Single Fall Harvest Management of Sorghum-Sudangrass

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As dairy and livestock producers increase the use of winter cereal forages (rye and triticale) harvested in late spring/early summer, they must decide which crop to establish thereafter. Many farmers turn to corn silage. However, the use of sorghum-sudangrass has become more popular, especially if the farm needs lower-quality forage for heifers or dry cows. It can work very well after a cereal forage crop, as the soil may be drier, and it may provide good timing for manure application before establishment. To achieve a high-yield, lower-quality forage ideal for diluting diets of pregnant dairy heifers or dry cows, a single (rather than multiple) harvest system is the way to go. A single fall harvest system for sorghum-sudangrass silage can be done in one of two ways to achieve the appropriate dry matter (DM) content for silage: late-summer harvest by cutting, wilting, then chopping; or direct harvest at full maturity or after frost drying.

Variety selection, planting, and fertility are important to manage for a successful harvest. For a single harvest system, a conventional (non-BMR) variety is likely a good choice to minimize lodging, however, additional fiber digestibility is usually not needed. A brachytic dwarf variety may also reduce lodging.

Planting depth is an important consideration with sorghums to ensure fast emergence. Shoot for a planting depth of ¾-1" in heavy soils or 1-1½" in sandy soils. Erring on the shallower side is suggested if rains are in the forecast, as crusting and reduced emergence can occur. Soil temperature must be at least 60°F for fast germination.

There is large variation in seeding rates for sorghum-sudangrasses (15-40 lbs/ac). However, a lower seeding rate (20 lbs/ac) is suggested for a single harvest, as the stems will not be as thin and prone to lodging. Wider row spacing should be considered (15-20") to help speed drying due to greater airflow.

Adequate fertility is key to plant growth with yields between 6-10 tons DM/ac. For an 8-ton DM/ac yield at 5% CP, a total of 128 lbs N would be removed by the crop. Wisconsin recommendations are 100-120 lbs N/ac for yields between 5-7 tons DM/ac depending on soil organic matter. Potassium (K) can be taken up in excessive levels especially if soil K levels are high. Recent work at UW Marshfield ARS showed a single harvest sorghum-sudangrass forage removed up to 250-300 lbs K_20 with little increase in forage K levels above 300 lbs K_20 applied, but no yield response to K fertility since soil levels were optimal. Single harvest will have lower K levels (1-1.5% K) compared to a multiple harvest crop (2-4% K).

Harvest Methods:

Late-summer harvest (mid-late September). A late-summer harvest offers several advantages, including: lower lodging risk (taking advantage of good harvest weather); potential manure application; and the opportunity to plant a winter cereal grain. However, late-summer yield will be reduced compared to a fully mature crop and requires additional field work. Late-summer harvest involves cutting the crop, allowing it to wilt to adequate moisture for chopping, then chopping. The crop will generally be 6-8' tall, but cutting can be accomplished using a sickle, disc-bine, or a triple-mower setup with a conditioner to help speed the drying process (Photo 1). Wide-swathing can help dry the crop more rapidly as well. There will be a large forage mass which will take ~2 days of good drying weather to harvest at 35-40% DM. Based on conversations with farmers and custom harvesters, cutting at an angle to the rows or merging the windrows at an angle helps the merger pick up the forage. With a high forage yield, merging/raking may not be possible though. Chopping is done using a forage harvester with a hay-crop head (Photo 2). Forage particle length should be short

Photo 1. Cutting sorghum-sudangrass in late September at Marshfield ARS.

Photo 2. Harvest of sorghum-sudangrass in late September at Marshfield ARS.

enough to prevent sorting and allow for packing; ½" tends to work well. Leaching should be minimal in this system if the silage is >35% DM.

Photo 3. Photoperiod-sensitive sorghum-sudangrass 4 weeks after killing frost (~30% DM).

Direct chop at maturity or after frost drying. Use of a direct harvest method when the crop is fully mature (soft- to hard-dough stage) or after a killing frost has advantages, including maximizing yield and simplifying the harvest process. But, there are risks – including significant lodging from wind or snow, tighter timeframe for fall manure application, and likely no option for planting a winter cereal or cover crop. Weather can also turn wet and cold in October, making harvest difficult. The most important thing about this method is to ensure forage DM content is adequate for ensiling. Typically, for conventional non-photosensitive varieties, the crop will be at soft- to hard-dough stage in early October if planted in early to mid-June and ≥30% DM. However, if planted later or if you are using a photosensitive variety, the crop will not be mature enough before a killing frost and will need to be frost-killed and allowed to dry prior to harvest. Based on plot data, it takes 2-3 weeks after a killing frost for the crop to dry from 20% DM to 30% DM. Leaves will be completely brown and dry, but the stem will still be green and holding moisture (Photo 3). Harvest is done with a forage harvester equipped with a multi-directional head. If the crop is wetter than ideal, chopping at a longer particle length of 1-1.5" can help reduce leaching from the silo. Sorting should be less of a concern since the particle size will be more uniform than using a cut/wilt/chop system.

Nitrate and Prussic Acid? Nitrates and prussic acid can be of concern with a single harvest system, even if the crop is allowed to dry after frost and after ensiling. To ensure the safety of cattle, it is recommended to test the silage prior to feedout for nitrates and prussic acid content and adjust feeding rates accordingly. Analysis costs are far less than the cost of losing an animal.