Annual Summer Forages for West Texas

including Brown Mid-Rib (BMR) and Photoperiod Sensitive Forages

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General Principles for High Quality Forage: For any forage, quality and energy level of the forage declines with maturity. This decline is rapid once the forage matures past boot stage. The decision about quality forage vs. tonnage depends on what you will use the forage for. If you seek quality forage for grazing or haying (vs. tonnage) do not allow forage to head out. Maximum tonnage for most forages occurs in the soft dough stage though quality is lower. As a rule of thumb the optimum time to harvest forage sorghum for silage is at the soft dough stage in the grain. For best regrowth after haying or grazing leave a minimum of 6" of stubble. Remember that seed size will differ among forage types. Seeding rates on irrigated land are roughly 1.5 to 2.0 times higher than dryland; grazing seeding rates are slightly higher than rates for hay or silage. For long-term grazing consider plugging your drill to have ~20-22" spacing between rows. Livestock tend to walk between the rows thus regrowth is better. If seed placement and stand establishment is an issue, especially for dryland, growers may be better off using a planter instead of a drill to increase the likelihood of achieving a stand.

Conventional sorghum/sudan. Haygrazer. Adequate for numerous uses and highly productive, but slightly more than 50% of yield comes from stem. Often the best all-round producer for hay or grazing. Better vigor, regrowth, and drought tolerance than forage sorghum. Depending on the hybrid it may be sweet or not, or have coarse or fine stems. These are normally about 16,000 seed/lb. Grazing may be initiated when the plants are 24-30" tall.

Sorgo-sorghum/sudan. Commonly referred to as 'three-way cross.' This class of forage is supposedly sweeter than sorghum/sudan, which is believed to increase consumption and palatability for livestock. Seed size (20,000-24,000 seed/lb.) is smaller than conventional sorghum/sudans thus seeding rates should be 20% less. Sorgo-sorghum/sudan has the good regrowth and drought tolerance of conventional sorghum/sudan. Forage tends to be finer stemmed due to increased presence of sorgo and sudan.

Brown mid-rib (BMR) sorghum/sudan. The feature of BMR forages is lower lignin content. The management of BMR sorghum/sudan (~16,000 seed/lb.) is similar to conventional sorghum/sudan for seeding, planting date, and harvesting. The brown mid-rib trait is just that, a brown midrib in the leaves. More importantly, BMRs have lower lignin concentration in the leaves and stalk. This can result in 20 to 50% less lignin than conventional sorghum/sudan when harvested at comparable maturities. High lignin lowers the digestibility {i.e., the negatives of higher Neutral Detergent Fiber (NDF) and Acid Detergent Fiber (ADF)} of the forage. Thus BMR forage has higher feed value and forage palatability for livestock (grazed or baled). 1999 and 2000 results from Texas A&M-Amarillo determined a 12% increase in average daily gain for stockers in a replicated rotational grazing system when grazing BMR vs. the exact same hybrid without the BMR trait (Table 1). In addition, grazing preference for BMR forage vs. other sorghum/sudans has been observed in the field. Don't be deterred by somewhat higher seed costs with BMR forages. At modest seeding rates many of the regional Texas High Plains companies' hybrids will

cost $3-4 more per acre to plant (and these companies have been at the forefront of developing BMR), but you may pay an additional $3-4 per acre for the hybrids of large national seed companies.

One concern with BMR may be standability (lodging). This is generally only a concern if the forage heads out. Higher seeding rates increase lodging potential. Lower seeding rates than conventional sorghum/sudans and lower applied N may be appropriate for BMRs if the forage will head out. Also, BMR forage sorghum is available, and forage quality results demonstrate that BMR forage sorghums as a class are very near corn silage quality (Table 2), but require less water to obtain equal tonnage.

Do BMR forages yield as well as conventional forages? Few comparisons exist, but the Texas A&M—Amarillo forage sorghum trials do suggest a yield drag with the BMR trait when all BMR forage sorghums are compared as a class to the average of all conventional forage sorghums. Many of the BMR forages represent first-generation BMR forages (as well as experimentals that will not be released). As second generation BMR materials come on the market I anticipate that yield differences will be less. Individual BMRs today do yield more than many conventional forages whether forage sorghum or sorghum/sudan.

Photoperiod-sensitive sorghum/sudan and forage sorghum. Current photoperiod sensitive forages remain in the vegetative stage until daylength is less than ~12 h, 20 min (about September 20th for West Texas) at which time it will initiate the reproductive stage (and head out about 4 weeks later). Thus forage potential (grazed, baled, ensiled) is higher due to long-season growth, especially if planted early. While producers run the risk of conventional forages heading out due to delayed harvest (rainy weather, no time to harvest) photoperiod sensitive forage simply continue adding more leaves. This puts the producer in control and reduces the risk of losing forage quality due to heading. The general management of photoperiod sensitive forages (~16,000 seed/lb. for forage sorghum or sorghum/sudan) is the same as conventional hybrids for planting date, seeding rate, regrowth, etc. Photoperiod sensitive traits are now available in forage sorghum from several companies as well as hybrid pearl millet. Some research suggests that photoperiod-sensitive hybrids may have lower quality than conventional forages, but this appears to often be due in part to the higher tonnage. Several companies are marketing photosensitive hybrids that in fact might be very long maturity, but not PS.

Forage sorghum. Old names such as 'Red Top Kandy', 'Cane', 'Sweet sorghum'. Many forage sorghums are multi-purpose, but are most often planted for silage rather than hay or grazing because of their limited regrowth (retillering) potential. These materials are often very tall and coarse stemmed in part due to their strong daylength sensitivity. Forage sorghums have sweet, juicy stems, relatively small grain heads, and may mature late. Traditionally, some grain production was expected from forage sorghums produced for silage, but the widespread availability of feed supplements has made this less important. Prussic acid potential tends to be higher than sorghum/sudans. Seed size varies, but averages near 16,000 seed/lb. Forage sorghum is the best choice for after frost grazing, especially the "male sterile types" which will head out but not set grain unless pollinated by another hybrid.

Somewhat similar is 'Red Top Cane,' an old 'early sumac' forage sorghum cross, which has higher seeding rates than conventional forage sorghum. Also, 'Hegari,' or 'Hy-Gere' is popular with some growers. It produces chalky or starchy-white seeds, and is sweet. Some have suggested that hegari is suitable for shallow soils or chlorotic soils. It is an older 'workhorse type' forage with good drought tolerance, but low disease resistance. Over time, Hegari has evolved to a lower-class forage placed on less productive soils. A downside of full maturity in both Red Top Cane and Hegari forages is tannin in the grain which when consumed by livestock inhibits nutrient uptake.

Hybrid pearl millet. This leafy forage is similar to conventional sorghum/sudans, but with some key differences. Seed size is much smaller (75,000-90,000 seed/lb.) than sorghum/sudan thus seeding rates must decrease. Due to small seed size, a shallow seeding depth of 0.75 to 1.5" is recommended, which often limits establishment under dry conditions. Relative to sorghum/sudans (60-65 F) warm soils at planting are critical for success for hybrid pearl millet (65-70 F). Yields are somewhat lower than

sorghum/sudans but this leafy forage tends to have higher quality (more than 50% leaf). In West Texas hybrid pearl millet is much more tolerant than sorghum/sudan of iron (Fe) deficiency induced by chalky or caliche soils. Thus millets may produce comparable or even higher yields on these soil types relative to conventional sorghum/sudans. Hybrid pearl millet is drought tolerant, can be grazed by horses, and does not develop prussic acid problems (a good forage choice for fall grazing when light frosts are possible). This material may be grazed sooner (18-24") than sorghum/sudan. It should be harvested in boot stage for maximum total digestible nutrients per acre, or in pre-boot if higher quality is desired. Regrowth potential is somewhat less than sorghum/sudan so if haying leave 8" of stubble or if grazing do not allow livestock to trample the stalks.

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Table 1. Performance of steers grazing non-brown midrib and brown midrib sorghum/sudan hybrids, Texas A&M-Amarillo, 1999-2000.

Evaluation Criteria	Non-BMR	BMR
Average daily gain (ADG), lbs. per head	2.62	2.94
Average gain per acre, total lbs.	300	337

Initial weight, 531 lbs. per head
Grazing cycle, 41 days in '99, 59 days in '00.
Note: The non-BMR is the same genetic hybrid without the BMR gene. Field observations indicated steers more readily grazed the stalks of the midrib plants.

Table 2. Comparative data for non-brown midrib and brown midrib sorghums and sorghum/sudans as well as corn harvested for silage, Texas A&M-Amarillo, 2001.

Forage Type Forage Type	Crude Protein, CP, %	Acid Detergent Fiber ADF, %	Neutral Detergent Fiber NDF, %	Lignin, %	In Vitro True Digestibility IVTD, %
Corn (Avg. of 4)	9.0	23.9	41.2	3.5	82.7
Corn (Range)	8.4-9.7	18.2-27.4	33.7-45.8	2.7-4.2	78.3-88.1
BMR forage sorghum (Avg. of 21)	9.2	27.6	45.69	3.6	81.3
BMR forage sorghum (Range) have	6.9-10.5	24.3-35.0	40.7-60.1	2.8-4.5	75.1-84.2
Non-BMR forage sorghum (Avg. of 28)	8.3	29.9	49.1	4.4	75.5
BMR forage sorghum (Range)	6.3-10.8	21.3-41.7	33.9-67.5	2.7-6.4	60.9-83.6

From *Brown midrib forage sorghums and sorghum X sudan hybrids for summer grazing and silage productio*n. 2001. Ted McCollum III, Jason Banta, Brent Bean, and Wayne Greene, Texas A&M Univ. Research & Extension Ctr., Amarillo.