Reduce Grain Depth to Save Time/Energy When Drying Grain

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The time required to dry grain in a bin is a function of the initial moisture content of the grain, the desired final moisture content of the grain, the temperature and relative humidity of the air passing through the grain and the rate of airflow through the grain (cubic feet per minute per bushel [cfm/bu]).

Table 1 shows airflow resistance for shelled corn. More static pressure is required to push a given rate of airflow (cfm/bu) through grain as the depth of grain increases. Static pressure also must increase to push increasing rates of airflow (cfm/bu) through a given depth of grain.

Since drying time is directly related to the rate of airflow, we want airflow rates to be as high as practical when drying grain. The variable we can manipulate to our advantage when trying to reduce energy cost for fan operation is to reduce grain depth and lower the static pressure the fan must overcome.

If you were building new bins, you could plan to build larger diameter but shorter bins to keep static pressure low while not sacrificing the number of bushels dried per batch. Consider the differences when a 27-foot diameter bin and a 30-foot diameter are each used to dry 8,000 bushels of corn at one time. Grain depth in the 27-foot bin would be 17.5 feet, whereas grain depth in the 30-foot bin would be only 14.2 feet.

Using the **FANS** computer program to compare these scenarios, provides some interesting results. It would take 10.55 horsepower (hp) to push 1.25 cfm/bu through 8,000 bushels of shelled corn in a 27-foot diameter bin. To push the same 1.25 cfm/bu through 8,000 bushels of shelled corn in a 30-foot diameter bin would only take 6.32 hp; a savings of 4.23 hp.

Assuming electricity cost is $0.08/kWh, and if one were drying shelled corn using natural air in mid to late October (assuming 20 days drying time), the drying cost in the 30-foot diameter bin could easily be $0.02 per bushel less than in the 27-foot diameter bin.

A management alternative would be to select a fan for the larger diameter bin which requires the same 10.55 hp but delivers more airflow. Once again, the easiest way to analyze this is to use the **FANS** program because it can calculate the interaction of the system curve and the fan curve. Trial and error showed it takes the same horsepower to push 1.54 cfm/bu through the 30-foot bin as needed for 1.25 cfm/bushel in the 27-foot diameter bin. For deep-bed, in-bin drying, drying time is directly proportional to airflow. The airflow in the 30-foot bin is 23 percent higher for the same horsepower and drying time would be 23 percent less in the larger diameter bin.

Already have your bins in place? The same principles can apply to existing grain storage facilities. You can save time and energy for fan operation by partially filling a drying bin instead of filling it to the full depth. Since most producers move grain through drying bins into larger storage bins anyway, it takes only a little extra labor to dry grain in smaller batches.

The FANS program can be downloaded at no cost from the University of Minnesota Web site at http://www.bae.umn.edu/extens/postharvest#fans

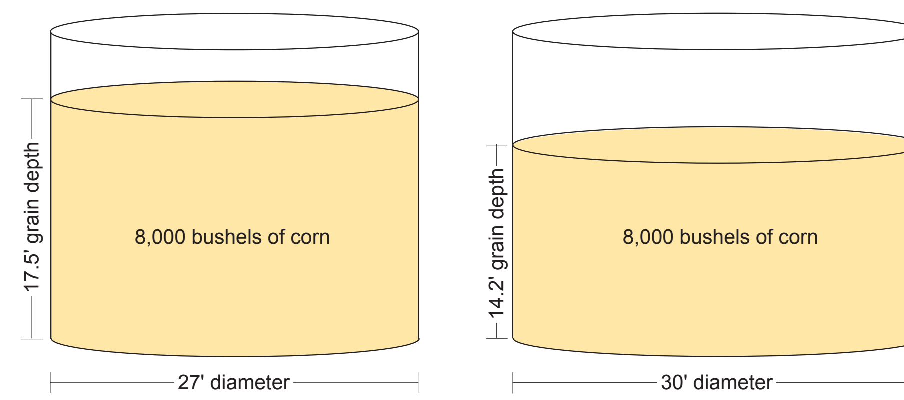

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Table 1. Airflow resistance data for shelled corn.

Grain Depth (feet)	Airflow (cfm/bushel)					
	0.5	0.75	1.0	1.25	1.5	2.0
	Expected Static Pressure (inch of water)					
8	0.2	0.3	0.5	0.6	0.8	1.2
10	0.3	0.5	0.8	1.1	1.4	2.0
12	0.5	0.8	1.3	1.6	2.1	3.2
14	0.7	1.2	1.7	2.3	3.0	4.6
16	0.9	1.6	2.4	3.2	4.2	6.4
18	1.2	2.1	3.1	4.3	5.6	8.7
20	1.6	2.7	4.0	5.6	7.3	11.3

Don't Feed Fresh Silage too Soon

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You chopped that silage, packed it into the bunker and now you finally have some feed other than dry pasture for your cows. But what if it's poisonous? Many times, crops stressed by drought or other factors will contain high levels of nitrates. Making these crops into silage is one good way to reduce toxicity of these nitrates because the fermentation process usually reduces the nitrate content of this feed.

However, during the first few days of early fermentation the chopped forage begins to heat, converting those nitrates first into nitrites. And, nitrites are as much as ten times more poisonous to cattle than nitrates. Later, these nitrites are neutralized and converted into other compounds that make them less toxic.

So, if you feed your freshly chopped forage before it has completed its full fermentation cycle, you risk giving your cattle highly poisonous forage filled with nitrites. This problem is avoided with two simple steps. First, wait three or four weeks after chopping before feeding fresh silage. And two, test your silage for nitrates before feeding. Then feed accordingly.

Having crops and pastures damaged by drought and hail is bad enough. Don't make it worse by feeding toxic silage to your cattle.

How much is drought damaged corn silage worth?

To estimate the value of drought damaged silage, what do you need to consider? You probably should start by comparing it to regular, high-grain corn silage. One common rule-of-thumb for pricing regular silage is that one ton of silage in the silo is worth ten times the price of a bushel of grain. Using this rule, when corn is worth $2.20 per bushel, then regular silage is worth $22 per ton.

Of course, drought damaged silage has lower feeding value than regular silage. But not as much as you might think. Silage from corn producing five bushels per acre or less will still have 75 percent of the feeding value of well-eared silage. And corn producing 40 bushels per acre is worth about 95 percent that of regular silage.

So, value of drought damaged silage in the silo can be adjusted proportionately to regular silage using this information. Feed value stays high during drought because leaves and stalks retain many nutrients that normally go into the grain.

If the corn is still standing in the field, harvest costs must be considered. These can be as low as $4–$5 a ton when yields are high and near the silo to over $10 a ton for fields with drought lowered yields that are several miles from the silo.

One final consideration might be to compare the silage to other potential feeds. With hay prices running around $80–$100 per ton, corn silage may be worth a couple dollars a ton more this year than usual!

Beware of Wood Heating Dangers

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With the high fuel costs this year, there is a renewed interest in wood heating. Wood is a renewable source of energy that can supplement conventional fossil fuels for home heating. Heating with wood can reduce costs, but can be dangerous if the homeowner does not take precautions.

Fires caused by the misuse of alternate energy sources—including wood stoves, portable space heaters, kerosene heaters and fireplaces—are the leading cause of residential fires in the United States today. The greatest number of fires occur in rural areas, with solid fuel heating equipment, such as fireplaces, blamed as the primary cause of death.

Smoke detectors have reduced home fire related injuries since they were introduced, but the growth of their use has slowed. Nearly 20 percent of American homes don't have a smoke detector. Another 25 percent of all U.S. homes have non-functioning smoke detectors. The main reasons found are dead or missing batteries and incorrect installation or location. That leaves only 55 percent of the country's residences which have at least one working smoke detector. There is also evidence that households most at risk for fires are those least likely to have detectors.

Chimney fires can happen when creosote accumulation from wood stoves and fireplaces ignites in the chimney. Creosote is a chemical by-product of a wood fire. Gases and minute droplets of tar and water are released as visible smoke during combustion. Some of these gasses and tars condense out of the smoke onto the cool inner surface of the chimney as creosote. Generally, the higher the burn efficiency of the stove, the higher the chance for creosote problems.

Airtight stoves with catalytic combustors can cut creosote problems up to 90 percent, reduce wood consumption as much as 20 percent and increase the overall efficiency of the stove by 10 percent. The combustor also reduces the amount of pollution entering the air by as much as 75 percent.

Tips for operating wood stoves and fireplaces safely include:

- Don't overload with wood.
- Keep glass doors closed or screen in front of fire at all times.
- Don't close the flue before the fire is out.
- Don't leave the fire unattended.
- Keep combustibles away from fireplace.
- Reserve the fireplace for wood, not trash burning.
- Have the chimney, stove or fireplace inspected regularly.