Easy Moisture Test for Forages and Grains
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Don Hillman, Dairy
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Easy Moisture Test For Forages and Grains

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BY DON HILLMAN
Dairy Extension Specialist

Ensiling of forages and storage of grains at the correct moisture content will help to eliminate storage losses, inferior quality and poor performance of livestock.

A simple procedure for determining moisture content of plant material was developed by Dr. Steven T. Dexter, Crop Scientist of Michigan State University. It consists of weighing 100 grams of the material, french-frying the sample in vegetable oil to remove the moisture, and weighing again. It can be accomplished in 15-20 minutes once the equipment is arranged. A diet scale that weighs in grams is the only piece of essential equipment that might not be on the farm. These are available at drug and hardware stores from $15 to $20. That is a fairly small investment considering the value of feed that may be at stake. The details are outlined below.

The Oil-Distillation Moisture Test

Equipment

1. A "diet scale" with an adjustable dial reading in grams makes the process much simpler than if other scales are used. Such scales are obtainable through drug stores, hardware stores or scientific equipment companies and cost from $15 to $20. They have a capacity of 500 or 1,000 grams (about 1.1 and 2.2 pounds respectively). Either scale will do the job, but the larger allows using a heavier pan.
2. A light seamless aluminum pan is convenient as an oil container. One quart capacity is ample. It should have a perforated cover if used for grain since the kernels explode and spatter oil. A one-pound (slender type) coffee can, or four to five cup light aluminum coffee pot is satisfactory.
3. A round piece of screen (1/8" hardware cloth) to fit inside the aluminum pan, to hold the sample under the oil. (Provide a hole in screen for the thermometer if one is used.)
4. **Optional** — A thermometer reading to 200° centigrade (292°F).

Procedure

A. Collect a representative sample. Forage chopper sample would be best. If sampling from a windrow, take sample from full depth of a uniform windrow and chop into pieces an inch or two long and mix.

B. Weigh out 100 grams of the sample (200 grams for grain). Set aside.

C. Place on the scale—the screen, the aluminum pan containing one to one and one-half cups of oil (and thermometer if used). Turn the dial to read "0." Leave the dial at this position.

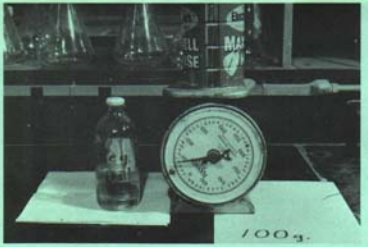
D. Place the weighed sample in the oil, place the screen on top of the sample. (Insert the thermometer if used.)

E. Heat the oil, occasionally pressing the sample down. When the sample gets hot, it will readily be covered by the hot oil. When the temperature reaches 100°C., the water in the sample will begin to distill off violently. By time the temperature reaches 110°C., most of the water will have been driven off and the temperature will rise more rapidly.

STEP #1 — Weigh out 100 grams of forage and set aside. Note simple equipment needed.

STEP #2 — Weigh container, with vegetable oil inside and screen. Set movable dial to "0".

STEP #3 — Add 100 grams of forage to container, place screen inside and heat for 15 minutes to drive off water.



STEP #4 — After heating, set container and contents (oil, forage, screen) on scale. If dial was set at "0" in step 2, you are reading the dry matter "contained in 100 grams of forage or percent of dry matter".

F. Continue heating for about 15 minutes or until the oil temperature reaches 145°C for forage samples, (190°C for grain). Tip the pan back and forth to make sure all the sample is well heated and to get an accurate value of oil temperature.

G. Set the container back on the scale. **The reading on the dial is the weight of the dry matter in the sample**, since the dial reading was "0" just before the wet sample was inserted. For example, if the dial reading is 30 grams, 70 grams of water must have been evaporated—thus, 30% dry matter or 70%moisture in a 100 gram sample. If a 200 gram sample of grain was used, divide the reading by two to get dry matter percent.

NOTE:

If a thermometer is not used — Recheck to be sure all the water was evaporated. Reheat for another 3-5 minutes and weigh again. If the weight is the same as previously, you were right the first time. If the sample lost weight, repeat the process until a constant weight is achieved.

H. The heater may be regulated so it takes 15 to 20 minutes to run a sample.

Familiarize yourself with the appearance and feel of materials at various moisture content. After testing several samples and establishing reference points, you will be able to guess the moisture content surprisingly close.

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