Corn Silage Harvest Management

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With the upcoming harvest, it is a good time to review harvest management for high-quality corn silage. Important factors to consider include dry matter (DM) percent particle size, kernel processing, and chop height.

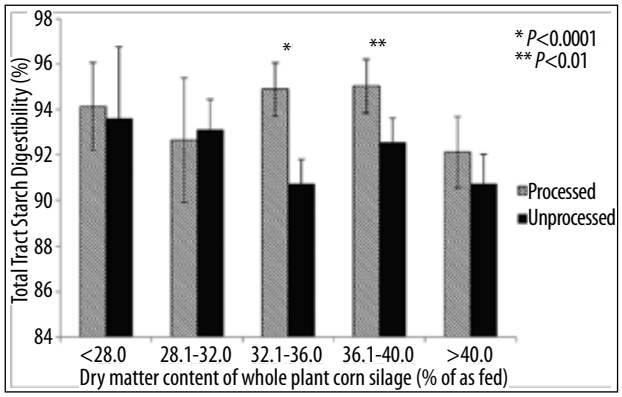
Dry Matter Content

Monitoring DM content is likely the most important factor to make high-quality corn silage. Harvesting silage too wet (<30% DM) will cause seepage and loss of nutrients from the silo, while too dry (>40% DM) will reduce digestibility of fiber and starch and cause packing issues. Ideal DM is 32-38% with lower DM silage working better in horizontal silos to allow better packing, while higher DM silage works well for upright silos to minimize seepage. Testing of corn silage for DM should begin once kernels are mostly dented and a milk-line is visible. Often the milk-line will be ⅓-⅔ to be in the ideal DM range. There is considerable variation in DM at any single milk-line value, so testing every few days will help dial in when harvest should occur. Test fields separately, as there will be differences in planting date (see Corn Silage article, p. 19), drydown rates, and soil characteristics that will cause differences in corn plant moisture. Testing can be done by chopping through a wood chipper and drying using a microwave, koster tester, dehydrator, or sending to a forage testing lab.

Kernel Processing

Ensuring kernels are broken (ideally ¼ kernel pieces) during chopping will lead to improved starch digestibility. Proper setup and use of a conventional roll-processor or newer processing equipment will help break kernels. Recommended roll gap for a conventional roll-processor is 1-3mm but will depend on crop moisture and chop length. Speed differential between rolls impacts breakage with higher differentials (30-40%) improving processing. Wetter or finely chopped silage will be less improved by processing. A dry silage (>40% DM) will likely have fewer digestible kernels due to higher prolamin content, so processing will help less than if harvested at the ideal DM (Figure 1). Harvesting at a longer chop length will decrease the ability of the processor to contact kernels due to the long forage particles covering them. Checking for kernel processing should be done prior to chopping. Simply use a tub of water, place a chopped silage sample in water, mix so kernels sink, then skim stover particles, and drain water to see kernels. Team Forage has an article with complete methods to separate kernels from stover (https:// fyi.uwex.edu/forage/making-sure-your-kernel-processor-is-doing-its-job/). A new app to determine kernel particle size and processing, allowing better assessment and management in the field, is detailed in the equipment article (p. 8). Samples can also be sent to a forage testing lab to test for kernel processing score (KPS), which is percent of starch passing 4.75mm screen. Optimal KPS is >70%. However, the delay in results doesn't allow harvesting adjustments if KPS is not optimal.

Figure 1. Starch digestibility of processed or unprocessed corn silage at various DM.



Source: Ferraretto and Shaver, 2012. Meta-analysis: Effect of corn silage harvest practices on intake, digestion, and milk production by dairy cows. Professional Animal Scientist.

Particle Size

Particle size is an important factor affecting silage packing and effective fiber (stimulates chewing). Recommended particle size depends on processor type used. If the harvester does not have a kernel processor, recommended theoretical length of cut (TLOC) is ⅜" to cause more kernel breakage. If using a conventional roll-processor, recommended TLOC is ¾". Length of cut is typically set longer (1-1.25") for harvesters equipped with newer processing equipment (Shredlage™, intermeshing disks) to increase fiber length while still processing kernels optimally. Use of a Penn State particle size separator can help manage corn silage particle size with 8-15% of particles on top screen and up to 70-80% of particles on top 2 screens.

Chop Height

With the need for higher digestible forages for lactating cows, higher chop heights can be a strategy to reduce stover content. As a tradeoff, yield will be reduced depending on how high the crop is cut with a reduction of ~100 lbs DM/in. A summary of 11 studies (https://extension.psu.edu/considerations-in-managing-cutting-height-of-corn-silage) evaluating low (7" average) vs. high (19" average) chop corn silage showed 7% yield reduction, but 3%-units lower NDF and 2%-units higher starch. Predicted milk/ton was 5% greater but milk/acre was ~2% lower.

Use of higher chop heights depends on hybrid used. High chopping is not recommended for brown mid-rib corn hybrids, as they have higher fiber digestibility, and you'll want to maximize tonnage harvested. If haylage is excellent quality, then high chopping may not be beneficial; however, if haylage is average or lower quality, high chopping will help increase forage quality in the diet. High chopping can help increase DM content if forage is still wet with ~2% higher DM content for high-chop corn. Also, high chopping can help reduce nitrate levels.

Forage inventory must be considered. High chopping should only be used if there will be sufficient yields to fill inventory needs. It can also be used if there is more forage in the field than can fit in the silo and grain harvest is not needed. If multiple silos are available, harvest low or high-chop corn silage and store separately to have corn silage for both lactating cows and heifer/dry cows.

Work with a nutritionist to decide if high chopping will be a benefit and how it will affect diet formulation, since some grain may need to be removed to balance fiber and starch levels.