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## 2009 Corn Quality Issues

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### **Abstract**

The state experienced a hard freeze Oct. 10 and 11, ending a growing season that had been slowed by rain and, in some areas snow. Despite the overall cool growing season – highlighted by a warm period in early September – the USDA October yield estimate of 186 bushels per acre in Iowa is the highest on record. As often happens with high grain yields, quality issues are surfacing. This article summarizes current field conditions, looks at test weight, weight shrink, and corn storability; two other articles in this series discuss field molds and storage management.

### **Keywords**

Agricultural and Biosystems Engineering, Agronomy

### **Disciplines**

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## 2009 Corn Quality Issues

By Charles Hurburgh, Department of Agricultural and Biosystems Engineering; Roger Elmore, Department of Agronomy

The state experienced a hard freeze Oct. 10 and 11, ending a growing season that had been slowed by rain and, in some areas snow. Despite the overall cool growing season – highlighted by a warm period in early September – the USDA October yield estimate of 186 bushels per acre in Iowa is the highest on record. As often happens with high grain yields, quality issues are surfacing. This article summarizes current field conditions, looks at test weight, weight shrink, and corn storability; two other articles in this series discuss [field molds](#) and [storage management](#).

A cool, long growing season will often result in high yields with high grain moistures and low test weights. The lower test weight is the result of more starch and lower protein on a relative basis, a condition that also reduces field dry down rates and increases drying costs. The quick burst of heat in September moved many crops, especially in the western half of the state, to maturity at the further expense of some grain fill and test weight.

East of Interstate 35, corn ranges from the low 20s to mid 30s moisture. Some corn was frost-damaged at the half to three-quarter milk line. This corn will be low test weight (likely below 50 lb/Bu) with all the characteristics associated with low test weight (see below). [Frost Damage to Corn and Soybeans, PM1635](#) has more specific information on frost damage to corn and soybeans.

Corn that has not dried early in the harvest period often stops at 17 to 18 percent. In 2008, this was in the 20-22 percent range. With the number of favorable drying hours much fewer after Oct. 20, attention needs to be given to stalk health. Producers may have to harvest wetter corn first if it is lodging.

Expect drying to cost about five cents per point of moisture removed. Eight points removed, down to 15 percent moisture, would cost about 40 cents per bushel plus the weight shrink. For this reason, there will be an incentive to hold corn at higher moistures, awaiting better drying conditions in the spring, blending opportunities, or higher moisture feeding. However, experiences from 2008 demonstrated the high risk doing this, particularly when test weights are below 54 pounds per bushel (lb/Bu) after drying.

### Test weight

Test weight is expressed as pounds per volumetric bushel. Corn test weights can range from 45 to over 60 pounds per bushel. The market standard is 54 pounds per bushel, the grade limit for No. 2 Yellow corn. Kernel size, shape, and density all affect test weight.

Higher test weights mean better filled kernels with a higher percentage of hard endosperm. Low test weights frequently imply that the crop did not mature entirely or that it was subjected to stress conditions. Dry corn test weights of 52-54 pounds per bushel (compared with the more typical 55-57 pounds per bushel) are indicative of incomplete maturity.

Food processors are sensitive to lower test weight. Product yield and quality is reduced. Ethanol processors may not be greatly affected by lower test weight this year; lower protein and higher starch yields more ethanol, but does reduce DDGS quality. Most ethanol plants stop taking corn at either 17 or 18 percent, and generally reject corn about 10 percent damage. The feed value on a weight, not volume, basis of low test weight corn is nearly equal to normal corn. Light corn will break more easily and create more fines in storage.

### **Weight Shrink**

Higher valued corn and higher moisture have increased the importance of shrink calculations. Regardless of the grain and starting moisture, the water shrink, per percentage point of moisture, will always be  $100/(100-\text{target moisture})$ . The market targets are normally 15 percent for corn and 13 percent for soybeans which leads to 1.17 and 1.15 percent shrink per point respectively. Any additional deduction in the market shrink calculation is an allowance for material handling losses.

For example, a corn shrink of 1.4 percent per point gives about 0.22 percent per point for handling loss. Typically a commercial elevator experiences about 1 percent overall handling loss and a good farm system about 0.5 percent overall handling loss. This does not include weight loss from spoilage if grain goes out of condition. About 0.5 percent of the weight is lost for every 3 percentage points increase (e.g. from 3 percent to 6 percent) in damage.

Accurate moisture tests are also needed to make shrink calculations work well. Check farm meters on 10-15 samples against the State-inspected meter at the local elevator, or the readings from an Official USDA grain inspector (see [list of locations](#)).

Grain elevators must post their shrink factors as the sum of water plus handling loss. Shrink calculations are important for warehouse receipts, loans, proven yield calculations, and inventory estimates. The general principle is to use a shrink rate that gives a reasonable estimate of the actual grain weight remaining after drying and handling operations. Consider the costs of drying, aeration and storage separately from weight shrink.

### **Corn Storability**

Test weight is a good indicator of corn storability. Corn that is below 54 lb/Bu after drying should not be stored into warm weather and should be dried to less than 15 percent moisture before storage of any duration. Lighter corn also will break more in handling.

Corn normally gains about 0.25 lb/Bu per percent of moisture removed, more with low temperature drying and less if corn temperatures exceed 150F. We are also learning that corn that has reached 150F or more in drying is more difficult to ferment in ethanol plants. However, corn with test weights below 50 lbs/Bu often increases test weight at a reduced rate, progressively less down to 45 lb/Bu where there may be no increase in test weight at all.

The moisture meters used at elevators also measure test weight. The state of Iowa moisture meter inspection will not check the test weight function; this is done by taking 5-10 samples of varying test weight to an official USDA licensed grain grader (list linked above), and adjusting the meter to match the average of the official tests.

Scout for field mold problems. If you were in one of the several hail areas, field mold is more likely. A September ICM News article [addresses management of hailed corn](#).

Field mold can create toxin and feed value concerns, and marketing problems if the damage is high enough to create discounts. A separate article in this series [addresses mold concerns](#).

We learned from 2008 that extra cost in additional handling and drying logistics is likely to pay off in terms of avoiding spoilage losses later on. This would not be a good year to take chances that wetter corn will keep and can be absorbed in the spring/summer. See the [storage management article](#) in

this series for more information.

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