
Cool Grain for Storage

Corn and milo matured and dried down early this fall allowing producers to save drying costs, however a grain storage management program is still important to maintain grain quality. A comprehensive management program to maintain grain quality includes: 1) Make sure the grain going into storage is dry, clean, and in good condition. 2) Aerate the grain to maintain uniform cool temperatures and uniform moisture conditions. This helps prevent localized hot spot development. Cool existing or developing hot spots immediately. 3) Regularly inspect the grain to locate temperature, moisture, or insect problems.

The storage life of grain is dependent on both moisture and temperature. Grain dried well in the field this year and may have been harvested at what are normally considered safe storage moisture contents.

To understand the importance of both grain moisture content and temperature on safe storage times, consider the results of experiments conducted with corn held at a constant temperatures and moisture contents in the laboratory. At 15% moisture, the shelf life (time grain can be held before losing 1/2% of the dry matter) decreased from 414 days at 55 degrees, to 206 days at 65 degrees to 115 days at 75 degrees. Storage times at higher moisture contents are greatly reduced from those at 15%. For example: the shelf life of corn at 55 degrees is reduced from 414 days at 15% to 133 days at 17%.

A rule of thumb would be for each 10 degree rise in temperature, storage time is cut in half when held at a given moisture content. Another rule of thumb would be safe storage times are one-third as long at a given temperature when moisture content increases from 15% to 17%.

Aeration systems design for temperature management of stored grain should not be confused with grain drying systems. Low airflow rates, typically between 1/10 and 1/5 cubic feet of air per minute per bushel (cfm/bu), are adequate for aeration but airflow rates of 1.0 cfm/bu or higher are required for drying. Therefore, grain placed into storage equipped with an aeration fan intended only for controlling the temperature must be at the proper moisture content for storage (15.5% if marketed by June, 14% if held up to one year, and 13% if held over one year).

The primary objectives of aeration are to keep the grain at a seasonally cool temperature and to maintain uniform grain mass temperatures, preferably with no more than a 10 F difference in temperature from one part of the bin to another. These objectives can generally be achieved by keeping grain temperatures within 10 F to 20 F of the average outside air temperature.

It is important to understand how cooling occurs in a bin (the same principles apply for warming grain). A cooling zone is established and moved through the grain in the same direction as the airflow. The rate at which the cooling zone moves is directly related to the total volume of air moved through the grain or a function of both the airflow rate (cfm/bu) and the number of hours the fan is operated.

When changing grain temperatures during the fall and spring, run the fan continuously until the cooling or warming zone has been moved completely through the grain. Move at least one (preferably two) cooling zone(s) through the grain to remove field or dryer heat. Thereafter, move one cooling zone per month through the grain until it is cooled to between 30 F and 40 F. Not only will this help prevent moisture migration due to uneven temperatures within the grain mass but will effectively prevent insect activity in the grain as most insect activity stops a temperatures below about 55 degree F.

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