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Winter Grain Storage

Harvest is complete and your grain is safely stored in the bin, or is it?

Safe winter storage of grain on the farm is a key to successful farm management. Harvested grain may be put into bins at acceptable moisture contents, but is it safe? Knowing what temperature and moisture contents are acceptable for safe storage is critical for safe winter storage of grain. The following information sheds some light on what to watch for in stored grain during winter conditions.

More stored grain goes out of condition or spoils due to lack of control over grain temperature than any other reason. It cannot be emphasized enough that the control of temperature in a bin of stored grain is absolutely critical. Geographically in Western Canada we are located in a region where we get North America's most severe temperature fluctuations from one season to the next. The transition between these extremes can happen rapidly or gradually. It is during these transition periods when grain is most at risk due to a phenomena called moisture migration. Moisture migration happens inside the bin when the difference in grain temperature and outside air is the most extreme.

Properly drying and cooling your grain in the fall is key to preserving grain quality through the fall and winter months. If you have harvested your grain in hot, dry conditions, you must be careful to bring the temperature of that grain down to enable safe storage through the winter. Likewise, if due to weather conditions at harvest time you have put your grain in the bin at a higher moisture content than acceptable, you must be careful to lower and maintain the temperature to a point where you can safely store the grain over the winter.

When the bin is initially filled with grain, moisture content and temperature are fairly uniform throughout the bin. However, as outside temperatures begin to drop, continued monitoring of your grain is required. In the winter, as the ambient temperature outside the bin starts to drop, it tends to cool the bin wall which in turn cools the adjacent grain and air inside of the bin. At this point, the cool air creates a current that moves downwards through the grain along the outside perimeter of the grain mass. This air current then moves inward to the center of the bin, here it is warmed by the grain. As the air warms, it starts to move upwards in the center of the bin and picks up moisture from the grain carrying it to the top of the bin where it starts to cool again. This results in a high moisture zone at the top center of the bin due to a release of moisture as the air cools. In and around this area of high moisture, is where you can expect grain spoilage to occur.

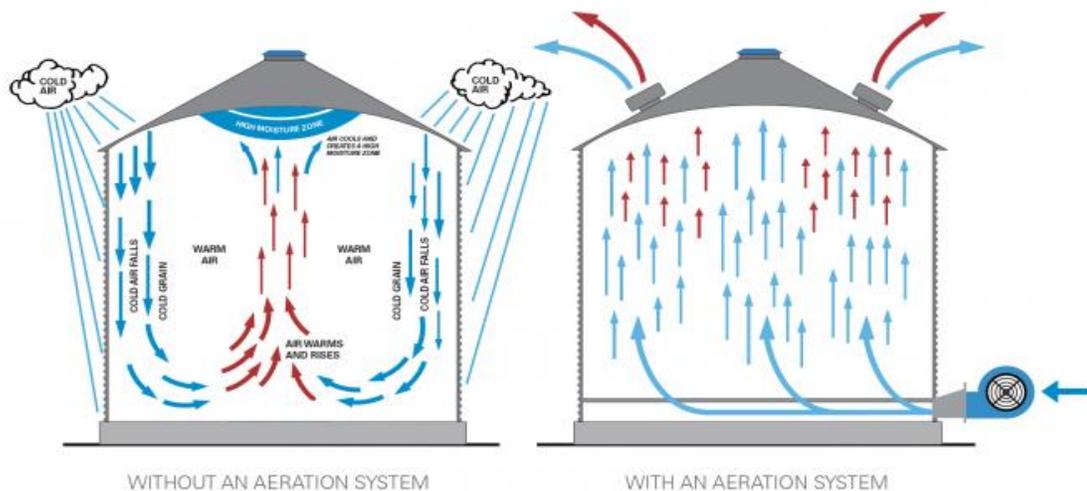


If grain is to be stored in a bin for any length of time, it is important to bring the grain temperature down to a point that will prevent the abovementioned from happening. In order to accomplish this, it is recommended that the grain temperature in the bin be lowered to, or just slightly below, the average ambient temperature that is expected for that time of year. This will prevent the downward movement of colder air. In cooler regions of the country once a uniform grain temperature of approx. -10° Celsius is achieved further cooling is not required. It is important to mention that the producer needs to consult safe storage charts and monitor their bins on a regular basis. Safe storage charts will illustrate what length of time grain can be stored at in relation to moisture levels and temperature.

Aeration (cooling) at this point should be accomplished with .05 to .1 cfm/bu and only until the desired, uniform temperature throughout the bin is achieved. As the season proceeds, the temperature of the grain should be monitored on a regular basis and controlled accordingly by the use of aeration.

By utilizing aeration (whether cooling or warming the temperature of the grain) inside of grain bins, you are able to minimize the effects of moisture migration and maximize the benefits of temperature control within your bin.

The diagrams below depict fall/winter moisture migration; in a bin without aeration and in a bin where aeration is being utilized.



In summary, monitoring moisture and temperature conditions within your bin and having an aeration system in place to help regulate these conditions is key to safe and successful grain storage.