Keep Stored Grain Cool and Dry

By Ken Hellevang - North Dakota State University Extension

Keeping stored grain cool is important as outdoor temperatures start to warm this spring, a North Dakota State University Extension Service agricultural engineer advises.

Each 10 degrees the grain temperature increases reduces the allowable storage time by about half, according to Ken Hellevang, also a professor in NDSU’s Agricultural and Biosystems Engineering Department. For example, the allowable storage time for 18 percent moisture corn is about 200 days at 40 F, 90 days at 50 F, 50 days at 60 F and only 30 days at 70 F.

“Not only are daytime temperatures increasing, but the bin works as a solar collector,” he says. “This heats the grain to temperatures exceeding outside temperatures, particularly on the south side of the bin and on the top of the bin. There is more than twice as much solar energy warming the south wall of a bin on Feb. 21 as there is on June 21 due to the low solar angle.”

He recommends producers run the aeration fans periodically at night or during the cool part of the day to cool the grain. The goal is to keep the grain temperature cool during spring, preferably near 30 degrees in the northern part of the country and below 40 degrees in southern regions. Nighttime temperatures typically are near or below 30 in March and below 40 in April. Even in early May, they frequently are below 45 degrees.

“Temperature sensors are an excellent tool, but remember that they only measure the temperature of the grain next to the sensor,” Hellevang says. “Because grain is an excellent insulator, the grain temperature may be much different just a few feet from the sensor and not affect the measured temperature.”

Aeration fans or ducts should be covered when not operating. The wind will push warm, moist spring air through the grain, warming it to near the daily maximum temperatures. Typical maximum temperatures even in northern states in late March are in the mid-40s and increase in late April to around 60 degrees. Also, grain moisture will increase as grain is warmed.

Hellevang also suggests checking the stored grain every two weeks. While checking on the grain, measure and record the grain temperature and moisture content. Rising grain temperature may indicate insect or mold problems. Insect infestations can increase from being barely noticeable to major infestations in three to four weeks when the grain is warm.

Checking the grain moisture content is important because moisture measurements at harvest may have been in error due to moisture gradients in the kernel, grain temperature and other factors. In addition, the moisture may have changed while the grain was in storage due to moisture migration or moisture entering the bin. Immature grain and grain with damage to the seed coat are more prone to storage problems, so the grain should be stored at a lower moisture content than normal, Hellevang says.
When checking the moisture content of stored grain, follow the manufacturer’s procedure for obtaining an accurate moisture measurement. Temperature adjustments, cold grain, inaccurate sample quantity and moisture variations across the kernel frequently cause substantial measurement errors.

Verify the accuracy of the measurement by warming the grain sample to room temperature in a sealed plastic bag before measuring the moisture content. A period of six to 12 hours in a sealed container also permits grain moisture to reach equilibrium across the kernels.

Grain moisture content is even more important for summer storage. The moisture content must decrease as the grain temperature increases to prevent mold growth and grain deterioration, Hellevang says. Corn needs to be dried to 13.5 or 14 percent moisture, while soybeans should be dried to 11 percent, wheat to 13 percent, barley to 12 percent and oil sunflowers to 8 percent for summer storage.

“The goal for summer storage also should be to keep the grain as cool as possible to limit insect activity,” Hellevang says. “Insect reproduction is reduced at temperatures below about 65 to 70 degrees, and insect activity is reduced as grain temperature is reduced.”

He also recommends covering aeration fans in the summer to prevent wind and a natural chimney effect from warming the grain. Grain will warm to near the outdoor temperature if the wind is allowed to blow into the fan or duct.