



Task Force

Proper Use of Moisture Meters

Dirk E. Maier, Agricultural Engineering

The proper use of a moisture meter is critical in making sound grain harvesting, drying, storage and marketing decisions. Inaccurate moisture readings can lead to serious consequences:

- spoilage when grain is too wet for low temperature drying (heated air up to 10^oF, or natural air)
- higher combine losses, damage levels, and drying costs when grain is harvested too wet
- extra shrink and drying charges when grain is sold too wet
- higher drying costs and moisture discounts when grain is dried below market standard
- spoilage when hot grain is transferred too wet for dryeration or in-bin cooling

To obtain accurate moisture readings, a representative sample must be obtained, the tester must be used properly, and the tester must be calibrated periodically.

Grain Sampling

Field Sample - Obtaining a representative field sample before harvest is difficult. Moisture content of standing grain is often underestimated. Spot check each field to determine apparent quality and moisture of the crop. Since the outside rows are atypical, walk through the field in a pattern. Hand pick and shell grain from several plants, mix the samples, and take at least three readings for an average value. Because many testers are not very accurate above 22-24% moisture (unless specifically calibrated for wet grain), adding 3 to 4 percentage points to the reading may be necessary.

Grain Load Sample - When sampling a load of grain, scooping a can-full off the top is NOT adequate. Either probe the load in at least two locations (avoid the center and the corners), or

preferably sample the flowing grain during unloading. Pass the can across the grain stream about every 50 bushels and collect the grain into a bucket. After unloading is completed, mix the grain in the bucket (for example, by emptying it back and forth several times into a second bucket), then draw out a sample for a moisture test. To avoid changes in the moisture content cover the bucket if the grain will not be tested immediately.

Bin Sample - When checking moisture of binned grain, a probe to collect samples from various depths will provide the most representative samples. Going as deep as possible at the bin center and several other locations will help determine the progress of the drying front in bin drying operations, or reveal potential trouble spots in storage bins. Do not mix the samples but test them separately. Knowing the moisture at different locations will help in making better management decisions. Routine sampling of binned grain periodically during the storage season helps to avoid hot spots and spoilage problems.

Tester Use

In a portable moisture meter make sure the battery is good. A low battery causes inaccurate readings. Replace it at least once a year. Also, removing the battery during long, idle periods prevents acid leakage which could damage the meter. Carefully read and follow the manufacturer's instructions. All moisture testers show some variability when the same sample is tested repeatedly. An average of three successive readings should be used.

Temperature Compensation - Attention must be paid particularly to the tester's temperature compensation. Grain temperature has a large effect on moisture readings. Some testers have automatic compensation, and some

compensate when a button is pushed. Others require separate measurement of grain temperature with a thermometer and the addition or subtraction of a correction factor to the moisture reading. Even with temperature compensation, moisture meters are NOT capable of testing grain above 90°F with any accuracy.

Cold Grain - When cold grain is removed from storage on a warm day, or when cold samples are brought inside during harvest, moisture will condense on the kernel surfaces. Condensed surface moisture produces erroneously high readings in electronic testers. Avoid this problem by placing the grain into a sealed container and allowing it to equilibrate to the ambient temperature before testing. When selling grain in warm weather, warm the grain by aeration to avoid erroneous high moisture readings.

Hot Grain - Electronic testers will underestimate the moisture content of hot grain that has not reached equilibrium by at least 1 to 2 percentage points. To get an accurate reading of hot grain, let it cool slowly in a sealed container before testing (freezer bags are excellent to use, for example). An alternative for estimating the moisture content of hot grain is to cool the sample rapidly in an open container, or cooling box. Although definitely not as accurate, it reduces the temperature compensation problem.

Figure 1 shows such a box equipped with a fan that cools a 1 pound sample within 3 - 5 minutes. It consists of a metal mesh sieve, meat thermometer, 5-minute timer, paper air filter, small squirrel-cage blower, and plywood. The total cost of constructing such a box is about \$70, with the blower being about 50% of the cost.

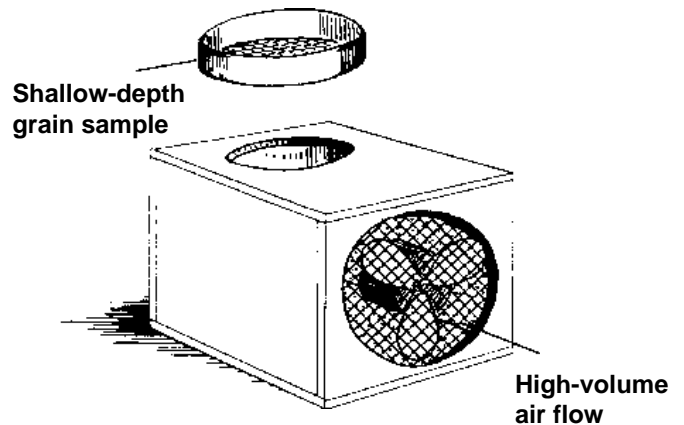


Figure 1.

Calibrating for Accuracy

Elevator moisture testers are inspected and certified regularly. Also, most equipment dealers that sell and service moisture testers have an inspected and certified unit available for calibration purposes. Thus, farmers can use either of them to check their tester's accuracy.

Readings from several samples at different moisture contents on a farm moisture tester should be compared against a certified unit. At least three samples should be tested at both the 15 percent and 25 percent level. If testing is done on the farm, transport the samples in a sealed container and do both tests within a few hours of each other.

Testing each sample three times in the farm meter and three times in a calibrated unit allows for the calculation of an average moisture content difference. The difference in readings at the higher and lower moisture contents is generally not the same. However, if the difference for any single sample is greater than 1.0 points, or if the average difference for all samples at one moisture level is greater than 0.5 points, the tester should be serviced by the manufacturer.

Acknowledgment - AE-3024 "Using Farm Moisture Testers" published by the Cooperative Extension Service at Iowa State University was used as a major reference.

The information given herein is supplied with the understanding that no discrimination is intended and no endorsement by the Purdue University Cooperative Extension Service is implied.

For more information, obtain copies of AED-20, "Managing Dry Grain in Storage," E-66, "Stored Grain Insect Pest Management," and PIH-129, "Mycotoxins and Swine Performance" from your local CES office.

The information given herein is supplied with the understanding that no discrimination is intended and no endorsement by the Purdue University Cooperative Extension Service is implied.