Grain Moisture Management Pays Big Dividends

Manage Grain Moisture for Enhanced Profitability

A bushel (bu) of corn is traded on the basis of 56 lb/bu. A bushel of corn at 15.5 percent moisture contains 47.32 lbs. of dry matter and 8.68 lbs. of water. This is an important concept to remember because as corn becomes drier you are actually delivering more dry matter to the market and less water weight. While delivering bushels to the market at optimum moisture is important, it is only one of the factors determining moisture levels of corn going into storage.

According to Bill Wilcke, Extension Researcher at the University of Minnesota, corn stored up to 6 months should be dried to 15% moisture. Corn stored from 6 to 12 months should be dried to 14% moisture and corn stored for more than 12 months should be dried to 13% moisture. Due to temperature changes and moisture migration in the grain, storage structures must have adequate flooring and air movement to prevent grain from going out of condition. Fines must also be removed by pre-screening or removing centers from bins.

Over-drying corn can lead to significant dollars lost due to added expense and less bushels to sell in the market. At 15.5% moisture and a market price of $3.00, a bushel of corn is worth 6.34 cents per lb of dry matter. This same corn at $5.00 per bushel is worth 10.57 cents per lb of dry matter.

If your goal is to store and market corn at 14.5% moisture and it is inadvertently dried one point less (13.5%), you have given up 3.8 cents/bu in today's market (corn at $3.25/bu). The drying cost for the extra point would be 0.02 gallons of propane at $1.50/gallon which is 3 cents.

In this previous calculation, you can see that fine tuning the grain drying operation with extra attention and/or extra investment is worth over eight cents per bushel. Consequently, a farmer harvesting and drying 100,000 bushels of corn and missing the mark by one percentage point of moisture will leave over $6,500 on the table.

How Much Yield Is Needed To Offset Drying Costs?

A number of factors determine the profitability of corn production. At harvest we are looking at primarily two factors – yield and moisture. There is often a trade-off between these two factors. Longer maturity hybrids often yield higher but are wetter at harvest. A good question to ask is:

'How much higher yield do you need to offset higher drying costs?'

It takes about 0.02 gallons of propane to remove one point of moisture per bushel of corn.

You can use this formula to calculate the drying cost per acre:

bu/acre x points of moisture to remove x 0.02 x propane cost ($/gal) = $/acre

Figure 1. Thorough management of grain moisture is critical to maximizing profitability when marketing grain.

The table below shows the bu/acre required to off-set energy costs at different yield and moisture levels at a propane cost of $1.50/gal and a corn price of $3.25/bu.

Table 1. Yield required to offset energy costs.

Yield (bu/acre)	Points of Moisture Difference				
	1	2	3	4	5
	*bu/acre to pay energy cost**				
75	0.7	1.4	2.1	2.8	3.5
100	0.9	1.8	2.8	3.7	4.6
125	1.2	2.3	3.5	4.6	5.8
150	1.4	2.8	4.2	5.5	6.9
175	1.6	3.2	4.8	6.5	8.1
200	1.8	3.7	5.5	7.4	9.2
225	2.1	4.2	6.2	8.3	10.4
250	2.3	4.6	6.9	9.2	11.5

** propane cost = $1.50/gal; corn price = $3.25/bu*

For example:

At a yield level of 150 bu/acre, it takes 2.8 bu/acre to offset the energy costs to dry a hybrid that is two points wetter at harvest. Of course, energy cost is not the only factor to consider. There are also equipment and handling costs associated with drying.

More Best Practices for Managing Grain Moisture

Moisture testers: Grain farmers need to have an accurate and reliable moisture tester on the farm (Figure 2). In a single season, selling grain that is too dry by even half a percent could cost much more than a high-quality moisture tester. Even with a high-quality tester, growers should calibrate their meter with that of the point-of-sale.

Grain dryers with manual settings need to be checked frequently with a good moisture tester to achieve the desired moisture levels. Computer-controlled drying systems rely on a moisture tester as a standard to calibrate sensors reading wet grain in and dry grain out. The amount of investment justified in precision drying systems and storage aeration will depend on the number of bushels that can be run through the operation.

Shore® 920
http://www.moisturetesters.com

Dickey-John GAC® 500 XT
http://www.dickey-john.com

Figure 2. Examples of moisture testers designed for on-farm use. Other products are also available, including refurbished commercial testers.

Too wet or too dry? If growers had the choice of delivering grain that is one point too wet or one point too dry, they should choose "too wet", as the economics are overwhelmingly on their side. Delivering grain too dry results in losing all of the weight represented by the moisture differential. Delivering grain too wet incurs drying costs (some of which would have been spent to dry the grain on-farm) and shrink, but "weight" per se will not be lost.

Over-dry grain: Grain stored long-term on the farm may be significantly lower in moisture than the maximum allowed by the grain buyer. In fact, even grain stored short-term may be lower than required for some uses such as wet-milling.

Each end-use (dry-grind ethanol, wet-milling, long-term storage, etc.) may have a different moisture allowance, and knowing that number is the first step in meeting it.

Figure 3. Various grain buyers may have different grain moisture requirements, depending on grain use and expected storage time.

If grain is too dry, some growers may have the option of blending or aerating the grain to adjust it to the maximum moisture allowed (up to 15.5%). The resulting moisture content of a uniform blend of two grain sources is the weighted average of the two grain moistures.

Increasing grain moisture content by aeration is usually only possible with very high airflow rates such as those common in natural air drying systems. Even then, successful moisture adjustment may require electronic control systems that run the fans when ambient temperature and relative humidity conditions dictate. In bins with limited fan capacity, increasing grain moisture may require months to accomplish or may be impossible. In such cases, preventing over-drying of grain is even more important.

Grain drying and storage concerns, like other areas of production and management, can provide added opportunity for those willing to fine-tune their operations with an investment of time and/or capital.