Silage Management - Putting the Pieces Together

A major goal of silage management is to produce a stable forage that will maintained forage quality throughout its storage life and during feeding. Technically, this means the silage should be of or below a certain pH and consist of the right proportion of volatile fatty acids depending on the particular crop.

The following is a checklist of the many factors and practices that are helpful and usually necessary for making quality silage.

- **Select forage crops and varieties** that grow well on your soils and meet the needs of your animals.
- **Follow good agronomic practices** such as fertilization and pest management to get the most optimum from your crop.
- **Chop forage at right maturity**. The quality of silage is only as good as the quality of the forage at the time of harvest. See Table 2 for some general recommendations.
- **Adjust chopping length** - A fine chop helps reduce air space and increases the opportunity for fermentation bacteria to make contact with plant sugars. However, to meet rumen needs, the animal still needs about 15 to 20 percent of the forages to have particles at 1.5 inches or longer.

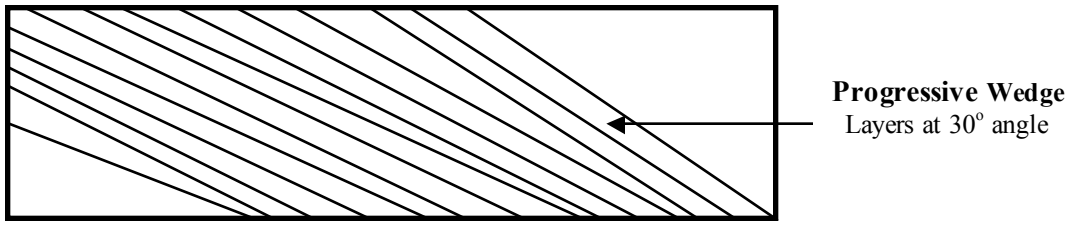
  This is a challenge to find that right balance. Some farmers accomplish this by raising the chopping length of their haylage; however, research has shown that when length is increased, ADF in the ensiled material increases probably due to poorer fermentation causing a reducing in forage energy value. One approach has been to chop fine to get good fermentation and then add some long hay or chopped hay to the ration to meet the long fiber needs. If corn is chopped too long, the silage ends up with large pieces of cob and uncracked kernels that are poorly digested. Some farmers are now using processors on their choppers that crushes the kernels and cobs. This allows them to make a longer chop but still get good use of the grain.
- **Chop at the right moisture content** for your particular silo - The optimum range of moisture is important to encourage the right bacteria to grow and reproduce. If chopped too wet, Clostridial bacteria dominate producing butyric acid, a weak acid that gives poor silage that rancid smell. Chopped too dry and it is difficult for the forage to compact and the lactic acid bacteria to grow.
- **Chop and fill fast but not at the expense of doing adequate packing -** This is one of the best opportunities for farms to optimize their silage operation. The quicker that forage is chopped and filled in the silo, the less time it has to deteriorate and loose sugars. On the other hand, bunk or field stacked silos that are filled too fast may result in poor packing which results in too much oxygen left in the silo.
- **For horizontal silos, pack appropriately -** Know the weight of your packing tractors. One rule of thumb is to have 800 pounds of tractor weight for every ton of forage filled per hour in order to get adequate packing. Also, it is best to pack material 6 inches or less in depth at a time.

Filling Rate (tons per hour) = Packing Vehicle(s) ÷800

Example 1 - A farm has a 26000-lb. tractor; therefore, their maximum filling rate would be 26000 ÷800 = 32 tons per hour. With an 20 ton yield of 150 acres of corn (=3000 tons), the farm would need to plan on almost 8 12-hour days to chop, fill and pack this forage (3000 ÷32 = 93.75 hours ÷12 hour days = 7.8 days), not including bad weather days.

Example 2 - The farm wants to shorten this period to five days. How much packing weight does the farm need to plan on? The filling rate would be 3000 tons ÷ 60 hours = 50 tons per hour. Therefore, packing vehicle weight would need to be 50 X 800 = 40,000 lbs. Therefore, the farm would need to add another 14,000 lb. 40,000 - 26,000) tractor to the packing operation.

- **For bunk silos, use a progressive wedge for filling** - Research has shown that filling at a 30° angle, as opposed to layering it flat or dumping off on one side at nearly full height, results in better packing and more energy preserved. For haylage that is coming from several fields, a progressive wedge also allows for a gradual shift in forage types as it is fed out from one side.



- **Use a silage inoculant, if necessary** - Much research has shown that the fermentation can be improved by the addition of lactic acid bacterial inoculants, especially for haycrop silage in the first and last harvest when air temperatures are cooler. The benefits are less obvious for corn (research trials have had more mixed results). If an inoculant is used, make sure it is from a credible source (a company that backs up its product with good research), that the inoculant is viable, and follow the recommended rate of application. Best results are reached when the inoculant is added in a liquid suspension at time of chopping; this assures better distribution of the bacteria over the forage surface and helps put the "bugs" in contact with the plant sugars which they need to grow and reproduce.
- **Cover the silo well** to prevent oxygen contamination. This prevents spoilage and dry matter losses. Also, air leakage is the primary cause of mycotoxins in silage. These fungal by-products can have subtle but serious consequences to herd performance, reproduction and health.
- **For horizontal silos, unload fast enough** to minimize face spoilage. Silo width and height should be matched to the amount of feed removed daily such that at least 5 inches of silage face is removed per day.

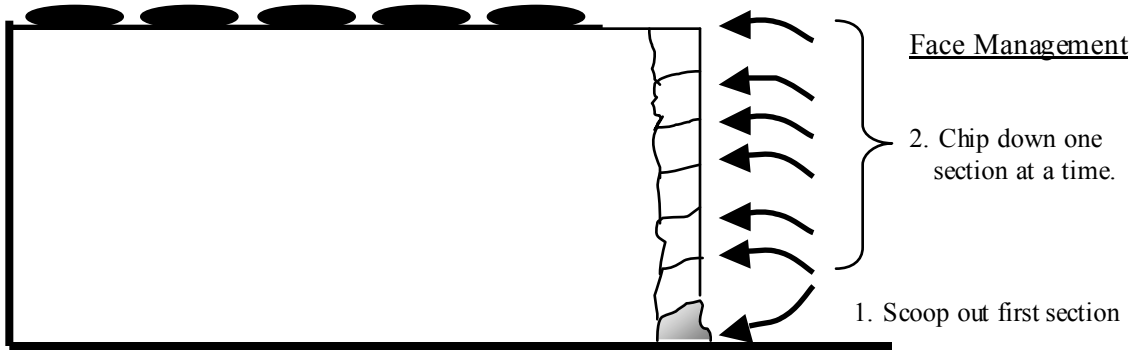
Silo Width (ft) = [12 x Amount fed (lbs dm/day)] ÷ [Height, ft x silage density (dm/ft^3) x 5]

Typically, with good packing practices:

Haycrop silage density is about 14 - 15 lbs dm/ft^3

Corn Silage is about 17 - 18 lbs dm/ft^3

- **For horizontal silos, prevent fractures in the face** and minimize loose silage on the floor - One method some farmers are using is to pull out a small amount at the bottom of the removal area and then break off small sections with a downward pressure from the blade tip of the unloader. See figure below.



Reference: Ruppel, Kurt. 1997. Economics of Silage Management Practices. Proceedings: Silage: Field to Feedbunk, NRAES-99. Natural Resource, Agriculture and Engineering Service, Ithaca, NY.

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