

## Minimizing Heat Damage While Drying Corn

There is a problem with corn kernels discoloring, 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, a sign of incomplete development, whether the corn is mature or not. Determine the allowance of the corn buyer for dryer heat damaged kernels to assist in making dryer management decisions.

The potential for discoloration is related to both the drying temperature and length of time the corn is exposed to the heat. Reducing the dryer plenum temperature is recommended. The amount of reduction required will need to be determined by trial and will likely vary from field to field. Reports indicate there is a variation in the potential for darkening with softer higher starch kernels possibly 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 multi-stage dryer will also 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 is still 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. Drying the corn in two passes should 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% to 20% moisture content on the first pass through the dryer. The corn could be cooled and stored as long as all winter at 20 percent moisture. Dryer capacity (bushels per hour) is greatly increased, in addition to reducing the potential for heat damage to the kernels, when only partially drying the corn. The corn would 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. Much of the kernel breakage associated with high temperature drying occurs as 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 is expected to 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 is expected to reduce the amount of kernel breakage.

