Corn Silage Harvest Timing: What Are Your Options?

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Harvesting corn silage at the optimum moisture content is essential to promote adequate fermentation, minimize effluent loss, and ensure aerobic stability during feed out. As the crop begins to dry down, surveillance is key. On a good September drying day in the Midwest, a corn plant can lose up to one percentage point of moisture. There are various tools for determining moisture, and we'll survey both high- and low-tech options.

Regardless of the method used to determine moisture, we first need to take a representative field sample. Lucky for us, Jerry Cherney at Cornell did the hard work of sampling up to 50 plants per field to determine how many would be needed to glean a reasonable estimate. There are a few caveats to the analysis. The field needs to be relatively uniform. You know your fields and where to sample. Of course, there will be drier and wetter areas but think about sampling areas representing the majority of the acreage. Based on the work from Cornell, I would recommend sampling 10 plants.

Now that you have 10 representative plants, you'll need to reduce their size for most methods of determining moisture. We've had good luck using a gasoline engine-powered woodchipper that can be bought at a big box hardware store for <$1,000. Once the sample is chopped, you can mix by hand, sub-sample, and determine the moisture content. Here you have a few options, including a drying oven, Koster tester (~$500 with scale), food dehydrator ($50), air fryer ($50), microwave oven ($200), or near-infrared reflectance spectrometer (~$20,000).

The drying oven, Koster tester, food dehydrator, air fryer, and microwave oven all work gravimetrically or on the principle of determining the proportion of the sample weight that is water. It's interesting to observe that a handful of forage is more water than dry matter. While the oven provides the "gold standard" for moisture determination, the other methods provide a more rapid result. For these methods, you'll also need a scale that can weigh up to 300 g at a 0.1-g resolution. A food scale can do the trick, but you get what you pay for in terms of accuracy and precision.

In our lab, we dry samples in a forced-air oven at 103°F for 24 hours in a 4 5⁄16 x 2 7⁄16 x 7 7⁄8", #2 hardware paper bag (e.g., Uline part 6910). When samples are very wet, we limit the weight to ~300 g. Each bag is weighed empty to at least 0.1 g to determine the tare weight and again after adding the sample. Final weight is determined by weighing hot (be careful not to burn yourself on the oven racks). The moisture content is then defined as the ([Initial weight – Final weight]/[Initial weight – Tare weight]) x 100.

The other gravimetric methods partially dry the sample and rely on a relationship between the weight loss and the starting weight to estimate the moisture content. While this may sound less accurate, and it is, the methods are generally within a few percentage points of oven drying. The biggest challenge with these methods is the labor associated with preparing and handling the sample. This is a particular limitation of the microwave method.

Finally, we have the NIRS methods. Not the cheapest approach, but both benchtop and handheld instruments give instant results, and the technology is particularly suited for predicting moisture content. We've had the best performance from devices measuring light above 1100 nm, as these instruments detect two moisture peaks. In most cases, the samples will still need to be chopped. Depending on the manufacturer, there may be a distinction between the calibration for fresh and ensiled corn. Be sure to read your operator's manual for your specific device.

Have we reached the pinnacle of moisture prediction with NIRS technology? I don't think so. The same phenomenon that gives NIRS the utility to predict sample moisture has been integrated into satellites and UAVs. In the near future, you can expect to check your field from your phone. Until then, we have many options for harvesting at the proper moisture with some extra time invested.