THE OHIO STATE UNIVERSITY
COLLEGE OF FOOD, AGRICULTURAL, AND ENVIRONMENTAL SCIENCES

**Harvesting and Storing Corn Silage**

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Several important decisions regarding corn silage harvest must be made in the next few weeks and these decisions will affect the dairy herd for the next 12 months. Corn silage that is made and stored correctly is an excellent feed and one of the cheapest sources of nutrients in the Midwest. On the other hand, silage that is not made correctly can adversely reduce milk production when fed to cows and will have lower nutritional value resulting in higher supplementation costs.

The decisions that must be made (in order of importance) are:

1. When to chop the corn
2. Everything else

The "Everything else" category includes cutting height, chop length, kernel processing, use of inoculant, and how long the silage should be left before feeding. Although these are important, if the silage is not harvested at the correct stage, these other factors will not overcome the problems associated with either immature or mature corn silage.

**When should the corn be harvested?**

Corn silage that is chopped too early (i.e., too wet) often undergoes a poor fermentation that results in higher fermentation losses and can reduce intake when the silage is fed. Seepage also can occur which reduces the nutritional value and can cause environmental problems. On the other hand, wet silage usually does not heat or mold during feed out and digestibility can be high. Corn chopped too late (i.e., too dry) undergoes a limited fermentation, resulting in a substantially less stable silage. It often heats and molds at the silo face, during feedout, and in the feed bunk, and fiber and starch digestibility can be low. The ideal dry matter (DM) for corn silage is between 30 and 38% depending on the storage structure (closer to 30% for bunkers and closer to 38% for uprights). Slightly wet silage is usually better than slightly dry silage so err on the side of chopping early if necessary. Dry-down rates vary substantially because of hybrid and weather but *ON AVERAGE* corn plants gain about 0.5% units of DM each day after dent stage (can range between about 0.3 and 1% unit). Dry matter should be measured; do not rely on kernel milk line to make harvesting decisions.

**How high should the plants be cut?**

The least digestible part of the corn plant is the stalk. It has high concentrations of neutral detergent fiber (NDF) and lignin. When cutting height is increased, more stalk is left in the field

which reduces the proportion of corn silage that is stalk and increases the proportion that is leaves and ears. Typical stubble height for corn is 4 to 6 inches and most of the research on high cut corn had stubble heights of 15 to 18 inches. The absolute certain response will be a 4 to 6% reduction in DM yield (this means a 4 to 6% increase in production costs). Usually NDF concentrations are reduced and starch and DM concentrations are increased by 2 to 4 percentage units when corn plants are cut high. However, milk production studies have failed to show consistent benefit. Because of the certainty of lost yield and the uncertainty of any positive response, I do not recommend this practice.

**What is the correct chop length?**

Fine chopping promotes good packing and increases the rate of fermentation in the silo, but fine chopping may result in silage that does not promote adequate chewing when fed to the cow. Coarse chopping may cause fermentation problems and can increase sorting when fed to cows. Chop length has been described as the theoretical length of cut (TLC) at which the chopper was set, but TLC is a poor descriptor of actual particle size of the silage. A better approach is to actually measure particle size at the time of chopping with a device such as the Penn State Particle Separator. Corn silage that had not been kernel processed with 3 to 6% of the silage on the top screen and 60 to 65% on the second screen (8 mm hole diameter) of the Penn State Separator usually ferments well and has good nutritional value. For processed corn silage, a very wide range in particle sizes (equivalent to approximately 2 to 21% on the top screen) had no effect on cows. If the processing rolls are set properly (i.e., most kernels are physically damaged), silage with 5 to 10% on the top screen is adequate. Particle size evaluation should be done during harvest so that adjustments can be made.

**Should kernel processing be used?**

Proper kernel processing is when most of the kernels are physically damaged which results in improved starch digestibility for kernel processed silage than conventional silage. However, the response is a function of the maturity of the corn plant and hybrid. Processing almost always increases the nutritional value of drier corn silage (but it is still not as good as silage made at the correct DM) and is a recommended practice. Processing silage made at the correct DM usually has a positive effect but the effect is much less than what is observed for dry silage. Processing immature corn can substantially decrease its energy value and is not a recommended practice. Chopped material should be visually examined during the harvest and if many undamaged kernels are observed, the processing rolls and/or chop length needs to be adjusted.

**Should I use an inoculant?**

The two types of inoculants for corn silage are lactic acid bacteria (LAB) and bacteria that produce acetic and propionic acid (bacterial species is *Lactobacillus buchneri*). Treating corn with LAB usually reduces fermentation losses because it ferments faster and has more lactic acid (and less acetic acid). On the other hand, L. buchneri increases acetic acid which increases fermentation losses but because acetic acid is inhibitory to yeasts and molds silage treated with L. buchneri is extremely stable during feed out which reduces storage losses. Conversely, silage treated with LAB often has reduced stability during feed out. The return on investment of LAB

is usually slightly positive if feed out losses are not a problem. If spoilage and heating during feedout has been a problem or if silage feed out rate will be slow (less than about 6 inches/day) and/or the silage will be fed in the summer, L. buchneri could be quite useful.

**How long should the silage be left undisturbed after filling?**

Most studies with corn silage show that pH and acid concentrations become stable by 7 to 14 days post-ensiling if the silage is left undisturbed. Yeast and mold counts may require up to 60 days before stabilizing and opening a silo will increase that time. The digestibility of corn silage can continue to improve even after months of storage. Letting silage ferment undisturbed for several months has many benefits; however, maintaining silage inventory is not free. The best compromise is to let silage ferment undisturbed for 1 to 2 months before opening. This means that the first year you will need to harvest 13 or 14 months of silage and you need a place to store the silage that will not interfere with silo filling.

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http://dairy.osu.edu/bdnews/Volume%2012%20issue%203%20files/Volume%2012%20Issue%203.html