Grain Storage Management in March

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March is upon us. Soon average air temperatures will climb into the 40s and 50s. Grain held in the bin above safe storage moisture content (15% for corn) is in danger of spoiling when warmer temperatures return. The first symptoms of heating in the grain will likely appear next to the bin wall, especially on the sunny side of the bin where it will be warmer. The other place where one might first notice heating is the top-center of the bin.

When moisture content is above 16.5% and grain temperature is above 40 degrees F, you can expect some level of mold growth in the grain. As fungal organisms metabolize the starches in the grain, heat is generated. The rate of fungal growth accelerates with higher grain temperatures. This can lead to a runaway situation resulting in rapidly deteriorating corn in the bin.

Our cold Nebraska winters can be a blessing as well as a curse. Nebraska farmers were able to hold high moisture corn from December through February because they could keep the grain cold. I advised people to shoot for a grain temperature 30 degrees F(plus or minus 5 degrees). At these temperatures, the fungi that cause grain mold are almost completely dormant. In the winter months, the one-liner was: “If you can’t get your grain dry, at least get it cold”.

Now that March is here, the one-liner now has changed to “If you can’t keep the grain cold, then you must get it dry”. The target moisture content for corn sold by June first is 15% . Corn held into the summer months should be dried down to 14% moisture.

Airflow values as small as 0.2 cfm/bu are adequate for pushing temperature fronts through the grain. As mentioned in the February newsletter. The estimated time in hours to move a temperature front through a bin of grain is 15 divided by the airflow rate in cfm/bu.

Grain drying 101

Drying occurs in a horizontal zone in the bin and moves through the grain in the direction of airflow. When the corn nearest the aeration fan comes into equilibrium moisture with the air, no further drying takes place in that corn. This defines the bottom edge of the drying zone. Within the drying zone, grain moisture migrates to the surface of the kernels and evaporates into the passing airstream. As the air continues upward, it picks up more and more moisture. When the humidity in the air comes into equilibrium with the moisture content of the grain, no more drying can occur. This defines the top of the drying zone. Beyond this point, the air simply passes through the remaining grain and exhausts from the bin.

The minimum airflow I recommend for drying grain with either natural air or heated air is 1.0 cfm/bu. More airflow is better. You should not try to make up for inadequate airflow by adding heat. If your airflow is inadequate, pull some of the corn out of the bin and re-level the top. This will reduce the static pressure the fan must overcome and will increase the airflow the fan can produce. Pushing more air (cfm) through fewer bushels in the bin results in higher airflow rates

per bushel (cfm/bu). Often, reducing grain depth only a few feet can result in recommended airflow rates. For example: take a 36 foot diameter drying bin equipped with a 9.5 horsepower 24 inch axial flow fan. At 18 feet of grain depth the airflow is 0.84 cfm/bu. Reducing the grain depth to 16 feet results in 0.97 cfm/bu and reducing to 15 feet results in 1.1 cfm/bu. When you have at least the minimum of 1.0 cfm/bu airflow, you can safely add heat to reduce the time to dry the corn.

Don't forget to continue monitoring stored grain twice a month for signs of heating. Air takes the path of least resistance through grain. There could be pockets of wetter grain buried in the grain mass. This is usually the result of an accumulation of fines or perhaps a frost dam which impeded airflow.

As I said in February, if you have a grain temperature probe, take the grain temperature near the bin wall about every 20 feet around the outside of the bin and a couple of places near the middle of the bin. Let the probe stay in place for 7 to 10 minutes before taking each reading. If there is more than a 10 degree difference in temperature between the highest and lowest readings in the bin, run the aeration fan long enough to push a temperature front through the entire grain mass.

If you don't have a temperature probe, turn on the aeration fan and lean into the access hatch or climb into the bin. Does the air hitting your face feel warmer than expected, or do you detect a musty odor, or does condensation form on the inside surface of the bin roof on a cold day, if you detect any of these symptoms, continue to run the fan long enough to push a temperature front through the bin. If the bin is equipped with a stirring system run two or three rounds to break up hot spots and to equalize the moisture throughout in the grain mass.

If the warning signs are present and the bin is not equipped with a stirring system, pull some grain out of the bin and monitor the condition of the grain coming out of the auger. If you detect heating, run the aeration fans to cool the grain and to dry the grain if air properties allow. Level the grain surface if the remaining grain will be left in place.

What to do if your grain is still cold.

Cold grain should be warmed in stages. Run a warming front through the bin when the outside air temperature is 10 to 12 degrees higher than the grain temperature. Trying to warm grain in larger steps can result in moisture condensation into the grain mass because the could be grain be below the dew point temperature of the air mass, depending on the relative humidity. This is especially problematic if the grain temperature is below freezing as a frost dam can result.

Once you start aerating to finish drying and the grain temperature is above 40 degrees, you should run the fan continuously until the drying front has passed through the bin and the top of the bin is 15 % moisture. Ideally, you would like your corn to be 15% moisture and 40 degrees if held into May. This is dry enough to nearly stop mold growth and cool enough to stop insect activity.