

# Corn Grain Storage Management

By Bill Wiebold

**Editors Note:** The following article originally appeared in an Iowa State University publication, "Integrated Crop Management News". The authors were Dr. Charles Hurburgh (tattr@iastate.edu), a professor in the ISU Department of Agricultural and Biosystems Engineering and Dr. Roger Elmore (relmore@iastate.edu), a professor in the ISU Department of Agronomy. The document was edited, slightly, to better fit Missouri's situation.

In Missouri, frequent rain and cool temperatures have greatly slowed natural drying in the field of corn and soybean grain. Grain will be harvested much wetter than desired and careful handling of grain will be necessary to minimize loss of grain quality. There is less room to accommodate problems from this year because the grain market system is already overloaded with poor quality corn from 2008 crop. However, we learned from 2008 – 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.

## Storage Management

Grains have a shelf life just like any food product. Shelf life is primarily determined by moisture content and temperature. It is gradually used through the time before use, and each operation or storage regime consumes a portion of the life. Table 1 gives the storage life for corn and soybeans at varying moistures and temperatures.

**Every action taken after harvest affects the ultimate length of time grain can be stored and the quality at the time of use.** Check combine settings between fields for fines and cracked kernels. Fines and cracked kernels spoil much faster than whole, sound

kernels. Grain that starts to heat or get moldy has essentially used its storage life. The goal of grain storage management is to reduce the rate at which the storage life is lost. Always cool grain quickly and minimize variations within the grain lot both from the dryer and from the field.

**Always place wet corn into an aerated storage immediately.** Holding wet grain, especially without aeration, shortens shelf life considerably. Fungi grow very fast in corn above 20 percent moisture. Overnight storage of wet corn in a wagon or truck can have a marked effect on future storability. Likewise, the practice of holding medium moisture corn (16 to 20%) for future blending or feeding opportunities will cause problems for corn stored (even after drying) into the following summer.

**Wet corn should be checked weekly, and monitored for temperature increases.** Wet corn should have 0.2 cfm/bu of well-distributed aeration, double the normal rates for dry corn. Storage problems may begin this fall during periods of warm weather or in February and March as air temperatures rise. Wet corn should not be held in bunkers, piles, flat storages, sheds or other structures where airflow is not well distributed.

**Options when wet corn volume exceeds drying capacity**

- 1) Dry to 17 to 18% moisture and cool in the storage bin. Corn will end up at about 16 percent moisture. Good aeration should be able to manage 16% corn down to the 14% needed for midsummer storage.
- 2) Dry to 20% moisture, cool in bin, hold wet corn for spring but not summer.
- 3) Dry in two passes – first down to 17 to 19%, then the rest of drying later after the actual harvest is over. This

requires more handling and logistics, but could be profitable if the market carry increases to encourage storage. Last summer, 16 to 19% moisture corn was still coming to market (in Iowa), in poor condition. This corn could have been dried, albeit at additional cost and effort. The less you dry, the more risk you are accepting. But spreading out the drying into spring may be the only choice. Risk will require more constant attention.

**Be selective about what corn is placed in storage versus moved at harvest.** Deliberately decide which corn and bins are going to be kept into the summer. This should be your best (highest test weight) corn, harvested below 20% moisture with careful combine settings to minimize trash and placed in storage bins with good aeration rates/airflow distributions. Low test weight corn should not be put in temporary storages or outdoor piles.

It is also not wise to mix corn of different crop years in the same storage bin; the mix is less stable than each year's crop stored separately. The 2008 corn (in Iowa) was very susceptible to mold and heating in storage; the 2009 crop looks to be similar. Holding wetter corn should be done with a plan for drying or other options to halt spoilage if it starts.

Remove the center core and use a grain distributor if possible. Check your grain at least every two weeks, with some way to take grain temperatures. If a slow rise is noted, aerate. If a hot spot starts, make that the next corn to be moved out; one storage problem always leads to another.

Understand your buyers' needs, and match storage and drying practice to intended marketing time. For example, corn presold for July or August delivery should be dried more fully right away.

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**Table 1. Maximum Storage Time (Months) for Corn and Soybeans\***

| Corn Temperature ° F | Corn, soybeans moisture content |            |            |            |            |            |            |
|----------------------|---------------------------------|------------|------------|------------|------------|------------|------------|
|                      | 13%<br>11%                      | 14%<br>12% | 15%<br>13% | 16%<br>14% | 17%<br>15% | 18%<br>16% | 24%<br>N/A |
| 40                   | 150                             | 61         | 29.0       | 15.0       | 9.4        | 6.1        | 1.3        |
| 50                   | 84                              | 34         | 16.0       | 8.9        | 5.3        | 3.4        | 0.5        |
| 60                   | 47                              | 19         | 9.2        | 5.0        | 3.0        | 1.9        | 0.3        |
| 70                   | 26                              | 11         | 5.2        | 2.8        | 1.7        | 1.1        | 0.2        |
| 80                   | 15                              | 6          | 2.9        | 1.6        | 0.9        | 0.9        | 0.06       |

\* Based on 0.5% maximum dry matter loss—calculated on the basis of USDA research at Iowa State University. Corresponds to one grade number loss; 2-3% pts in damaged seeds. Soybeans approximated at 2% lower moisture than corn.

1. The numbers assume that temperatures are held constant – such as with aeration. Grain heats when it spoils, and gives off moisture. Grain not aerated will shorten its own shelf life through moisture and heat.
2. Lower test weight corn will spoil faster than Table 1 indicates. In 2008 in Iowa, storage times were about one-half of those expected.
3. If corn is held at higher moisture then dried, the storage time can be used up by the wet conditions. The dry corn will still experience hot spots or other problems in the summer. This was common for the 2008 crop in Iowa.

*Bill Wiebold*  
*WieboldW@missouri.edu*  
 (573) 882-0621