

Texas Dairy Matters

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DETERMINING DRY MATTER WITH A MICROWAVE OVEN

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Whether you are making silage or hay or trying to adjust rations, determining dry matter is an important task on a dairy. Although there are commercial devices to determine dry matter, a microwave oven can work. Just don't use the one in the family kitchen!

The following items will be needed to accurately determine dry matter:

- Small scale, preferably accurate to 0.1 grams
- Paper plate, 9 inch minimum
- Water glass, eight ounces or larger
- Microwave oven (designated for this use)

Follow these steps to determine the dry matter of a sample:

1. Weigh a large paper plate
2. Weigh out 100 grams of the forage to be sampled. (Other weights can be used but 100 grams makes the calculations easier.)
3. Spread the forage evenly over the paper plate to a uniform depth.
4. To **PREVENT FIRE!** - Place the water glass with at least 8 ounces of water in the back corner of the microwave oven. Refill the water glass as needed to maintain eight ounces of water.
5. Using a power setting that is 80-90 % of maximum power, complete an initial dry down based on the estimated starting moisture of the sample.
 - a. Forage moisture less than 30%, four minutes
 - b. Forage moisture 50 to 70 %, eight minutes



c. Forage moisture greater than 70%, twelve minutes

Depending upon the strength of the microwave these times may need to be adjusted. When first using a particular microwave, you may want to start with using two minute intervals to develop a timing chart specific for various forages in your own microwave oven.

6. After the initial drying cycle, weigh and record the sample weight. Mix the sample and place it in the oven for an additional two minutes. Remove and weigh again. If the weight doesn't change by more than one gram, you are done. If the weight decreases by more than one gram, continue drying using one minute intervals and then weighing until the weight change is less than one gram.
7. Do not char the sample, if you do you'll have to discard the sample and start over. Charring usually occurs because the oven was set too high, the drying time was too long, or the glass of water in the back corner of the microwave was forgotten or not kept full.
8. After a stable weight has been attained, use this equation to calculate dry matter:

$$\text{Percent moisture} = \frac{(\text{wet weight} - \text{paper weight}) - (\text{dry weight} - \text{paper weight})}{(\text{wet weight} - \text{paper weight})} * 100$$

Some scales will allow you to adjust the scale to zero for the paper plate (called the tare weight) and then you won't have to subtract out the paper weight.

For an example:

Paper Plate (tare) weight = 75 g

Wet weight including paper weight = 175 g

Wet weight = 100 g (175-75)

Dry weight including paper weight = 105 g

Dry weight of sample = 30 g (105-75)

$$\text{Percent moisture} = \frac{(175 - 75) - (105 - 75)}{(175 - 75)} * 100 = \frac{(100 - 30)}{100} * 100 = 70 \% \text{ moisture}$$

Or if you can set the tare weight to zero:

$$\text{Percent moisture} = \frac{(100 - 30)}{100} * 100 = 70 \% \text{ moisture}$$

9. To change to dry matter percent, simply take (100 – percent moisture) = percent dry matter or in this example (100 – 30 % moisture) = 70 % dry matter.

Whether you need to know the percent dry matter or the percent moisture, a microwave oven can be a tool to help get the results you need in a timely manner. **Make sure you keep the glass of water filled in the back of the oven so you don't start a fire.** Knowing the moisture content at harvest and storage can help you make and preserve your silage and hay. In addition, it's important for reformulating rations for your cows.

<http://texasdairymatters.org>

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