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Grain storage challenges in Iowa for the 2005 crop

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The 2005 corn and soybean crops, west of about Interstate 35 and north of Interstate 80 (the Northwest, North Central, Central, and West Central crop reporting districts), will likely yield higher than last year. These four districts contribute approximately 60 percent of the total Iowa corn and soybean production.

Entering the 2004 harvest, most commercial and on-farm storages were empty. Still, the crop overwhelmed the available storage capacity and large amounts of crops were placed in outdoor piles. Trade estimates place the amount of piled corn in Iowa at around 250 million bushels (out of a 1.4 billion bushel production) in 2004. There was a large premium for storage in the market, so the inevitable risks of outdoor storage seemed worth taking. Several complicating factors arose:

- Higher moisture (19 to 20 percent or greater in corn)
- Poor harvest weather (several rain and snow events through the fall and early winter)
- Strong desire by producers to get grain out of the field quickly.
- Ethanol plants became hesitant to accept corn with storage damage, because process yields decline sharply.

Significant amounts of 2004 corn, much of it with some amount of mold damage, are now in commercial storage, awaiting marketing opportunities from the 2005 crop.

The 2005 situation

The grain in elevators is not “mobile” grain because it has to be blended out slowly, not emptied all at once. Carryover 2004 corn is not suited for going back outside to a temporary pile.

- With the corn in storage, it is very likely that more corn will be piled outside this year than last.

- The hurricane has slowed barge shipments and increased railcar turnaround times. The large difference between the Chicago Board of Trade price and local price (wide basis) in the affected crop districts demonstrates the expectation of large storage problems. Some firms are considering transferring grain to other areas of the country with more storage, but that will add to the marketing cost.
- Increasing local ethanol demand is requiring corn to be retained locally. The ethanol industry has been very clear about not wanting damaged corn, but few plants have extensive on-site storage.
- Recent weather has accelerated maturation which will likely mean dry corn at harvest, and thus, faster dry-down. The rapid maturity may have cost 1 to 2 pounds per bushel of test weight. This is being confirmed by early harvest reports.
- Dryer corn means a very rapid harvest pace.
- More corn will be stored outside this year than last. A balance sheet estimate of production and current carryover would suggest 500 million bushels or more will have to be stored in temporary situations.
- Increased soybean yields will also compete for covered storage. Soybeans are rarely piled outside. Soybean yields in Iowa are above expectations, according to early reports.
- There is very little ability for the grain market to absorb out-of-condition corn.

Temporary grain storage

1. Make the grain pile on a solid surface or on packed ground in a high location with a slight slope for drainage. Recognize that gravel is hard to sort out of grain when it is picked up. Plastic under the grain helps,
but may complicate grain handling.
2. Pile dry (less than 15 percent), clean, cold corn with test weight 55 pounds per bushel and higher. Lower test weight corn spoils more rapidly.
3. Do not mix crop years in any storage situation. The old crop likely has molded, and the new crop is not stable in moisture content. With grain piles, you have fewer moisture control options.
4. Consider pre-cleaning with a gravity or rotary cleaner.
5. Build the grain pile quickly, to avoid incorporating weather conditions and wet layers (from rain or snow) into the pile. Avoid piling slowly at harvest pace unless harvest pace will build the pile in two to three days without precipitation. Try to make the pile at the end of harvest season, when outdoor temperatures are lower.
6. Make the grain pile surface smooth, and of reasonably uniform depth. This reduces capture of snow, and promotes better air-flow distribution.
7. Always pile over a fan and duct system. Updraft if the pile is not covered; down-draft if it is. Estimate 1 hp per 10,000 bushels (approximately 0.1 cubic foot per minute per bushel). However, if you cannot get this much airflow, any airflow will be helpful. The objective is to maintain equilibrium between grain and air temperatures.
8. Cool the grain pile as quickly as possible. It is often warm in early harvest, but warm grain will create air currents and spoil regardless of moisture. We have had very warm early fall temperatures this year.
9. Expect approximately a 0.5 percentage point increase in broken corn and foreign matter and a 3 to 5 percentage point increase in damage in uncovered grain piles, even under the best of conditions.
10. Covered grain piles are always preferred. Rain and melted snow do not run off, free water progressively wets corn to about 30% moisture as it moves down, so an uncovered grain pile will always have a layer of moldy corn on top (unless you are lucky enough not to have rain at all). An inch of rain will change about 6-8 inches of grain from 15 to 30 percent moisture.

A pile inside a building (machine shed, hoop building) is essentially the same as an outdoor pile except that it is covered, and therefore can be kept longer (up to 6-9 months if aerated). An outdoor pile, even with aeration, should not be kept longer than 3-4 months (February if the pile was made in November.)

Storage management
Aeration is the most critical need for any type of storage. Aeration is a progressive process for controlling the temperature of grain. Aeration needs to be done in phases.

Phase 1: Fall Cool Down
• Lower grain temperatures stepwise
  - October 40-45 degrees F
  - November 35-40 degrees F
  - December 28-35 degrees F

Phase 2: Winter Maintenance
• Maintain temperatures with intermittent aeration
  - January, February 28-35 degrees F

Phase 3: Spring Holding
• Keep cold grain cold
  - Seal fans
  - Ventilate headspace intermittently
  - Check frequently
  - Warm when problems are seen or when grain is taken out.
  - Once you start to warm grain, warm the entire bin.

Source: Purdue University

The chart on the following page shows the grain temperatures that correspond to safe storage for corn and soybeans. As temperatures rise in the spring, moisture content for safe storage is lower.
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It is essential to physically inspect grain in storage at least every two weeks; every week in spring after March 1. A portable thermometer on a long rod can be used if the bin is not equipped with electronic temperature monitoring. Increases in temperature from one inspection to the next with no fan operation during the period is a warning sign of possible spoilage. Once a grain storage has experienced condition problems, further problems are very likely. This should be the first grain moved to market.

The market is offering substantial premiums for storage this year. Well managed storage, even temporary storage should enable producers and elevators to capture these premiums.

For more information on grain storage and grain storage management, please visit: www.iowagrain.org