

## Minimize Heat Damage While Drying Corn

Corn kernels are discoloring and turning brown during drying this year, according to Ken Hellevang, agricultural engineer with the NDSU Extension Service.

“The darkening during drying is likely due to unbound sugar in the kernels that becomes caramelized, which is a sign of incomplete development, whether the corn is mature or not,” he says.

He advises producers to determine the corn buyer’s allowance for dryer heat-damaged kernels to assist in making dryer management decisions. Many of the corn samples evaluated by grain inspectors have been discolored without being dryer heat damaged. Dryer heat damaged kernels are almost entirely black in color and are different than dryer damaged kernels. A picture is available on the USDA Grain Inspection web site  
<http://www.gipsa.usda.gov/GIPSA/webapp?area=home&subject=grpi&topic=sq-isd-c50>

The potential for discoloration is related to both the drying temperature and length of time the corn is exposed to the heat. Hellevang recommends reducing the dryer plenum temperature. The amount of reduction required will need to be determined by trial and likely will vary from field to field. Reports from producers indicate a variation in the potential for darkening, with softer, higher starch kernels possibly being more affected.

In a typical cross-flow dryer, corn near the inside of the drying column will approach the plenum temperature as it dries. A plenum temperature of 160 to 180 degrees is still hot if the corn approaches the air temperature. A dryer that moves the corn from the inside of the column to the outside of the column, varies the corn flow rate across the drying column or varies the exposure of the corn to the drying air should be less prone to cause kernel discoloration.

Decreasing the temperature in the lower portion of a multistage dryer also will decrease the potential for heat damage.

The potential for heat damage is related to the kernel temperature, which is related to the drying temperature, length of time the kernel is exposed to the heat and the kernel moisture. Drying the corn to 20 percent instead of 15 percent moisture content should reduce the potential for heat damage. More evaporative cooling still is occurring at the higher kernel moisture content and the kernel will not be exposed to the heat as long if drying is stopped at a higher moisture content.

Hellevang also suggests drying the corn in two passes to reduce the amount of heat damage. Only about one-half of the moisture is removed on the first pass through the dryer.

For example, corn might be dried from 28 percent to 20 percent moisture content on the first pass through the dryer. The corn could be cooled and stored as long as an entire winter at 20 percent moisture. In addition to reducing the potential for heat damage to the kernels, dryer capacity (bushels per hour) is greatly increased when the corn is dried only partially. The corn then could be dried to storage moisture some time in the future.

“Even though the corn will need to be handled more using the two-pass drying process, the amount of corn breakage should not be excessive,” Hellevang says.

Much of the kernel breakage associated with high-temperature drying occurs because the outside of the kernel dries more rapidly than the moisture transfers from within the kernel to the surface. Stopping drying at higher corn moisture contents can reduce the amount of stress cracks and breakage susceptibility.

In addition, some of the breakage potential is developed during rapid cooling in the high-temperature dryer. Partial drying and cooling in the bin should reduce the amount of kernel breakage.