Grain Management Strategies for Winter Holding

Drying corn to target moisture might have already been accomplished by now, or might be underway depending on harvest moisture, location, crop maturity, and time of harvest. However, winter is quickly approaching, so grain has to be conditioned as soon as possible for safe winter storage. Safe grain storage is highly dependent on grain moisture and temperature, and the combination of these would determine the safe storage period and/or the spoilage risk. Dry and cool grain can be safely stored for a longer duration (6-12 months), however, it is often difficult to achieve these goals due to several factors such as wet crop, delayed harvest, insufficient aeration and drying systems, and poor management strategies. Different management approaches for winter holding will be required based on the grain moisture.

Managing Dry Grain
Corn uniformly dried to nearly 15% moisture content (soybeans to 13%) is easier to store safely than if the moisture content were higher. Cool the grain as soon as possible after the drying target is achieved. Grain should be uniformly cooled to 35-40°F as soon as possible. Do not freeze the grain as it may result in significant condensation in the following spring/summer when ambient temperatures start warming up. Moisture accumulation inside the stored grain due to condensation may lead to mold growth, hotspot development, and significant spoilage. Without the temperature/moisture cables such hotspots would go unnoticed further magnifying any losses. Airflow rate is a key factor in the uniform and rapid cooling of grain. The bin should have at least 0.10 cfm/bu airflow rate uniformly delivered through the grain bulk. It is important to note that this airflow rate is only for the cooling of already dried grain. For in-bin drying of grain airflow requirement is at least 10 times higher than required for aeration.
With automated fan control, cooling in step cycles (starting fan when average daily ambient air is 10-15°F cooler than grain) is not required and the fan will run automatically when ambient air with cooling potential is available. Automated ‘aeration’ fan control, such as in IntegrisPro, also ensures that grain is not being over-dried during the cooling process, thus minimizing shrink loss. Automated fan control eliminates the guesswork and confusion in operating the aeration fan, and is more efficient with reduced energy consumption and negligible shrink loss.

It is important to ensure that uniform cooling is achieved throughout the grain bulk. Fines and broken present in the core block/reduce airflow rate resulting in non-uniform cooling and establishment of temperature gradients. These temperature gradients cause moisture migration and may result in condensation with a potential risk of mold growth and hotspot development.

Managing Wet Grain

If drying cannot be finished prior to winter, wet corn of 16-20% moisture content can be held by aerating/cooling the grain to nearly 35°F. Freezing of the wet grain is not recommended as it creates condensation problem in the following spring. It is important to note that safe storage time is cumulative so storage conditions (temperature and moisture) since the harvest date should be considered in estimating the safe storage period. Corn with 20% moisture content (wet basis) has a safe storage period of nearly 28 days at 60°F, 50 days at 50°F, 88 days at 40°F, and 115 days at 35°F storage temperature. High moisture grain is always at the risk of spoilage due to mold growth with the potential for mycotoxin development.

Grain drying should be started in spring as soon as ambient temperatures warm up to 40°F, since natural air-drying is ineffective below this temperature. Low temperature supplemental heat could be added to accelerate the drying process. Given the limited safe storage life of wet grain, drying in spring should be finished as quickly as possible. For successful and fast drying, airflow rate is the key factor. Bins should have at least 1.0-1.5 cfm/bu airflow rate to dry the grain to safe moisture levels quickly.
Delaying the drying until summer months would heat the grain again resulting in quick spoilage. If the in-bin drying system cannot deliver the sufficient airflow rate then high temperature drying should be considered as an alternative for quick drying.

Monitor the Grain
Grain stored in your bins should be monitored regularly. Even grain dried to safe storage moisture levels and cooled may start spoiling. Grain respiration generates heat and moisture, and varying weather patterns may cause condensation near the sidewalls and in the headspace of the bin, resulting in mold growth and hotspot development. Track the grain moisture and temperature using your moisture and temperature cables. An increase in grain moisture and temperature is a strong indicator of mold/insect growth. Pay attention to rate of change (ROC) and temperature rise alarms generated and sent by IntegrisPro management system. An increase of about 5°F/week in temperature (without aeration) indicates that spoilage has started. Take immediate and appropriate action to cool the grain to avoid any further spoilage and prevent the spreading of hotspot to a larger grain mass. If the hotspot cannot be controlled by aeration, try to unload the affect portion of grain from the bin.