



### Drying Cost and Shrink Factor

Another approach is to charge the producer the direct cost of drying the corn to an acceptable moisture level, then assess a shrink factor to adjust the volume of wet bushels for the water loss and assumed handling loss. This allows the buyer to easily adjust the drying charge based on the actual cost of fuel and electricity each year.

Using the same example, assume that the elevator is currently charging a drying fee of \$.048 per wet bushel per point of moisture removed. For the 1,000 bushels of 20.5 percent moisture corn the drying charge would be  $5.5 \text{ points} \times \$.048 \text{ per point} \times 1,000 \text{ bushels} = \$264$ . The seller would be charged this amount directly or have it deducted from the gross sales amount.

In addition, assume a shrink factor of 1.4 percent of the volume of grain is assessed for each point of extra moisture. In the example, this would be  $5.5 \text{ points} \times 1.4 \text{ percent} \times 1,000 \text{ bushels} = 77 \text{ bushels}$ , leaving 923 bushels of dry grain. The seller will now get paid \$5.00 per bushel for the dry bushels, or \$4,615. Subtracting the drying charge of \$264 leaves a net payment of \$4,351, slightly less than under the moisture discount method. However, which method provides the highest net revenue will depend on the particular discount and drying cost factors being used at any given time.

### On-farm Drying

Many corn producers have the capacity to dry their grain themselves. This allows them the flexibility to store the grain in their own facilities and to avoid possible bottlenecks when delivering grain at harvest time. However, drying grain on the farm may require extra transportation compared to delivering directly to the buyer, and the producer's drying system may not be as efficient as a large capacity system owned by an elevator.

The cost of on-farm drying depends on the type of drying system used, the amount of moisture to be removed, the current air temperature and relative humidity, and the current price of drying fuel and electricity. When choosing between drying corn on the farm and then delivering it to the elevator

or delivering wet corn, only the variable costs for drying need to be considered. Ownership costs such as depreciation, interest and insurance will be the same regardless. Variable costs include items such as repairs and maintenance, labor and the cost of handling the grain in and out of the dryer. However, the major costs will be for drying fuel and electricity. Which of these is larger will depend on the type of system being used. *AgDM File A2-31, Estimating the Cost for Drying Corn*, provides more information about estimating drying costs for a particular system and energy price level.

Assume that the producer in the example has variable costs for drying corn of \$.045 per bushel for each point of moisture removed. If 5.5 points of moisture are removed, the cost will be  $5.5 \times \$.045 = \$.2475$  per bushel, or \$247.50 for 1,000 bushels. In addition, the dry corn will weigh less so there will be fewer bushels. A load of 20.5 percent moisture corn weighing 56,000 pounds will consist of 11,480 pounds of water and 44,520 pounds of dry matter. After being dried to 15 percent moisture it will still have 44,520 pounds of dry matter, but its total weight will be only  $44,520 / (1.00 - .15) = 52,376$  pounds. The producer may also incur some dry matter loss (handling loss) in the drying process. Hicks and Cloud measured on-farm drying losses from 0.22 percent to 1.71 percent in their research. Assuming a dry matter loss equal to 1 percent of the wet bushel weight results in 560 fewer pounds of dry corn, leaving 51,816 pounds. At 56 pounds per bushel, the dry volume is now  $51,816 / 56 = 925$  bushels of number 2 corn. The elevator will pay the producer the full \$5.00 for each dry bushel, or  $\$5.00 \times 925 \text{ bu.} = \$4,625$  for the load of corn. Deducting the on-farm drying costs of \$247.50 leaves net revenue of \$4,377.50.

Note that extra costs may be incurred if the grain is dried below 15 percent moisture, which may be necessary if it is to be stored for a period of time. The extra costs of additional drying include, not only the variable costs of drying, but the shrink loss from removing additional water. More detailed information about calculating shrink can be found in the National Corn Handbook fact sheet NCH-61.

## Field Drying

Many corn producers prefer to let their crop dry naturally in the field before harvesting. This reduces the cost of artificially drying the crop, but may delay harvesting and result in additional field losses due to drier stalks and ears. Producers must weigh these potential costs against potential drying charges and/or discounts. Elmore and Abendroth estimated that unharvested corn could dry at a rate of from 0.3 points of moisture per day in wet, cool weather to 1.0 points per day in hot, dry weather. The American Society of Agricultural and Biological Engineers suggests a yield loss of 0.3% may occur for each day of harvesting delay. Harvest losses will also vary with the particular hybrid planted. Even after corn has dried in the field, producers will still have to choose among the options discussed above for their final sale. However, the more moisture that is removed by drying in the field, the less impact artificial drying costs and moisture discounts will have on the net revenue received.

*AgDM Decision Tool A2-32, Grain Drying and Shrink Comparison*, is available to help compare the three options described above. In addition, it can help predict moisture level and harvesting losses at harvest based on expected wet bushel yields and weather conditions.

## References

American Society of Agricultural and Biological Engineers Standards, Section D497.2, 8.7.

Elmore, Roger, and Lori Abendroth. "In-field Dry-down Rates and Harvest." [www.extension.iastate.edu/CropNews/2010/0928elmoreabendroth.htm](http://www.extension.iastate.edu/CropNews/2010/0928elmoreabendroth.htm)

Hicks, D.R., and H.A. Cloud. "Calculating Grain Weight Shrinkage in Corn Due to Mechanical Drying." National Corn Handbook fact sheet NCH-61, [store.extension.iastate.edu/Product/nch61-pdf](http://store.extension.iastate.edu/Product/nch61-pdf).

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Issued in furtherance of Cooperative Extension work, Acts of May 8 and July 30, 1914, in cooperation with the U.S. Department of Agriculture. Cathann A. Kress, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.

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