

## Determining Forage Moisture Content With A Microwave Oven

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If you have a microwave oven, you can determine the moisture content of hay or hay crop silage in about 20 minutes. The main reason to know the forage moisture content is so you can determine when to harvest without risk of subsequent mold or spoilage due to rot. Compared to moisture testers, microwave ovens are reasonably quick and relatively accurate. Complex heat-type testers, such as the Koster Forage Tester, may be more accurate, but they require more time; electronic meters are faster, but they are less accurate.

If you do not own a moisture tester, you should test with your microwave at least until you develop a good feel for estimating by yourself. If you do own a moisture tester, you also may want to test with the microwave and compare results. By trying different methods, you develop confidence in your tester.

Never use your microwave to dry samples for feed analysis since it may cause heat damage which will affect crop quality. Remember, as with moisture testers, you can only use your microwave to obtain a reasonable estimate of moisture content. To determine the true moisture content, the sample must be oven dried under controlled conditions.

### Taking the Sample For Analysis

Before you begin your moisture test, make sure that your sample accurately represents your lot. Hay samples are most representative if taken from bale cores rather than from windrows, so try to make a few bales before sampling. However, if you can't bale first, sample the windrows using one of the methods below. (Refer to fact sheet I-104 for methods of sampling hay and silage.)

#### **Method 1:**

1. Take a minimum of 10 grab samples from various depths and locations in several windrows.
2. Fold each sample in half and clip off the hay extending from both sides of your fist.
3. Cut the fistful in half to pieces no longer than 2 inches.
4. Mix these samples in a clean pail or bag before subsampling for analysis.

#### **Method 2:**

1. Cut a 6- to 12-inch wide section from 3 to 5 average windrows using shears. Utilize the complete windrow depth.
2. Chop all collected samples into 1- to 2-inch pieces.
3. Mix samples in a clean pail or bag before subsampling for analysis.

## Determining the Moisture Content of the Sample

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### What You Will Need:

- **microwave**, preferably with a turntable.
- **scale** that weighs in grams with at least a 100 gram (3 oz.) minimum capacity. Most dietetic scales work well; postal scales (ounces) will do, but they are less accurate.
- **microwave-safe container**, such as a paper plate, paper bag, or a round, plastic dish.
- **8-oz glass of water** (three-fourths full) to protect the oven.
- **pencil and paper** to record weight values.

### Determine the moisture content of your sample by following these steps:

1. Weigh the container to the nearest gram. Be as precise as possible. Record as **Value A**.
2. Place about 100 grams (3 oz) of forage into the container, lightly pack it, and weigh. Record as **Value B**.
3. Place the 8-oz glass of water in a corner of the oven.
4. Place the sample in the oven. Using medium to high heat range, begin drying the sample. If you suspect that the sample is above 35% moisture, then start with 3 minutes; otherwise, begin with 2 minutes.
5. Remove the sample after 2 or 3 minutes and weigh it. It should weigh less than before. Mix or shake the sample and place it back in the oven.
6. Reheat the sample for about 30 seconds.

7. Remove the sample and reweigh it. Mix or shake the sample and place it back in the oven for about 30 seconds. Repeat this process, recording the weight every time.

*Note: Most microwave ovens have hot spots, so rotate the sample each time if you do not have a turntable.*

8. Repeat this process until back-to-back weights are equal. When the weight does not change any more, the sample is dry. Record this final weight as **Value C**.

*When the stems start to snap easily, you should be close to your final value. If you heat the sample too much, it will char. If this occurs, just take the previous recorded weight as your final value.*

9. Calculate the percent of moisture ("wet weight basis") using this equation:

$$\% \text{ Moisture} = \frac{\text{B}-\text{C}}{\text{B}-\text{A}} \times 100$$

### Additional Hints

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1. It is all right if your sample slightly discolors during drying. If however, the sample chars, you have gone too far. To avoid charring, heat in small intervals as suggested above.
2. Experiment with the length and frequencies of heating times in your oven. Once you get a feel for it, you'll find that drying and calculating become easier and quicker.

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