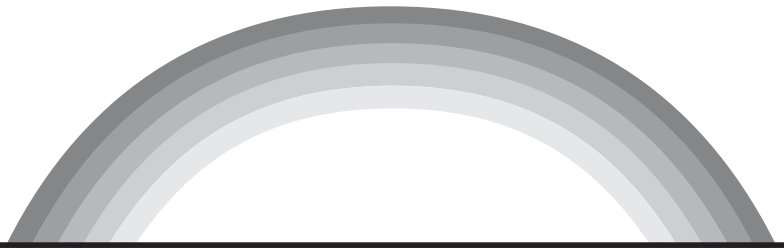


Disaster Recovery



Livestock

Determining moisture of immature corn silage

Once a decision has been made to harvest the immature corn crop as silage, it is easy to become too anxious. As with normal silage, the proper stage for chopping is 60 to 65 percent moisture.

Often the only difference between making good silage or poor silage is the moisture content at the time of ensiling. Optimum fermentation of both silage and haylage depends largely on moisture content. Corn silage or haylage that is too wet ferments longer than necessary. An excess of acids and other end products of fermentation accumulates, which can cause a reduction in consumption of the silage or haylage. On the other hand, silages and haylages that are too dry are light and fluffy, making packing difficult. This allows air to penetrate the silage mass. Molds flourish in silage whenever air is present. Molds not only feed on the energy in the forage, but they also produce heat, which, if excessive, can reduce protein availability.

A problem is how to determine the moisture content quickly yet accurately on the farm. There are many commercial devices, such as oven driers, that can be purchased. These are quite accurate, but rather expensive. Electronic hay moisture testers operate in the dry hay moisture range, so they would work with baled stover, but are not very useful for silage moisture estimates.

Two simple, inexpensive methods involve drying the forage with a 250 watt infrared heat lamp or in a microwave oven.

Heat lamp method to determine dry matter

The equipment needed for the heat lamp method includes, a 100 to 500 gram scale, a foil pie pan, a 250 watt infrared bulb, a heat lamp, and a stand to hold the lamp. These items are available from most livestock supply companies at a total cost of less than \$50.

Spread 50 grams of chopped corn or corn silage evenly over the bottom of the pie pan. The lamp is placed 5 inches above the surface of the forage for 90 minutes. The sample should be stirred two or three times during the 90 minutes to ensure even drying. The dried sample is weighed again at the end of 90 minutes to determine the amount of dry matter remaining. To calculate the moisture percent, subtract the dry weight from the wet weight, and multiply by two. The following example illustrates the calculation:

$$\begin{aligned} \text{Wet Weight} - \text{Dry Weight} &= \text{Moisture (x2)} = \text{Moisture \%} \\ 50 \text{ gm} - 17 \text{ gm} &= 33 \text{ gm (x 2)} = 66\% \end{aligned}$$

The results of this technique compare favorably with moisture determinations by commercial laboratories. The following moisture analysis was conducted on five samples of chopped corn before it was placed in the silo. To check the accuracy, a similar sample was sent to a commercial laboratory for analysis. The procedure was repeated for corn silage when the silo was opened.

	Sample	Heat Lamp	Commercial Laboratory
Chopped Corn	1	68% Moisture	
	2	68	
	3	66	
	4	64	
	5	69	
	Average	67%	68.4%
Corn Silage	1	66	
	2	68	
	3	69	
	4	66	
	5	69	
	Average	67.6%	68.5%

Results show that the lamp method can be used for

Results show that the lamp method can be used for both chopped corn and corn silage. The method works equally well for haylage going in or coming out of the silo.

The heat lamp method is not recommended for high moisture grain because the heat will cause grain to “pop” like popcorn.

The 5-inch distance between the lamp and sample is critical. If the lamp is closer, the sample can burn. Placing the lamp farther away than 5 inches will delay drying. Since line voltage sometimes varies from farm to farm, the sample should be watched closely to avoid burning. If the sample does not appear dry after 90 minutes, check the weight at 10-minute intervals. It is dry when it no longer loses weight. Any reliable analysis depends on accurate sampling.

Microwave Method to Determine Dry Matter

Listed below is a method that will serve as a quick, on-the-farm moisture tester for your hay and silages. The microwave oven and diet scales are the main items for this method. Using this method for estimating moisture content of already ensiled silage may produce undesirable odors in the kitchen. Drying fresh cut forage is often more tolerable.

Sampling standing corn

Important to any forage moisture test or feed analysis is getting a representative sample. Sampling standing corn presents a challenge because plants in different parts of the field may be drying at different rates and only a small sample is used in a moisture check. The most accurate estimate would be to actually field chop a partial load of corn forage from an area or areas representative of the field. A few small grab samples from different parts of the chopped load best represents what will be ensiled. A frequently used, but less representative, method is to hand chop a few corn plants. If this is the method you choose, sample standing corn by selecting two or three representative corn plants and cut at the height where it will be chopped by the forage harvester. Cut the plants finely then thoroughly mix the chopped forage before taking a grab sample. Another possibility is a test run by the forage harvester in a representative area in the field.

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Microwave oven—moisture test

Tools:

- (1) Microwave oven
- (2) Kitchen scales (diet type) 16 oz. or 500 gram (a gram scale is best)
- (3) Large paper plate
- (4) Scissors

Recipe:

- (1) Obtain three samples.
- (2) Chop the sample into thumbnail size pieces until you have 100 grams (including the plate). If your scales read in one-tenth ounces, chop until you have 10 oz. on the paper plate.
- (3) Spread the chopped forage as much as possible over the paper plate.
- (4) Put an 8 ounce glass 3/4 full of water in the back corner of the microwave oven. If you reset the oven make sure the glass is 3/4 full of water.
- (5) Place the plate of forage chopped for silage (estimated moisture 50 percent to 75 percent) in the microwave and set at 80 to 90 percent power for five minutes.

OR

Place the plate of forage harvested for hay (estimated moisture 5 percent to 35 percent) in the oven and set at 100 percent power for 2 minutes. If the forage feels dry, weigh the plate of material and record weight. If in doubt about the dryness, rotate plate and set timer for 1/2 minute and weigh again at the end. (Weight shouldn't change if the sample is dry).

- (6) You may continue drying in 1/2-minute time settings as long as the glass of water is kept 3/4 full. If the forage chars, use the weight previous to the burning.

Caution: After the final weighing, allow the hot, dried forage to cool in the open air before discarding to avoid trashcan fires.

- (7) Calculate:

$$\% \text{ moisture} = \frac{(\text{wet weight} - \text{dry weight}) \times 100}{\text{wet weight}}$$

$$\% \text{ dry matter} = 100 - \% \text{ moisture}$$

- (8) Example:

$$\text{Wet weight} = 60 \text{ gram}$$

$$\text{Dry weight} = 20 \text{ gram}$$

$$\frac{(60 - 20)}{60} = 66.6\% \text{ moisture}$$

$$\% \text{ dry matter} = 100 - 66.6 \\ = 33.4$$

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