



Task Force

Keeping Cold Grain Cold

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After an excellent fall harvest of high quality grain, the past few months have been unseasonably warm. Generally, there were few periods of sufficiently low temperatures to cool stored grain to the recommended 30 - 35°F as soon after binning as possible. As outside temperatures have already begun to rise this spring, the outer grain layers, and the top of the pile begin to warm. This is enhanced through increased solar radiation on storages. Additionally, warming of the bottom of the pile and the grain bulk itself occurs by not covering (capping, sealing) aeration fans and ducts. There is little that can be done to avoid warming of the outer grain layers, but warming of the bulk can be minimized!

Grain Warming Due to Wind

A previous study on three grain bins in North Dakota clearly showed that warming of the grain mass between March and May by 5 to 10°F was caused primarily by high wind speeds. Grain was warmed to near maximum daily temperature because the maximum wind speed typically occurred during the warmest part of the day. Thus, warm spring winds can cause unwanted ventilation of farm and commercial storages unless aeration fans and ducts are covered. Open fans and ducts pointing southward are prime candidates for wind-induced warming. Additionally, warmer, higher humidity air can cause condensation of moisture on colder grain adjacent to aeration ducts, floors, and pads. This may lead to caking and spoilage of grain.

Grain Warming Due to “Chimney” Effect

Sealing ducts and fan intakes also eliminates the natural “chimney” effect in which cold air “leaks” out of the bottom of a grain bin through the fan opening. The lost cold air is replaced with warm air drawn in through the roof eaves and vents. This is the reverse effect of warm air drawn out of a house in the winter time when the damper is left open in the fireplace. If low grain temperatures are to be maintained through the spring and summer, premature warming of the grain mass needs to be avoided by sealing fans and ducts. Covering fans and ducts also reduces the chance of rodent and pest access.

Managing Cold Grain Storage in Warm Weather

Traditionally, it has been recommended to rewarm grain to be stored through the summer to 50 - 60°F by late spring. Unfortunately, rewarming to this range is easier said than done. Manual operation of aeration fans makes it difficult to control rewarming precisely. Normally it takes 120 to 150 hours to accomplish a temperature change in a grain mass. During this time, warm weather can move in and cause grain temperatures to warm beyond this range if fan operation is not stopped in time. Grain temperatures above 60°F provide ideal conditions for spoilage agents such as insects and molds to reduce grain quality.

Experience has also shown that grain at 30 - 35°F can be successfully stored through the summer. However, this requires good initial grain quality and careful implementation of good storage management practices. These include cleaning, leveling, coring, and frequent monitoring of grain. Drawing a core, or leveling the grain by hand creates a flatter grain surface that will warm-up much more slowly than a peaked grain surface. Peaking makes it difficult and dangerous to enter the bin for probing and sampling. Monitoring during the warm weather storage period involves switching from bi-weekly to weekly grain inspections. Checking a grain bin routinely for temperature, moisture and pests prevents major headaches later on.

A Word of Caution

If unsure about whether grain in a bin is in good enough condition to make it through the spring and summer, the fan should be operated on a cold day and the exhaust air checked for odors or “steam”. A musty smell, a vapor (steam) plume, or condensation on the underside of the roof indicates that the grain is heating in some parts of the bin. Remember that whenever there are serious signs of grain heating (“hot spots”), no matter what the season or the weather, run the fan continuously. Also, feed or sell such low quality grain as quickly as possible. Grain quality NEVER improves during storage!

For more information on utilizing cold grain temperatures as a natural, non-chemical, preventive quality management strategy request a copy of the new publication “Maximize Grain Quality & Profits Using S.L.A.M.” (ID-207) from the Purdue University Cooperative Extension Service.

