghums into more traditional forage rotations and silage systems. We at La Crosse Seed contend that employing even a conservative 10% of the farm to warm season annuals mixed with other cool season forages makes agronomic sense and spreads out risk from adverse weather conditions.

> "I trust Summer Select when it comes to summer annuals. They have hybrids we can use and they recognize how their products fit into our different cropping systems."
>
> John R., CCA, Wisconsin

We Deliver More Than Seed

Premium seed isn't enough. We also bring effective marketing solutions plus training, tools & tips to help you succeed.

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Getting Started with Forage Sorghum

Planting sorghums should be delayed until soil temperatures reach 65° F at 2 to 4 inches depth. Planting too early can easily lead to stand problems, as sorghums aren't as tolerable to cool soil conditions or where heavy residue is present. Sorghum's smaller seed size and high temperature requirements often result in slower seed emergence and lower seedling vigor compared to corn. However, forage sorghums really take off in summer when temperatures rise and moisture is less likely. Planters should be set to place seed around ¾ inch to 1 inch deep. Seeding rates for forage sorghum vary based on row width and hybrid selection, with typical rates falling between 6 and 12 lbs per acre – the higher end of that range for narrow rows. Given the assumption that forage sorghum emergence normally averages about 80 to 85%, this equates to a planting population of somewhere between 80,000 and 140,000 plants per acre. Keep in mind, forage sorghum can be planted with the same equipment as planting corn (using a milo/sorghum plate or drum depending on planter). Planting in rows allows for easier harvest and cultivation, should weed control be needed.

Managing Nitrates

- Consider split applications of nitrogen to decrease nitrate accumulations
- Nitrates are concentrated more in the lower stalk – raising cutting height can reduce the risk
- When a stressful drought precedes a moisture event, delay harvest by 1 to 2 weeks
- Never turn hungry livestock into forages that could possibly be high in nitrates
- Just because a grower allows a few animals out on potential poisonous forage and nothing happens quickly, that doesn't mean there's not a problem. Because cattle tend to consume the tops of plants first (where the nitrate concentration is lowest), nothing happens too quickly, but problems arise as cattle remain and begin to eat parts of plants lower to the ground.
- Get hay tested if there's any concern – and test standing forage for several weeks until levels subside. If hay is indeed high in nitrate, feed in combination with very low protein forages (high C:N crops) or other hay low in nitrates

NITRATE LEVELS IN FORAGE

REFERENCES:
Univ. of Missouri, Univ. of Wisconsin, Univ. of Tennessee, North Carolina State Univ., South Dakota State Univ.

REPORTED METHOD (DRY MATTER BASIS)				
Nitrate Nitrogen (NO_3-N)		Nitrate (NO_3)		
% (Ions)	ppm	% (Ions)	ppm	COMMENTS
<0.10	<1,000	<0.44	<4,400	Generally safe to feed. University of Missouri Extension states problems can already commence at 550 ppm NO3-N (2,500 ppm NO3), especially if feeding along with non-protein N sources.
0.10 - 0.15	1,000 - 1,500	0.44 - 0.66	4,400 - 6,600	Safe for non-pregnant animals. Limit to 50% or less (DM basis) for pregnant animals. Some abortions possible at this level.
0.15 - 0.20	1,500 - 2,000	0.66 - 0.88	6,600 - 8,800	Limit use to 50% total ration (DM basis) for all animals. Missouri Extension recommends limiting to only 25% of total ration between 1,100 - 3,400 ppm NO3-N (5,000 - 15,000 ppm NO3).
0.20 - 0.35	2,000 - 3,500	0.88 - 1.54	8,800 - 15,400	Limit use to 35% or less of total ration (DM basis) for non-pregnant animals. **DO NOT FEED** to pregnant animals.
0.35 - 0.40	3,500 - 4,000	1.54 - 1.76	15,400 - 17,600	Limit use to 25% or less of total ration (DM basis) for non-pregnant animals. **DO NOT FEED** to pregnant animals. Missouri Extension says anything over 3,400 ppm NO3-N (15,000 ppm NO3) should not be fed.... but if it must be fed, limit to less than 15% of total ration.
>0.40	>4,000	>1.76	17,600	Potentially toxic. **DO NOT FEED**.

THIS IS ONLY A GUIDE. La Crosse Seed makes no claims and makes no guarantees/warranties regarding performance and function of feedstuffs or their detrimental effects. Test results will vary by testing lab and by method of sample collection, forage management, climate and other environmental factors.

Prussic Acid Poisoning

Prussic acid poisoning can occur when feeding forage sorghums after periods of drought or other stress, including frost. Toxic levels usually dissipate after 2 to 3 weeks and will further decrease when ensiled. DO NOT ALLOW livestock to graze suspect forage either directly after frost or at night during a potential frost event. Waiting 10 - 14 days after a killing frost should be a safe timeframe for allowing livestock to graze again. Prussic acid is most concentrated in new growth, so sorghum forages should not be grazed until they are at least 18 inches tall – preferably 24 inches. Note: livestock grazing on pearl millet (especially later in the year following cold weather and frosts) are not subject to prussic acid poisoning like sorghums. Storing hay or silage for at least 30 days generally dissipates the concern. Like nitrates, test forage if there is a concern. The table from Kansas State identifies the varying levels and their effect on livestock.

ppm HCN	EFFECT ON ANIMALS
0 - 500	Generally safe; should not cause toxicity
600 - 1,000	Potentially toxic; should not be the only source of feed
1,000 & Above	Dangerous to cattle & usually will cause death

From Kansas State University "Prussic Acid Poisoning"

Herbicide Considerations

Herbicides for forage sorghums and sorghum sudans are extremely limited – basically 2,4-D, atrazine, dicamba, bromoxynil and metalochlor. In order to apply metalochlor, the sorghum seed planted would need to have been treated with a seed safener (using the combination of metalochlor and atrazine, resulting in a highly effective preemergence herbicide system). Many of our forage sorghums and sorghum sudangrass hybrids are available as a safened option.

Whereas 2,4-D can be utilized early post for limited broadleaf control, there are no postemergence grass herbicides labeled for forage sorghum. Keep in mind, row cultivation is an effective option when sorghum is planted in rows. However, the best weed control strategy is often starting with a clean seed bed and doing everything possible to quickly establish the stand, shading the soil and out-competing weeds for sunlight and water.

HELPFUL HERBICIDE HINTS

- ALWAYS READ HERBICIDE LABELS BEFORE APPLICATION
- Herbicides for sorghum sudangrass hybrids and straight sudangrass are even more restricted. Depending on region, soil type and pH, atrazine is commonly used (for broadleaf control). Read all labels, and always keep grazing and feeding constraints in mind before application.
- Pearl Millet – Limited herbicides are labelled for pearl millet. NOTE – If the term "millet" is used without definition on a herbicide label, the recognized interpretation is that the product is registered for use in any of the millet crops. But if the label is specific – such as foxtail millet or pearl millet - then that herbicide is limited for only that crop. Understand the pearl millet and proso millet react considerably different than other, more grassy types like foxtail millet.
  - » Mesotrione and Sharpen are common options prior to crop emergence
  - » Postemergence herbicides include 2,4-D, dicamba, halosulfuron (Permit), and fluroxypyr (Comet/Starane Ultra)
- Teffgrass – No herbicides are currently labeled for use specifically in teff, however several studies have been published in the last decade that indicate a handful of broadleaf herbicides (that are labelled for general grass hay and/or pastures and thus permissible for teff) have adequate crop safety while providing at least some control of weeds. Consider applying glyphosate before or quickly after planting (but before emergence) to control existing weeds. Make every effort to keep the stand clean until it is fully established – once the crop reaches 8 to 10 inches it becomes very competitive.

Fertility

- Under favorable conditions, 1 to 1.25 lbs of nitrogen per day of planned growth should be available for maximum production, with little risk for nitrate poisoning, (for example, for a planned 40 day harvest, 40 to 45 lbs of nitrogen should be available)
  - » University testing shows that 5 to 8 lbs of nitrogen are required per wet ton of expected yield in maximum production systems
  - » Any nitrogen amendments should supplement existing contributions from crop residue and organic matter to reach desired yield goals
  - » Keep nitrogen/sulfur levels at 5:1 to ensure nitrogen is converted into protein
- Potassium levels should be maintained similar to that of corn
- If soil pH is greater than 7.2, application of iron may be necessary to prevent iron chlorosis
- Teffgrass -
  - » Nitrogen – comparable to most hay or pasture stands at planting (40 to 60 lbs)
  - » Apply phosphorus and potassium similar to cool season grasses
  - » Multiple harvests will require additional nitrogen applications (up to 100 lbs total nitrogen per year)

"I only use Summer Select Forages on my acres. It works great for my operation."
Brad S., Grower, Nebraska

Harvest Management

APPROXIMATE HARVEST (GRAZING OR MECHANICAL) & STUBBLE HEIGHTS OF SELECTED SUMMER ANNUALS

	Grazing Management		Hay/Baleage Management		
Species	**Height (in)**	**Maturity Stage**	**Height (in)**	**Maturity Stage**	**Stubble Height***
Pearl Millet	**18 - 22**	**Pre-boot**	**30 - 40**	**Early head**	**4 - 6**
Sorghum x Sudan	**22 - 30**	**Pre-boot**	**30 - 40**	**Early head**	**6 - 8**
Sudangrass	**24 - 28**	**Pre-boot**	**30 - 40**	**Early head**	**6 - 8**

***Stubble grazed or cut below these height ranges may result in poor or no regrowth** **Reference: University of Georgia**

- **Baleage/Hay – these options are suitable for baleage or dry hay at 40 days after emergence (or approximately 40 inches tall)**

GRAZING

- Employing short rotational grazing intervals is best for sorghums and millets – 3 to 4 paddocks at minimum will help increase grazing efficiency
- Whether utilizing rotations or not, graze fields for no longer than 7 to 10 days and allow 2 to 3 weeks between cycles
- ALWAYS remove livestock before stubble reaches 6 to 8 inches
  - » Maintaining leaf area will promote quicker regrowth
  - » Prussic acid concentrations increase lower in the stem
- Teffgrass – the plant's shallow root system may present problems for grazing (as cattle could pull plants out of the ground); horses usually do not have this issue

HARVEST PRIOR TO HEADING FOR HIGHER PROTEIN LEVELS

- Energy levels will increase upon heading
- Dry hay and/or baleage are applicable where and when proper harvest management is followed. Dry hay is suited for areas with less moisture and humidity; baleage offers more flexibility in all other areas.
- Harvest at proper moisture – yield and quality are maximized between 60% and 72%
- Wide windows are required for baleage to ensure rapid dry down
- Mower-conditioners speed up drying by crimping stems
- For silage, keep chop length uniform (around ½ inch)

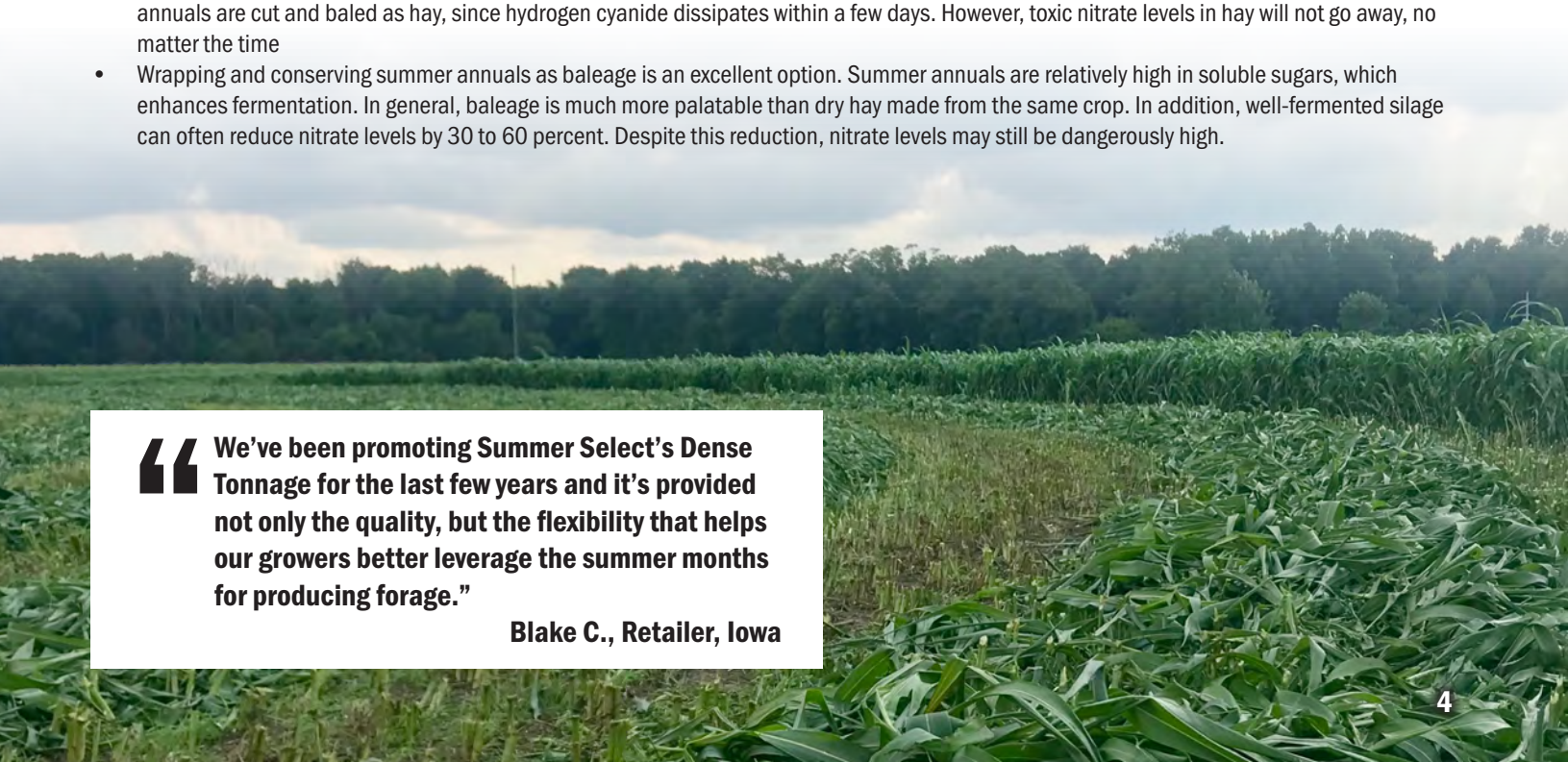
TEFF CONSIDERATIONS

- For optimum forage quality, teff should be harvested in the pre-boot to early boot stage, approximately 45 to 50 days after planting at a cutting height of 3 to 4 inches
- Multiple equipment passes (for harvest, fertility applications), can impact regrowth – some producers follow same tracks to sacrifice small areas versus negatively affecting larger areas
- Harvest regrowth in 30 to 45 days depending on environmental conditions

STORAGE

When selecting a harvest method, consider how suitable the forage is for a given method, the storage capability, weather conditions, and the intended use of the conserved forage

- Despite its thick stems, many sorghum sudans can be successfully harvested as hay. Prussic acid poisoning is less common when summer annuals are cut and baled as hay, since hydrogen cyanide dissipates within a few days. However, toxic nitrate levels in hay will not go away, no matter the time
- Wrapping and conserving summer annuals as baleage is an excellent option. Summer annuals are relatively high in soluble sugars, which enhances fermentation. In general, baleage is much more palatable than dry hay made from the same crop. In addition, well-fermented silage can often reduce nitrate levels by 30 to 60 percent. Despite this reduction, nitrate levels may still be dangerously high.



> **"We've been promoting Summer Select's Dense Tonnage for the last few years and it's provided not only the quality, but the flexibility that helps our growers better leverage the summer months for producing forage."**
>
> **Blake C., Retailer, Iowa**

SUMMER SELECT™ SUMMER ANNUALS

MULTI-CUT SPECIES

				MATURITY	APPROX. SEEDS PER POUND*	DRYLAND SEEDING LBS/ACRE	IRRIGATION/ HI-RAIN SEEDING LBS/ACRE	RECOVERY AFTER CUTTING	LEAF DISEASE RESISTANCE	SUGARCANE APHID TOLERANCE	SINGLE SILAGE CUT SUITABILITY	RAPID DRY DOWN
SORGHUM X SUDANGRASS	QUICKDRY BMR	BMR 6		MED LATE	14,000 - 15,000	20 - 25	35 - 50	4	4	3	2	3
	DENSE TONNAGE BMR BD	BMR 6	BD	MED LATE	14,000 - 15,000	15 - 25	25 - 35	4	4	1	4	2
	EVERGROW BMR PPS	BMR 6	PPS	LATE	14,000 - 15,000	20 - 25	35 - 50	3	5	2	3	2
	GREENSUGAR TR			MED	16,000 - 20,000	20 - 25	50 - 60	3	3	2	2	2
	GREENSUGAR MS		MS	MED LATE	16,000 - 20,000	20 - 25	50 - 60	3	4	1	2	2
SUDANGRASS	BALEMORE			EARLY MED	35,000 - 40,000	15 - 25	20 - 35	3	3	1	2	4
PEARL MILLET	HERCULES BMR BD	BMR 6	BD	MED	50,000 - 60,000	10 - 12	10 - 12	5	5	5	4	4
	PERFORM			MED	50,000 - 60,000	10 - 12	10 - 12	5	4	5	4	4
TEFF GRASS	REPRIEVE XL			NA	650,000	8 - 10	8 - 10	4	3	5	NA	4

SINGLE-CUT SPECIES

				DAYS TO HARVEST (SOFT DOUGH STAGE)	APPROX. HARVEST HEIGHT (FT)	APPROX. SEEDS PER POUND*	SEEDING 30" ROWS (LBS)	SEEDING NARROW (LBS)	RECOVERY AFTER CUTTING	STANDABILITY	SUGARCANE APHID TOLERANCE	DOUBLE CROP	OVERALL ADAPTABILITY
FORAGE SORGHUM	93			80 - 90	6 - 7	14,000 - 16,000	5 - 7	NR	1	4	3	3	4
	94 MS		MS	MS	6 - 8	17,000 - 19,000	4 - 6	10 - 15	3	4	2	3	4
	95 BMR	BMR 12	DWARF	85 - 95	5 - 7	16,000 - 18,000	5 - 7	NR	2	4	3	3	5

		PANICLE TYPE	GRAIN COLOR	MID-BLOOM (DAYS)	GRAIN MATURITY (DAYS)	APPROX. HEIGHT (IN)	APPROX. SEEDS PER POUND*	DRYLAND POPULATION / ACRE	IRRIGATED POPULATION / ACRE	HEAD EXERTION	STANDABILITY	SUGARCANE APHID TOLERANCE	PRE-FLOWER STRESS TOLERANCE	ANTHRACNOSE TOLERANCE
GRAIN SORGHUM	79 B	OPEN	BRONZE/RED	48 - 51	80 - 85	36 - 42	13,000	25,000 - 40,000	60,000 - 75,000	5	4	4	5	2
	94 R	SEMI-CLOSED	RED	68 - 71	110 - 115	50 - 56	16,000	25,000 - 40,000	60,000 - 75,000	5	4	5	4	3

SUBSTITUTING SORGHUM SILAGE FOR CORN SILAGE

There are obvious benefits to using summer annuals, specifically options for silage. Three major advantages come to mind when considering summer annual silage versus traditional corn silage:

- Performance during drought - using approximately 30 to 40% less water than corn to make the same dry matter (DM)
- Performance when summer temperatures are elevated to extremes
- Reasonable yield even when normal silage planting is delayed (because of cool, wet conditions)

Because so many variables exist it's hard to make blanket comparisons, but here's a few simple points to consider that might help work through the differences:

1. The biggest differences are STARCH (energy) and FIBER. Corn silage will have lower lignin versus traditional forage sorghum and sorghum x sudan hybrids. Corn silage also contains more grain. Most references list the starch fraction within corn silage between 25 to 35%, whereas sorghum silages will likely be half of that (11 to 17%). That's a wide gap but realize that it's common for starch digestibility to increase the longer a forage crop is ensiled. All these discrepancies shouldn't be overlooked but can be managed. Recognize BMR summer annuals greatly reduce the lignin variance (and digestibility).
2. Relative Feed Value (RFV) = According to U of Wisconsin, expect RFV levels in both feedstuffs to be comparable – 95 to 105 for corn versus 90 to 100 for summer annual silages.

BD = Brachytic Dwarf, **BMR** = Brown Mid-Rib, **MS** = Male Sterile, **PPS** = Photo Period Sensitive

Unless otherwise indicated, a standard 5 point rating system is used. Ratings are based on comparison with other products of like maturity/product use.
1 = POOR, 5 = EXCELLENT

For more information on summer annuals, visit summer-select.com

ONLINE RESOURCES

• Widely adapted • Traditional growth habit with wide, long leaves	• Increased sugar content = improved digestibility • Fast establishment & regrowth = more productivity
• Management friendly hybrid with greater harvest flexibility • Dwarf hybrid = improved standability & higher leaf:stem ratio	• Suitable for grazing environments or 1-cut silage systems • Increased sugar content = improved digestibility
• Widely adapted with improved disease resistance • PPS hybrids remain vegetative until mid-Sept (day length < 12h, 20m)	• PPS allows for wider window of harvest • Build tonnage without sacrificing quality
• Broad adaptation in a traditional, non-BMR package	• High yielding; increase population for improved quality
• Higher levels of sugar/protein in vegetative portion of plant • Increased disease resistance	• MS = no anthers, thus no pollen for self-fertilization • Improved standability
• Best summer annual option when dry hay production is planned • Can also be used for grazing or green chop	• Strong emergence & quick regrowth
• Versatile hybrid suitable for silage, grazing & dry hay • Dwarf gene increases leaf:stem ratio & improves standability	• Enhanced palatability, digestibility & overall utilization • No prussic acid or sugarcane aphid concerns
• Versatile hybrid suitable for silage, grazing & dry hay • Quicker regrowth compared to sorghum x sudangrass	• No prussic acid or sugarcane aphid concerns • Shorter stature = improved standability
• Great rotational crop between alfalfa & perennial stands • Superior quality - ideal for horses & other livestock	• Well adapted to dry climates

YIELD FOR MATURITY	LEAF DISEASE RESISTANCE		
5	4	• White grain color • High grain:stover ratio	• Early maturing hybrid with excellent standability • Anthracnose resistant
4	3	• Good disease resistance • Excellent regrowth for a forage sorghum	• Male Sterile = increased sugar accumulation
5	5	• Early maturing dwarf BMR • High grain yield for maturity	• Excellent leaf disease resistance • Widely adapted with excellent standability

HEAD SMUT TOLERANCE	FUSARIUM TOLERANCE	MAIZE DWARF MOSAIC TOLERANCE	DOWNY MILDEW TOLERANCE		
3	4	4	3	• Widely adapted - can go anywhere! • Ultra early hybrid	• Exceptional drought tolerance
5	4	5	5	• Widely adapted hybrid that yields • Medium maturity	• Excellent sugarcane aphid tolerance & disease resistance

*Refer to seeds per lb on seed tag

3. Protein = Protein percentage in sorghum silage is typically similar, if not greater than corn silage – anywhere from 9 to 16% in sorghums versus 9 to 10% in corn.
4. Harvest Tips: cut early (63 to 68% moisture is ideal); harvest when at least 50% of kernels reach milk or soft-dough stage; chop length = ½ inch or greater (BMR's can probably tolerate a bit longer cut)
5. Replace corn silage with sorghum silage based on a fiber basis, not a dry matter basis – meaning additional energy is required if fed to lactating livestock. For example: the addition of corn grain to the ration either during ensiling or into the total mix ration (TMR). Whole-plant forage sorghum silage has lower starch digestibility because it's kernels are hard and can often go unprocessed through the animal, though harvesting early will minimize this deficiency. If livestock diets are reformulated to account for this discrepancy, feed quality (and milk yield) are not negatively impacted – especially when BMR forage sorghum is utilized. Conventional forage sorghum will work for many classes of livestock, like heifers and dry cows. These animals have lower energy requirements than lactating animals.
6. No matter the silage, inoculants should be used to improve dry matter conservation and overall bunker life.

Even after adjusting for additional feedstuffs to enhance quality, many studies throughout the country show a lower cost per ton and even lower costs per lb of milk or lb of animal gain by utilizing sorghum silages compared to silages from corn.

REFERENCES:
University of Georgia, University of Florida, Texas A&M University, University of Wisconsin

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