

On-Farm Storage Techniques Critical For Top Quality Corn

For U.S. farmers, corn quality starts on the farm - even before seed is planted in the spring. Farmers choose varieties that are complementary to the local soils, climates and planting locations based on characteristics such as rate of maturity, fast dry-down and yield potential. From harvest to storage, stringent management techniques are put into place to ensure the grain remains at its highest quality grade before it is used on farm or marketed elsewhere.

Commercial grain elevators have larger capacity than most individual on-farm facilities, yet some farmers choose to hold their grain in their own storage bins. Prior to harvest, sanitation of machinery, bins, fans and aeration systems is an early step to ensure quality corn and successful storage.

In the fall, corn is typically harvested at the lowest practicable moisture content to

“This is the level (14 percent moisture) where corn stores best. At this percentage, the grain won’t go out of condition.” – Dennis Friest, corn farmer

avoid, if possible, the necessity of additional mechanical drying. Machinery settings at harvest are adjusted to minimize grain damage and maximize the removal of trash and broken corn and foreign material (BCFM).

Once the corn reaches the bin, farmers dry it down, if necessary, to 14 percent moisture with the use of an aeration system that moves warm or cool air depending on conditions. Iowa corn farmer Dennis Friest stressed this is vital in order to store and maintain quality corn.

“This is the level (14 percent moisture) where corn stores best,” he said. “At this percentage, the grain won’t go out of condition.”


The corn in the bins is monitored for the duration of the storage period, which can range from three to nine months depending on marketing plans. A combination of visual inspections, sampling and the use of sensors and monitors helps to maintain the proper temperature and moisture inside the bin.


Weather changes throughout the storage period dictate management of the bins. When the temperature drops, grain is cooled in the bins to the outside temperature. Likewise, during the warmer months, grain is gradually warmed to the outside temperature to avoid condensation. ■

U.S. Grains Council

Email: grains@grains.org
www.grains.org

 @usgc

 /usgrainscouncil

 /usgrainscouncil

U.S. Headquarters

20 F Street NW
Suite 600
Washington, DC 20001
202.789.0789 TEL
202.898.0522 FAX

Your Local Office

Address
Address
TEL
FAX
EMAIL

Developing
Markets.

Enabling
Trade.

Improving
Lives.

Continued on page 2

U.S. Grain: Methods to Ensure Quality



When it comes to delivering high-quality grain to the world market, U.S. farmers have several options to maintain quality attributes.



Dry Storage Bags

When existing facilities reach capacity, overflow storage is sometimes in temporary unprotected stockpiles. Now, huge polyethylene bags can be used both on- and off-farm. These bags have a capacity up to 254 metric tons (10,000 bushels) for grain with less than 15 percent moisture.



On-Farm Storage Monitoring

A series of sensors inside bins monitor moisture, temperature and carbon dioxide. In addition to the externally-mounted control panels, many systems link to wireless networks to allow monitoring by computer and mobile devices and sending of automatic alerts.



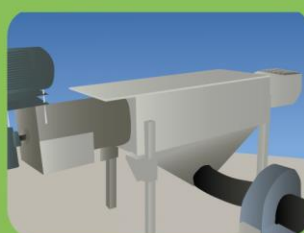
Portable Moisture Testing

Hand-held units that measure the temperature and moisture content of grain are especially helpful with temporary storage systems and spot-checking. Most include easy data transfer software to track readings over time.



Conveyer Systems

Especially designed to preserve grain quality while grain is transferred, these systems can be belt-style, which provide gentle handling, or pneumatic, which uses air to remove dust and non-grain material in addition to moving grain.



Cleaning

Several methods exist to remove broken kernels and debris as grain goes into storage in an effort to reduce further handling, aeration costs and in-storage shrink.



Corn Export Cargo Quality Report Released

The U.S. Grains Council has issued its 2014/2015 Corn Export Cargo Quality Report, which measures the quality of U.S. corn samples ready to be loaded for overseas shipment. This is the fourth year for the report and is a companion to the 2014/2015 Corn Harvest Quality Report that provides details about the quality of the U.S. corn crop at the time of harvest.

Early 2014/2015 U.S. corn exports were, on average, better than or equal to U.S. No. 2 corn on all grade factors, while moisture was the same as the previous year.

Chemical attributes indicated higher oil levels than the previous year, with protein and starch levels similar to 2013/2014. Physical attributes of stress cracks were lower, kernel size was larger, and true density was higher than 2013/2014 export samples.

All samples were safely below the U.S. Food and Drug Administration's (FDA's) action and advisory levels for aflatoxins and DON.

The cargo quality report also measures additional physical factors that provide more in-depth information about the processability, storability and potential for breakage in handling.

U.S. corn producers are committed to their export customers and provide these reports in an effort to share reliable, transparent and

Continued on page 3

Off-Farm Storage Management For Grain Quality

Off-farm grain storage at elevators offers much more capacity than on-farm bins, and U.S. farmers with large production volume often sell their grain at harvest to these facilities. According to the U.S. Department of Agriculture (USDA), the United States' off-farm commercial storage capacity is 272 million metric tons (10.7 billion bushels).

Large commercial storage facilities receive grain from multiple sources with a varied degree of moisture and quality conditions. The facilities blend grain sources together with the end goal of producing a consistent quality product that will meet contract specifications for international customers.



Off-farm commercial grain storage facility.

Maintaining quality throughout storage to the point of export requires planning and management to avoid potential problems and to meet customer expectations.

“Proper facility design based on volume is essential to managing grain quality in large commercial facilities throughout the storage period,” said Carol Jones, Ph.D., a grain storage expert at Oklahoma State University.

“Some grain lots handle better based on growing and storage management conditions. Regardless, following guidelines to minimize breakage is key.” – Carol Jones, Ph.D.


Grain temperature is a key factor to monitor and control in grain storage. Proper training is essential to understand different grain properties, appropriate monitoring techniques, and specific grain quality management, such as correct pressure during aeration. Many state

extension services, in partnership with land-grant universities, offer such training for grain elevator employees.

Another consideration farmers, elevator operators and personnel consider is that increased handling can lead to increased breakage and thus a lower quality grain.

Corn Export Cargo Quality Report Released, cont'd

objective measurements about U.S. corn quality.

To view the full report visit <http://grains.org/key-issues/grain-supply-and-demand/corn-harvest-quality-and-export-cargo-reports>. 


Connect With Corn Growers on Facebook

Keep in touch with U.S. corn growers as they prepare for, plant, grow and harvest the 2015 U.S. corn crop. A Facebook page – Growing the U.S. Corn Crop – is now available for overseas buyers and customers to gain insight and information directly from farmers throughout the United States.

Overseas customers and end-users can stay updated on the condition and quality of the 2015 U.S. corn crop in real time through photos and updates provided by farmers. The page will also share a series of videos during planting, growing and harvest.

Viewers can follow along on other social media platforms by searching the hashtags #plant15 #grow15 or #harvest15.

Farmers from across the U.S. Corn Belt are excited to use the page to communicate with their international customers.

To follow the Facebook page, visit www.facebook.com/GrowCorn 

Continued on page 4

“Some grain lots handle better than others based on growing and storage management conditions,” Jones said. “Regardless, following guidelines to minimize breakage is key.”

Effective grain management can prevent conditions that lead to insects and mold in the stored product. The factors affecting these problems in stored grain are moisture content, grain temperature, the length of time grain is susceptible to adverse conditions and storage accessibility to pests.

“There is no scientific evidence that insects found in stored grain come from the field with harvested grain,” Jones said. “Therefore, sanitation along with proper aeration to cooler outdoor temperatures during the autumn season is essential to suppress infestation.”

Although specific chemical treatments are approved for application directly to grain for insect control, some customers don't allow them in their purchase contracts. To make grain available for these contracts, experts recommend extra sanitation efforts to minimize pest access.

Ultimately, the intended use of grain dictates the quality of the grain specified in a buyer's contract. Off-farm commercial storage facilities employ multiple management techniques and strive to provide a consistent quality product for the variety of grains available from U.S. farmers to international buyers. ■

Chemical And Physical Properties Contribute To Corn Quality Grade

U.S. farmers produce grain in a wide variety of geographical regions with major differences in soil, temperature and climate. However, the management tools they use to meet their goals of producing and harvesting a quality corn crop are similar. Growing conditions, timing of harvest, handling equipment, storage practices and transportation procedures all affect grain quality. Finally, when it comes time for official grading, there are essential chemical and physical properties that influence the final grade assignment.

The U.S. grading system for corn takes into account many physical properties of the purchased lot. Initial classification is determined by the color of the corn: yellow, white or mixed. Special grades can be assigned to corn including dent kernel, which has kernels with a distinct depression or dent in the crown; flint corn, which has a kernel with a rounded crown but is smaller than a dent kernel; infested corn, which indicates the presence of insects; and waxy corn, a starch variant of normal corn.

Additionally, grain quality grades reflect a range of properties that can be defined in terms of physical, sanitary and intrinsic quality characteristics.

"We have well-established operation systems in place from the farm to export vessel. Customers abroad can expect consistent quality from the United States." – Carlos Campabadal, Ph.D.

Physical quality characteristics include moisture content, test weight, kernel size, total damaged kernels, heat damage, broken kernels, stress cracking and breakage susceptibility – which are results of handling, transporting and storing. These issues are unavoidable in a high volume grain handling system, but proper monitoring identifies problems, allows accurate grading, and minimizes the effect on the quality of corn export cargoes.

Sanitary characteristics include fungi and mycotoxin count, insects, rodent excrements, foreign material, toxic seeds, pesticide residue, odor and dust. These factors can also be minimized with steps taken before harvest to clean storage facilities and when corn is properly stored and monitored.

Continued on page 5

Intrinsic quality characteristics include milling yield, oil content, protein content, hardness, density, starch content, feed value, viability and storability. These factors depend on the variety of corn as well as environmental conditions from planting to harvest. These characteristics are genetic, cannot be altered, and in most cases have a positive impact on quality.

Graders use testing equipment that has a series of sieves to separate and catch broken kernels and foreign materials (BCFM). The machine removes larger and finer particulate matter from a sample to determine the percentage of BCFM. According to the Federal Grain Inspection Service (FGIS), damage is reported as a percentage and factored into the quality grade as described in the FGIS handbook, available at http://www.gipsa.usda.gov/fgis/public_handbooks.aspx.

Numerical grade designations, from U.S. No. 1 to U.S. No. 5, plus a U.S. sample grade that does not meet the requirements for a numerical grade, are assigned to all samples based on their tested characteristics. While a particular lot may grade higher than another, corn from multiple sources is typically blended together as it moves through the marketing channel. As a result, the grade for a given intrinsic quality characteristic is an average of multiple samples.

Carlos Campabadal, faculty member of the Department of Grain Science and Industry at Kansas State University and program specialist for the International Grains Program Institute (IGP), said despite the varied grade designations, international customers can expect the same quality from U.S. farmers throughout the year.

“We have well-established operation systems in place from the farm to export vessel,” he said. “Customers abroad can expect consistent quality from the United States.”

U.S. farmers make every effort to raise and market a top quality product for domestic and international customers. “We are always working to improve,” Campabadal said. “And we always deliver.” ■

Grading Process Ensures Uniform Product

A major strength of the U.S. grain production and marketing system is the variety of consistent, impartially tested grades, classes and prices that it can offer customers around the world. In the U.S. marketing system, quality requirements for grain exports are governed by both contract and specifications and complex, constantly evolving, government-regulated guidelines that cover the inspection, sampling, grading and weighing of grain. These grains standards and inspection procedures are designed to ensure a uniform product and to facilitate the trading and marketing of U.S. grain.

Official certification is mandatory for export grain sold by grade. It must be inspected and officially weighed through a process handled by the U.S. Department of Agriculture’s (USDA’s) Federal Grain Inspection Service (FGIS). These technicians observe and verify weighing and loading of grain and monitor scales and grain flow security. All findings are reported on a certificate, which represents the entire inspected lot.

Additional inspection services for quality information can be requested by the buyer or provided as a service from the seller. Any certificates from this process include the resulting information, but are not official FGIS certificates. ■

