

GETTING THE MOST OUT OF YOUR SORGHUM SILAGE

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My goal as a forage consultant is to attempt to develop continually improving silage programs for each individual dairy. There are a number of components that must be considered when trying to improve our silage management with the uncertainty of weather playing an unknown component in the entire circle (Figure 1).

Each dairy requires its own specific strategies for determining what crops and which hybrids to grow for each situation. The dairy producer/farmer normally makes these decisions in late fall or early winter for seed discounts or because a particular hybrid's availability is limited.

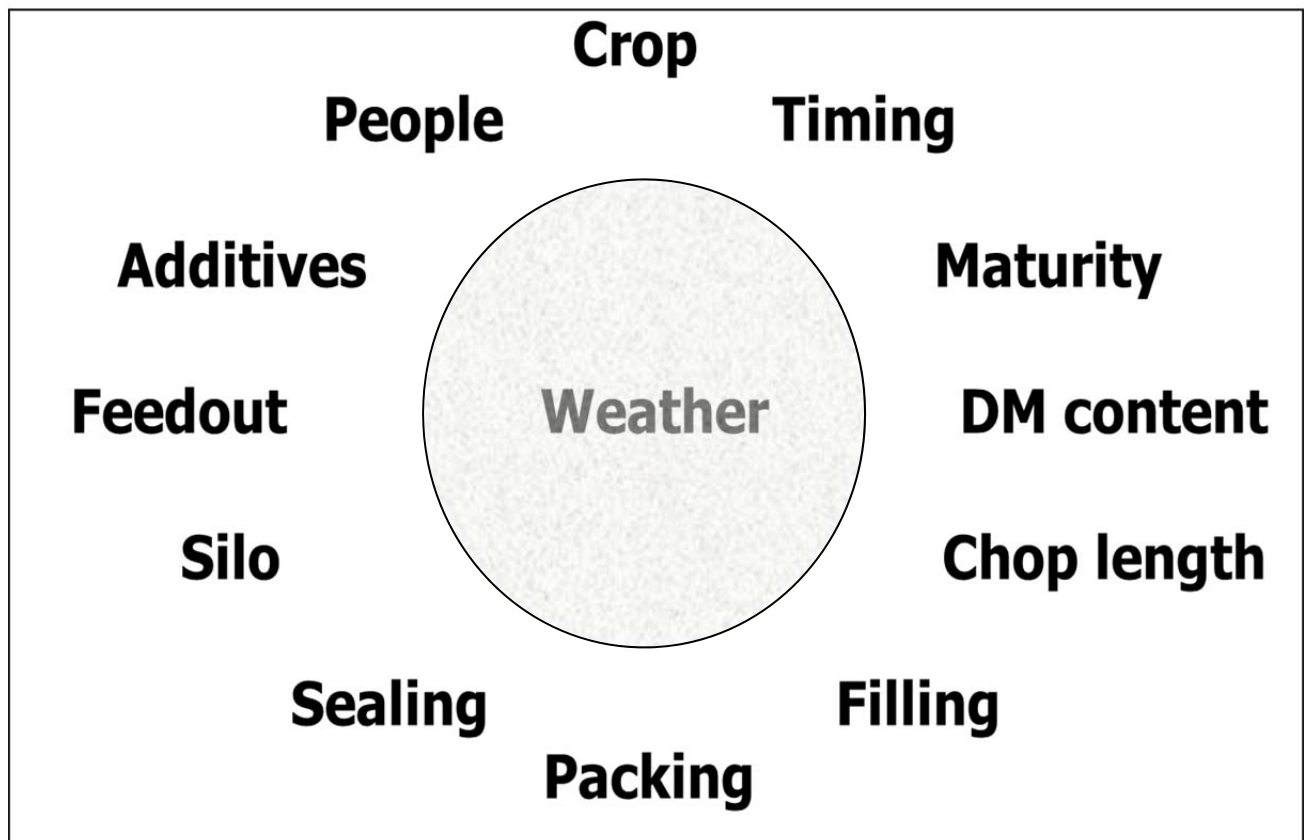


Figure 1. The silage/haylage circle of success.

What hybrid varieties to choose would be influenced by each area's circumstances. Some items to consider include:

- 1) Water availability (irrigated, limited irrigation, dryland)
- 2) Growing season length and environmental conditions
- 3) Type of animal to be fed – heifer, lactating cow, dry cow, etc.
- 4) Complimentary silages
- 5) Summer vs. winter vs. year-round feed-out
- 6) Soil type and fertility
- 7) Weed, pest, or disease pressures
- 8) Personal preferences of producer and the dairy's consultants

In addition to information available from seed companies, check with your university regarding the availability of variety trial information for your general locale. These reports typically include information regarding lodging, yield, and nutrient composition from multiple sites (Bean, 2011). In the Southern High Plains (Texas, Oklahoma, New Mexico, Kansas, Colorado) declining underground water levels in the Ogallala Aquifer, coupled with continuing drought in certain areas, are prompting decisions favoring hybrids such as sorghum silages that have lower water requirements and production costs (Texas A&M AgriLife Extension Agricultural Economics, 2014).

As a dairy producer, investigate the specific hybrids a crop producer might grow for you or you might grow yourself. Evaluate your options thoroughly enough that you would be able to recommend or plant hybrids yourself which have shown superior feed nutrient composition, as well as yield. Depending upon the amount of feed required and the number of acres you control, you may want to diversify your hybrid selection so you don't have all of

“your eggs in one basket.” In addition, some variation in hybrids might be required if a winter cover crop was grown on a portion of the acreage.

During the winter and early spring conduct meetings with your entire silage team! Include the:

- 1) Dairy Owner/Management
- 2) Crop Growers
- 3) Custom Choppers
- 4) Packers
- 5) Silage Sealers
- 6) Dairy Feeding Team

During these meetings cover all aspects of the “planting to harvest to feeding” procedures with “everyone” involved. Consider swathing sorghum, as the plant is frequently too wet when the grain is ideal for ensiling. You may also need to include your manure management team members to insure you remain compliant with your permit.

To achieve the highest feed quality sorghum silage, you must carefully manage the timing of harvest, the harvest process, and the ensiling phase.

- 1) Monitor the sorghum plant several weeks before the anticipated harvest time, measuring whole plant dry matter as well as grain maturity.
- 2) Create a preliminary “order of harvest” for fields based on field maturity monitoring results.
- 3) To maximize the digestibility of the grain portion in sorghum silage, harvest in the early to mid dough stage.
- 4) The ideal dry matter for any sorghum silage would be in the 32-36 % DM (64-68 % moisture) range.
- 5) Monitor moisture in the swath and schedule chopping and hauling to optimize dry matter. Optimum dry

matter also reduces the amount of leachate produced.

Make sure you have the site for your silage prepared well in advance of harvest for drive-over piles or bags.

- 1) This includes having the surface ready for the silage with the proper slope for water runoff.
- 2) Do not overfill bunker silos or drive-over piles.

INOCULANTS

Correctly handle the application of the inoculants.

- 1) If possible, apply inoculant at the forage chopper.
- 2) Keep inoculants frozen or under refrigeration until shortly before being mixed. Follow the manufacturer's recommendations!
- 3) Check application rates several times daily.

For liquid/water soluble inoculants:

- 1) Use insulated application tanks.
- 2) If application tanks are not insulated, add ice packs during daily operation to maintain temperatures within the range specified by the manufacturer. Generally, maintain the water temperature between 24 to 32 °C (75 to 90 °F).
- 3) For best results, mix up only enough inoculant for one day. If inoculant is left over at the end of the day, put ice packs in the tank to keep the temperature within the ideal range.

A silage inoculant should:

- 1) Increase dry matter (nutrient) recovery.
- 2) Improve beef or dairy cattle performance:
 - * Milk quantity and/or composition.

- * Body condition and reproduction.

- * Rate and efficiency of gain.

- 3) Decrease heating and molding during feedout.

PERSONNEL

Employ experienced people:

- 1) Especially those who operate the forage harvester, blade/push tractor or bagging machine.
- 2) Communicate in a timely manner for:
 - * Kernel processing (corn & milo)
Adjust kernel processing as needed.
 - * Chop length is determined by type of crop, maturity (whole plant DM) and plant structure. Typically with sorghum, strive for about a ½ in chop.
 - * The ideal corn or sorghum silage DM is 32-36 % (64-68 % moisture)
- 3) Provide training as needed.
- 4) Proper kernel processing and chop length need to be monitored day by day, field by field as silage whole plant DM and kernel maturities are affected by weather.
- 5) Stress safety throughout the process

PILE/BAG MANAGEMENT

Attain proper packing density:

- * Achieve a high, uniform packing density of at least 16 lbs of dry matter per cubic ft. to minimize shrink loss (Table 1).
- * Maximize the weight of all tractors.
- * Use the progressive wedge filling technique.
- * Maintain a 1 to 3 or 1 to 4 slope for the wedge.
- * Spread all forage in uniform layers that are about 15 cm (6 inches) thick. The thinner the better!!

- * Pack each layer east-west and north-south in drive-over piles and in large

bunker silos, when possible.

Table 1. DM loss (shrink loss) as influenced by silage density. Minimum targets are 245 to 260 kg of DM per m³ (15.3 to 16.2 lb of DM per ft³) or 690 to 720 kg of DM per m³ (43 to 45 lb of DM per ft³).

Density, kg of DM per m ³ (lb of DM per ft ³)	DM loss at 180 d, % of the DM ensiled
160 (10)	20.2
192 (12)	18.5
225 (14)	17.0
255 (16)	15.0
285 (17.8)	13.0
340 (21.2)	10.0

^aAdapted from Ruppel (1992).

- * Ideally, the arrival of trucks to the bunker or pile should be evenly spaced throughout the day.
- * Packing for a longer time at the end of the day is a waste of both time and diesel fuel!!

Seal to minimize surface spoilage:

- * Back, front, and sides of bunker silos and drive-over piles should never exceed a 1 to 3 slope.
- * All surfaces should be smooth, so water drains off...not in!
- * For bunkers and drive-over piles seal each day's harvest that evening if possible or the following morning, leaving only enough open to start correctly that following day.
- * Seal immediately after filling is complete.
- * Minimize surface spoilage by using a product such as the Silostop[®] (Bruno Rimini Corp., Brentwood, Essex, United Kingdom) 2-Step System (a sheet of Silostop orange film under a sheet of regular plastic), which has been shown to reduce organic matter losses compared to 6-mil black plastic (Bolsen et al., 2006).
- * Overlap the sheets at least 1 meter (about 3 ft).

- * Sheets should be at least 1 meter (about 3 ft) off the forage surface around the entire perimeter of drive-over piles.
- * Put uniform weight on the sheets over the entire surface and double the weight on all overlaps.
- * Sandbags filled with pea gravel are excellent for weighting overlapping sheets and provide uniform weight at the interface of the sheets and bunker silo walls.
- * Mow the area surrounding a bunker or pile and put up temporary fencing.
- * Regular inspection and repair are important.

FEEDOUT/DELIVERY

Manage the feedout/delivery :

- * Maintain a rapid progression through the silage.
- * Manage the face so that a smooth surface that is perpendicular to the floor of a bunker or pile remains after feeding.
- * Shave down the feedout face using proper unloading techniques.
- * Never "dig" the bucket into the bottom of the silage feedout face.

- * Undercutting creates an overhang that can tumble to the floor.
 - Never allow people to stand near the feedout face.
 - A rule-of-thumb is to never be closer to the feedout face than three times its height.
- * Remove 15 to 30 cm (6 to 12 inches) of silage per day in cold weather months and 30 to 45 cm (12 to 18 inches) of silage per day in warm months.
- * Minimize the time corn or sorghum silage sits in the commodity area before it is added to the ration.
- * Add 1 to 2 kg (2 to 4 lb) of buffered propionic acid per ton of total mixed ration if heating does occur.
- * Consider re-sizing a bunker or pile and subsequent feedout face for the time of year that silage will be fed out.
 - Feed from “large feedout faces” in cold weather months.
 - Feed from “smaller feedout faces” in warm weather months.
- * If aerobic stability continues to be a problem, consider using bacterial inoculants that contain *Lactobacillus buchneri*.

MONITORING SUCCESS

In an attempt to make better forage decisions for each crop each time we put them up, we have various procedures we follow through with, throughout the year. So how do we measure the success of a program?

- Take several corn or sorghum silage densities.
- Send in a representative sample for fermentation analysis

- Depending upon growing, harvesting, and fermentation conditions; submit samples for mycotoxin testing.
- Create a system to track weights on silage fed *with weigh backs* to get a handle on silage shrinks.
- Meet with the nutritionist and key dairy personnel at each dairy to evaluate whether the silage is performing in the farm’s rations as expected using nutrition modeling program predictions and on-farm production records.

CONCLUSIONS

For the best results with any program, someone on the dairy has to take charge of the process from beginning to end. Crop consultants, local growers, field managers, nutritionists, harvesters, packers, sealers, and feeders all play a role, but someone has to be the HEAD COACH if top performance is going to be achieved. Most of you know what needs to be done. TAKE CHARGE and make it happen.

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