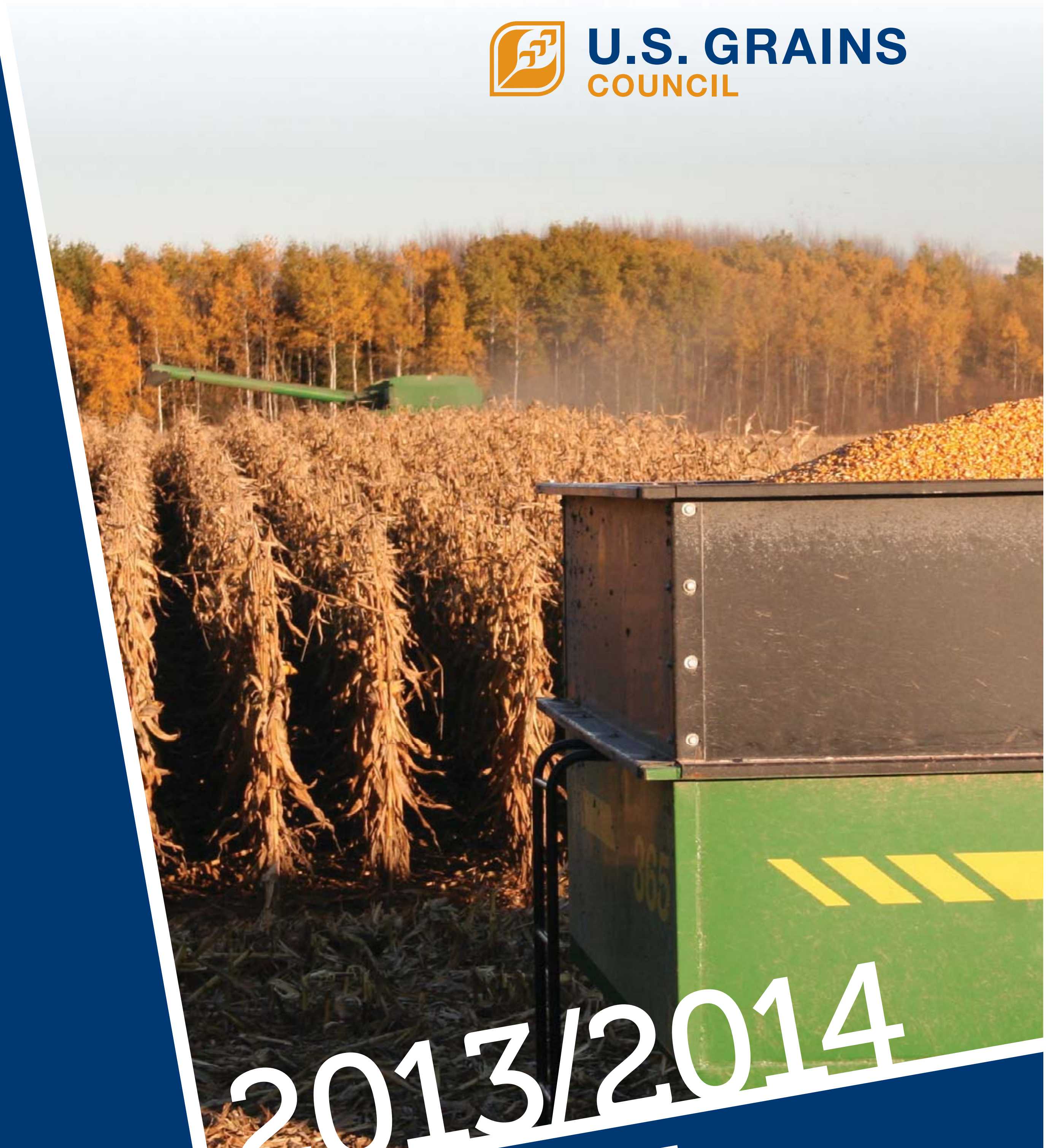


2013/2014 CORN HARVEST QUALITY REPORT

U.S. GRAINS COUNCIL

ACKNOWLEDGEMENTS | 2013 HARVEST

Developing a report of this scope and breadth in a timely manner requires participation by a number of individuals and organizations. The U.S. Grains Council is grateful to Dr. Sharon Bard and Mr. Chris Schroeder of Centrec Consulting Group, LLC for their oversight and coordination in developing this report. They were supported by internal staff along with a team of experts that helped in data gathering, analysis, and report writing. External team members include Drs. Tom Whitaker, Lowell Hill, Marvin R. Paulsen, and Fred Below. In addition, the Council is indebted to the Illinois Crop Improvement Association's Identity Preserved Grain Laboratory and Champaign-Danville Grain Inspection that provided the corn quality testing services.

Finally, this report would not be possible without the thoughtful and timely participation by local grain elevators across the United States. We are grateful for their time and effort in collecting and providing samples during their very busy harvest time.

TABLE OF CONTENTS | 2013 HARVEST

GREETINGS FROM THE COUNCIL | 2013 HARVEST

The U.S. Grains Council is pleased to present the *U.S. Grains Council Corn Harvest Quality Report 2013/14*. Accurate and timely information on crop quality helps buyers make better informed decisions, increases confidence in the capacity and reliability of the market, and assists nations around the world in achieving food security through trade. We believe that the *Corn Harvest Quality Report* sets a new standard for transparency, and it is offered in the hope that buyers around the world will find it a useful tool.

The *Harvest Report 2013/14* is the third of an annual series. These reports utilize a consistent methodology that allows the evaluation of trends over time. This year's report was delayed slightly because of a cool, wet spring in the U.S. corn belt, which led to late planting and a late harvest.

It should be emphasized that the *Harvest Reports* assess the quality of the current U.S. crop at harvest as it enters international merchandising channels. Corn quality will be further affected by subsequent handling, blending, and storage conditions. The Council therefore annually publishes a second report, the *Corn Export Cargo Quality Report*, that measures corn quality at export terminals at the point of loading for international shipment. We anticipate that the *Corn Export Cargo Quality Report 2013/14* will be published in March 2014.

The Council is committed to global food security and mutual economic benefit through trade. As a bridge between international corn buyers and the world's largest and most sophisticated agricultural production and export system, the Council offers this report as a service to our partners around the world in support of the Council's mission of Developing Markets. Enabling Trade. Improving Lives.

Sincerely,

Julius Schaaf
Chairman
U.S. Grains Council
December 2013

I. HARVEST QUALITY HIGHLIGHTS | 2013 HARVEST

The 2013 U.S. corn growing season experienced later than normal planting and harvest, resulting in higher harvest moistures than in 2011 and 2012. Nonetheless, overall corn quality is good and U.S. corn producers experienced much higher yields in 2013 than the previous two years, resulting in the largest U.S. corn crop on record.

The overall quality of the 2013 corn crop for many factors was similar to 2011. The 2013 corn crop is entering the marketing channel with the following characteristics:

GRADE FACTORS AND MOISTURE

- High test weight of 57.9 lb/bu (74.5 kg/hl), nearly 2 lb/bu above the limit for No. 1 grade, with 93.3% of the samples above the No. 2 grade minimum. While test weight is slightly lower than the previous two years, the results still indicate well filled kernels.
- Low levels of BCFM (0.9%) similar to 2012 and 2011, well below the grade limit for No. 1 corn.
- Low total damage (0.9% compared to 0.8% in 2012 and 1.1% in 2011) with no reported heat damage (same as in 2012 and 2011).
- Elevator sample moisture average of 17.3%, which is higher than in 2012 and 2011. In 2013, 75% of the samples were above 15% moisture. This will require more drying or aeration at the elevators than in 2012 and 2011. The wide range in moisture contents will require careful segregation.

CHEMICAL COMPOSITION

- Average protein content of 8.7% dry basis, the same as recorded in 2011, yet lower than in 2012. The average protein is most likely a return to more normal levels.
- Significantly higher starch content of 73.5% dry basis compared to 2012 (73.0%), offsetting the lower protein content and signifying relatively good kernel filling and maturation, results beneficial for wet millers.
- Average oil content of 3.7% dry basis, about the same as in 2012 and 2011.

PHYSICAL FACTORS

- Stress cracks (9%), somewhat higher than in 2012 and 2011, possibly resulting in more susceptibility to breakage compared to the previous two years but still relatively low.
- Average true densities and horneous (hard) endosperm, indicating moderate hardness in 2013 which should be good for wet milling and feeding.
- Even with sample averages showing moderate hardness, more than 50% of all samples have test weight above 58 lb/bu, indicating that with selection, supplies of moderate to hard endosperm corn is available for dry millers.
- Whole kernels (92.5%), slightly lower than 2012 and 2011, should still enable good storability.

MYCOTOXINS

- A significantly lower incidence of aflatoxins detected in the 2013 corn crop compared to the 2012 corn crop. Around 99.4% of the corn samples tested below the FDA aflatoxin action level of 20 ppb.
- 100% of the corn samples tested below the FDA advisory levels for DON (5 ppm for hogs and other animals and 10 ppm for chicken and cattle) (same as in 2012 and 2011).

II. INTRODUCTION | 2013 HARVEST

The *U.S. Grains Council Corn Harvest Quality Report 2013/14* has been designed to help international buyers of U.S. corn understand the initial quality of U.S. yellow commodity corn as it enters the merchandising channel. This is the third annual survey of the quality of the U.S. corn crop at harvest. With three years of results, the Council is beginning to observe patterns in the impact of weather and growing conditions on the quality of the U.S. corn as it comes out of the field.

Both the 2011 and 2013 crop years started with cooler and wetter planting seasons. However, the 2013 season experienced a greater delay with planting, a cooler summer, and a wetter and later harvest than the 2011 season. The 2012 crop year was defined by its early planting season and a severe drought prompting early plant maturity and harvest. These differences in the growing season conditions were exhibited in the quality of the corn crop as it reached the first stage in the merchandising channel. The 2013 corn crop mimicked the chemical composition of the 2011 corn crop with comparable protein and starch levels, characteristics significantly impacted by growing season weather. However, the 2013 harvest season produced corn with higher moisture than the previous two crop years. The 2013 corn crop also contrasts to the previous crops with lower test weight and true density, softer endosperm and slightly higher stress cracks. These observations show quality differences among the three years. Nonetheless, the absolute values indicate 2013 corn will still be of high quality that should store and handle well as it moves through the marketing channel.

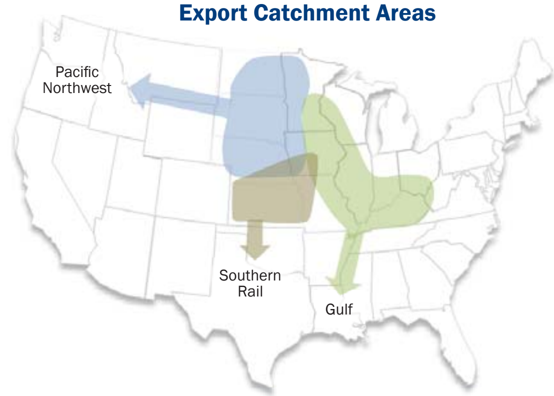
The Council notes that three years of data begin to lay the foundation for evaluating the trends and the factors that impact corn quality. As the Council continues to accumulate harvest quality data over additional years, the cumulative *Harvest Report* surveys will gain increasing value by enabling export buyers to make year-to-year comparisons and assess patterns of corn quality based on growing conditions across the years.

This *Harvest Report 2013/14* is based on 610 yellow commodity corn samples taken from defined areas within 12 of the top corn producing and exporting states. Inbound samples were collected from local grain elevators to observe quality at the point of origin and to provide representative information about the variability of the quality characteristics across the diverse geographic regions.

The sampling areas in the 12 states are divided into three general groupings that are labeled Export Catchment Areas (ECAs). These three ECAs are identified by the three major pathways to export markets:

1. The Gulf ECA consists of areas that typically export corn through U.S. Gulf ports;
2. The Pacific Northwest (PNW) ECA includes areas exporting corn through Pacific Northwest and California ports; and
3. The Southern Rail ECA comprises areas generally exporting corn to Mexico.

Export Catchment Areas



Sample test results are reported at the U.S. Aggregate level and for each of the three ECAs, providing a general perspective on the geographic variability of U.S. corn quality.

II. INTRODUCTION | 2013 HARVEST

The quality characteristics of the corn identified at harvest establish the foundation for the quality of the grain ultimately arriving at the export customers' doors. However, as corn passes through the U.S. marketing system, it is mingled with corn from other locations; aggregated into trucks, barges and rail cars; stored; and loaded and unloaded several times. Therefore, the quality and condition of the corn change from the point of first sale to the export elevator. For this reason, the *Harvest Report 2013/14* should be considered carefully in tandem with the *U.S. Grains Council Corn Export Cargo Quality Report 2013/14* that will follow early in 2014. As always, the quality of an export cargo of corn is established by the contract between buyer and seller, and buyers are free to negotiate any quality factor that is of importance to them.

This report provides detailed information on each of the quality factors tested, including average and standard deviation for the aggregate of all samples, and for each of the three ECAs. The "Quality Test Results" section summarizes the following quality factors:

- Grade Factors: test weight, broken corn and foreign material (BCFM), total damage, and heat damage
- Moisture
- Chemical Composition: protein, starch, and oil
- Physical Factors: stress cracks/index, 100-kernel weight, kernel volume, kernel true density, whole kernels, and horneous (hard) endosperm
- Mycotoxins: aflatoxin and DON

In addition, this *Harvest Report* includes brief descriptions of the U.S. crop and weather conditions; U.S. corn production, usage and outlook; and detailed descriptions of survey and statistical analysis methods, and testing methods.

A. Grade Factors

The U.S. Department of Agriculture's Federal Grain Inspection Service (FGIS) has established numerical grades, definitions and standards for measurement of many quality attributes. The attributes which determine the numerical grades are test weight, broken corn and foreign material (BCFM), total damage, and heat damage. The corn grades and grade requirements are summarized in the "U.S. Corn Grades and Conversions" section on page 47.

III. QUALITY TEST RESULTS | 2013 HARVEST

1. Test Weight

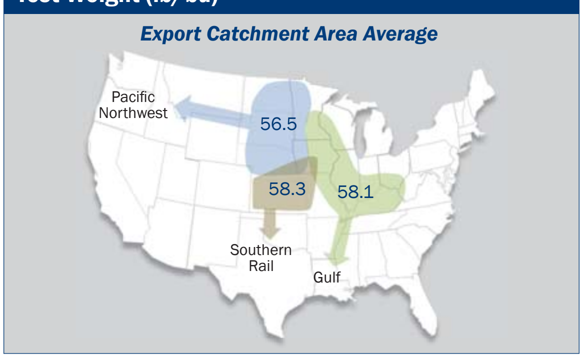
Test weight (weight per volume) is a measure of bulk density and is often used as a general indicator of overall quality and as a gauge of endosperm hardness for alkaline cookers and dry millers. High test weight corn will take up less storage space than the same weight of corn with a lower test weight. Test weight is initially impacted by genetic differences in the structure of the kernel. However, it is also affected by moisture content, method of drying, physical damage to the kernel (broken kernels and scuffed surfaces), foreign material in the sample, kernel size, stress during the growing season, and microbiological damage. When sampled and measured at the point of delivery from the farm at a given moisture content, high test weight generally indicates high quality, high percent of horneous (or hard) endosperm and sound, clean corn. Test weight is highly correlated with true density and reflects kernel hardness and kernel maturity.

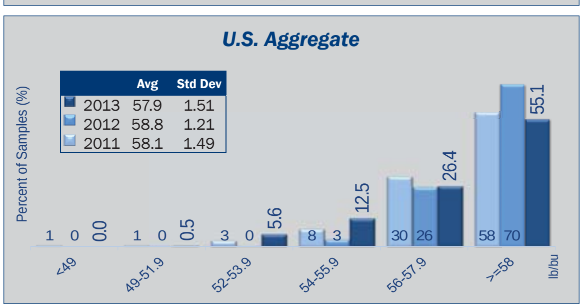
U.S. Grade Minimum Test Weight
No. 1: 56.0 lbs
No. 2: 54.0 lbs
No. 3: 52.0 lbs

RESULTS

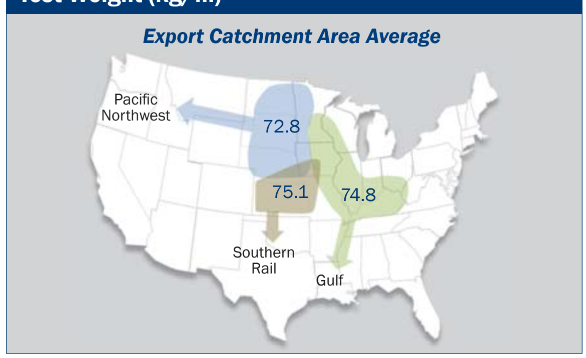
- The U.S. Aggregate average test weight in 2013 was 57.9 lb/bu (74.5 kg/hl), compared to 58.8 lb/bu (75.6 kg/hl) in 2012 and 58.1 lb/bu (74.8 kg/hl) in 2011.
- Average test weight for each ECA was also above the grade limit for U.S. No. 1. The Gulf and Southern Rail ECAs had the highest test weights, 58.1 lb/bu and 58.3 lb/bu, respectively.
- Sample values were less uniform in the 2013 crop relative to 2012, as indicated by the higher standard deviation. Standard deviations for 2013, 2012 and 2011 were 1.51 lb/bu, 1.21 lb/bu and 1.49 lb/bu, respectively.
- Test weight values were distributed with 81.5% of the samples at or above the factor limit for U.S No. 1 (56 lb/bu) and 94.0% at or above the No. 2 grade limit of 54 lb/bu.
- Test weight was highest in the Southern Rail ECA (58.3 lb/bu) and the lowest in the Pacific Northwest ECA (56.5 lb/bu).

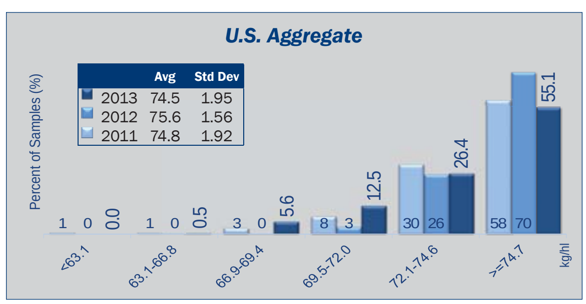
Test Weight (lb/bu)





Test Weight (kg/hl)





2. Broken Corn and Foreign Material (BCFM)

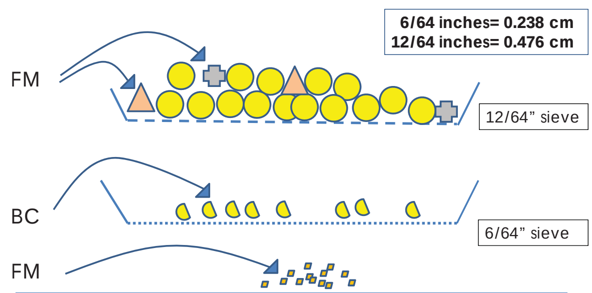
U.S. Grade BCFM Max Limits
No. 1: 2.0%
No. 2: 3.0%
No. 3: 4.0%

Broken corn and foreign material (BCFM) is an indicator of the amount of clean, sound corn available for feed and processing. The lower the percentage of BCFM, the less foreign material and/or fewer broken kernels are in a sample. Higher levels of BCFM in farm-originated samples generally stem from combine settings and/or weed seeds in the field. BCFM levels will normally increase during drying and handling, depending on the methods used and the soundness of the kernels. Increased stress cracks at harvest will also result in an increase in broken kernels and BCFM during subsequent handling.

Broken corn is defined as everything small enough to pass through a 12/64th inch round-hole sieve, but too large to pass through a 6/64th inch round-hole sieve.

Foreign material is defined as any non-corn material too large to pass through a 12/64th inch round-hole sieve, in addition to all fine material small enough to pass through a 6/64th inch round-hole sieve.

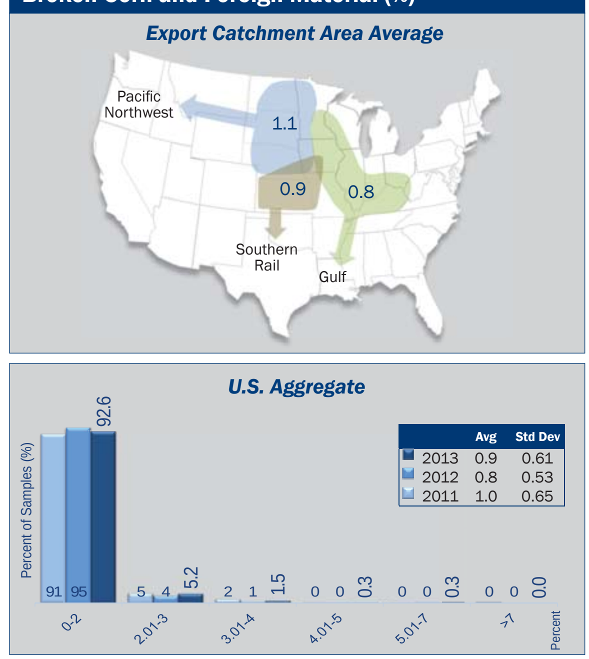
BCFM (Measured as Percent by Weight)



RESULTS

- Average BCFM for the U.S. Aggregate (0.9%) was slightly higher than in 2012 (0.8%) but lower than in 2011 (1.0%).
- The 2013 crop was more uniform in BCFM than the 2011 crop, but less uniform than the 2012 crop. The BCFM U.S. Aggregate values ranged from 0.1 to 5.8% with a standard deviation of 0.61% in 2013, compared to 0.53% in 2012 and 0.65% in 2011.
- BCFM in the Pacific Northwest ECA was slightly higher (1.1%) than the U.S. Aggregate and the other two ECAs.
- BCFM U.S. Aggregate values were distributed with 92.6% of the samples containing 2% or less.

Broken Corn and Foreign Material (%)



III. QUALITY TEST RESULTS | 2013 HARVEST

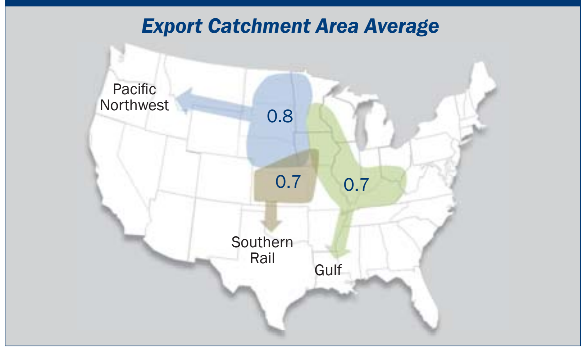
3. Broken Corn

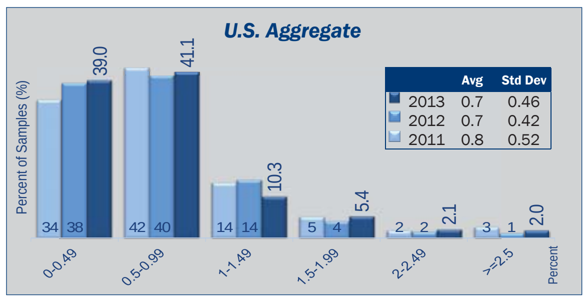
Broken corn in U.S. grades is based on particle size and usually includes a small percent of non-corn material. Broken corn is more subject to mold and insect damage than whole kernels, and it can cause problems in handling and processing. When not spread or stirred in a storage bin, broken corn tends to stay in the center of the bin while whole kernels are likely to gravitate outward to the edges. The center area in which broken corn tends to accumulate is known as a spoutline. If desired, the spoutline can be reduced by drawing grain out of the center of the bin.

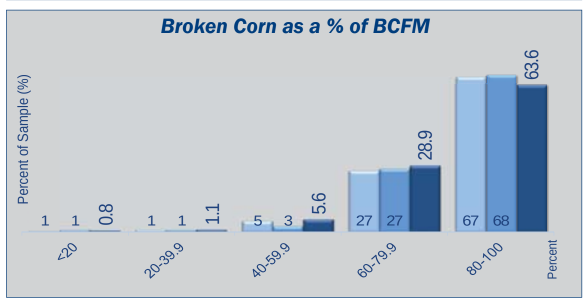
RESULTS

- Broken corn in the U.S. Aggregate samples averaged 0.7% in the 2013 crop, very close to the levels in 2012 and 2011 crops.
- Broken corn average value in the Pacific Northwest ECA was slightly higher than those in the other two ECAs (0.8% compared to 0.7% in the other two ECAs).
- The 2013 crop was more uniform than the 2011 crop, but less uniform than the 2012 crop. The standard deviation in the 2013 crop was 0.46% compared to 0.42% in 2012 and 0.52% in 2011. However, the range in values in 2013 was smaller than in 2012 and 2011, ranging from 0.1 to 3.9%, 0 to 4.8%, and 0 to 10.1%, respectively.
- U. S. Aggregate values for the 2013 samples were distributed with 39.0% of the samples less than 0.5% and 80.1% less than 1.0% broken corn.
- The distribution chart to the right, displaying broken corn as a percent of BCFM, shows that in nearly all samples, BCFM consisted primarily of broken corn, as was found in previous years.

Broken Corn (%)







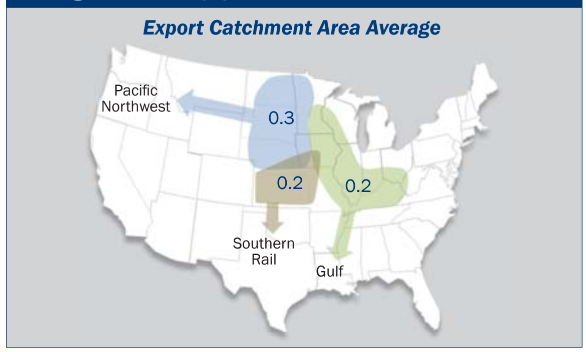
4. Foreign Material

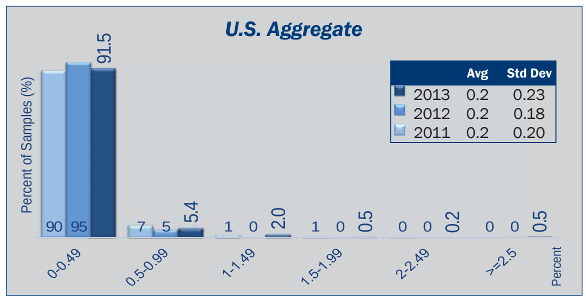
Foreign material is of importance because it has little feed or processing value, is generally higher in moisture content than the corn and therefore creates a potential for deterioration of corn quality during storage. Foreign material also contributes to the spoutline and has the potential for creating more quality problems than broken corn because of the higher moisture level as mentioned above.

RESULTS

- Foreign material in the U.S. Aggregate samples averaged 0.2% in 2013, the same as in 2012 and 2011.
- In the 2013 crop, 91.5% of the samples contained less than 0.5% foreign material.
- Variability among the U.S. Aggregate samples in 2013 was slightly higher than in 2012 with a standard deviation of 0.23% compared to 0.18% in 2012 and 0.20% in 2011.
- All ECAs had average foreign material values equal to or less than 0.3%, differing little from the 2011 crop.

Foreign Material (%)





III. QUALITY TEST RESULTS | 2013 HARVEST

5. Total Damage

U.S. Grade Total Damage Max Limits
No. 1: 3.0%
No. 2: 5.0%
No. 3: 7.0%

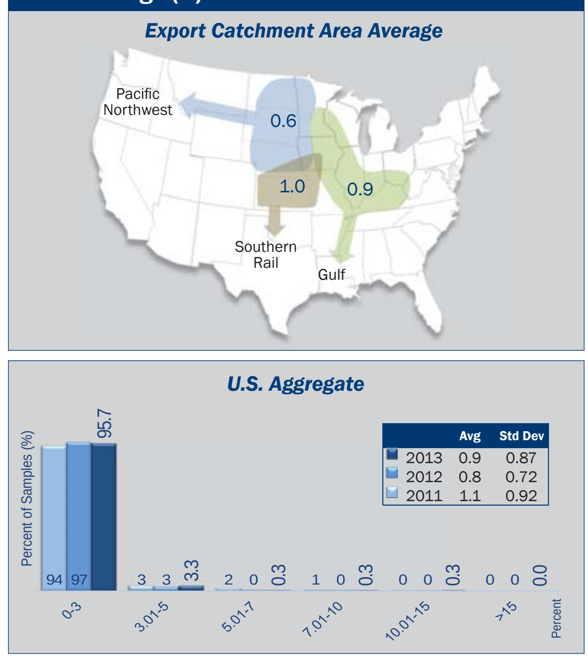
Total damage is the percentage of kernels and pieces of kernels that are visually damaged in some way, including damage from heat, frost, insects, sprouting, disease, weather, ground, germ, and mold. Most of these types of damage result in some sort of discoloration or change in kernel texture. Damage does not include broken pieces of grain that are otherwise normal in appearance.

Mold damage is usually associated with higher moisture content and high temperature in growing and/or storage. Mold damage and the associated potential for mycotoxins is the damage factor of greatest concern. Mold damage can occur prior to harvest as well as during temporary storage at high moisture and high temperature levels before delivery.

RESULTS

- Total damage in the U.S. Aggregate samples averaged 0.9% in 2013, compared to 0.8% in 2012 and 1.1% in 2011.
- Total damage in the U.S. Aggregate samples ranged from 0.0% to 13.6%, a higher range than in either of the two previous years.
- The few samples with high damage levels in 2013 (13.6% for example) were associated with a high moisture content when delivered to the elevator.
- Total damage in the U.S. Aggregate samples was distributed with 95.7% of the samples having 3% or less damaged kernels, and 99.0% having 5% or less.
- Total damage average values were lowest in the Pacific Northwest ECA (0.6%) compared to the Gulf and Southern Rail ECAs (0.9% and 1.0%, respectively).
- Average total damage values in all ECAs were well below the limit for U.S. No. 1 corn (3.0%) indicating that total damage was not a problem in farm deliveries.

Total Damage (%)



6. Heat Damage

U.S. Grade Heat Damage Max Limits
No. 1: 0.1%
No. 2: 0.2%
No. 3: 0.5%

Heat damage is a subset of total damage and has separate allowances in the U.S. Grade standards. Heat damage can be caused by microbiological activity in warm, moist grain or by high heat applied during drying. Heat damage is seldom present in corn delivered at harvest directly from farms.

RESULTS

- There was no heat damage reported in any of the samples, the same results as in 2012 and 2011.
- The absence of heat damage likely was due in part to fresh samples coming directly from farm to elevator with minimal prior drying.

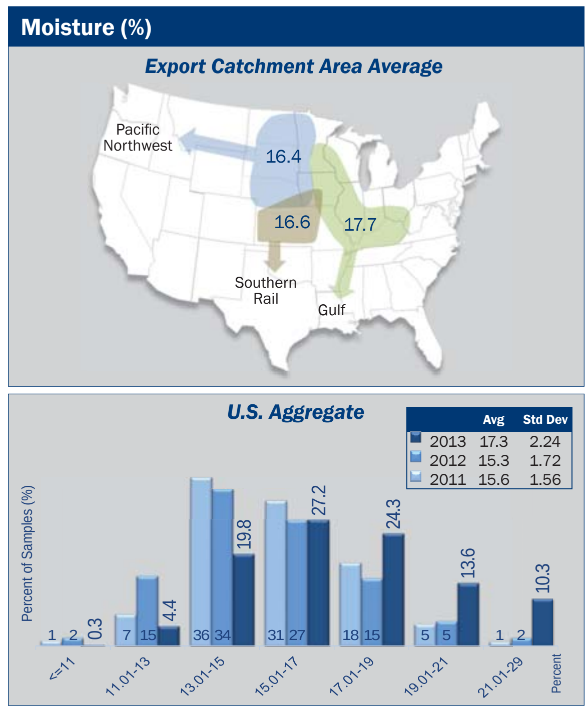
III. QUALITY TEST RESULTS | 2013 HARVEST

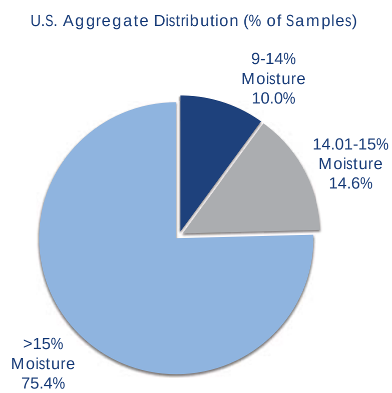
B. Moisture

Moisture content is reported on official grade certificates, but does not determine which numerical grade will be assigned to the sample. Moisture content affects the amount of dry matter being sold and purchased. Moisture is also an indicator for potential drying, has potential implications for storability, and affects test weight. Higher moisture content at harvest increases kernel damage during harvesting and drying, and the amount of drying required will affect stress cracks, breakage, and germination. Extremely wet grain may be a precursor to high mold damage later in storage or transport. While the weather during the growing season affects yield and the development of the grain, grain harvest moisture is influenced largely by the timing of harvest and harvest weather conditions.

RESULTS

- The U.S. Aggregate elevator recorded moisture in 2013 samples averaged 17.3%, significantly higher than 2012 (15.3%) and 2011 (15.6%).
- The range in moisture content was greater and standard deviation was higher in 2013 (2.24%) than in 2012 (1.72%) and 2011 (1.56%) indicating greater variability in harvest moisture.
- The U.S. Aggregate moisture values were distributed with 24.5% of the samples containing 15% or less moisture. This is the base used by most elevators for discounts and is a level considered storable for short periods during low winter-time temperatures.
- Only 10.0% of the 2013 crop contained 14% or less moisture compared to 31.7% in 2012 and 21.1% in 2011. Moisture of 14% is generally considered a safe level for longer storage and transport without drying.
- The distribution of moisture levels in the 2013 crop indicates a requirement for more drying than in the previous two years, with 75.4% of the samples above the base moisture of 15%.
- The U.S. moisture averages for corn from the Gulf, Pacific Northwest, and Southern Rail ECAs were 17.7%, 16.4%, and 16.6%, respectively. The Gulf ECA average moisture content has been consistently higher than in the other ECAs in all three years.





SUMMARY: GRADE FACTORS AND MOISTURE

- Although average test weight in 2013 (57.9 lb/bu or 74.5 kg/hl) was lower than in 2012 and 2011, it was nearly 2 lb/bu above the limit for No. 1 grade (56 lb/bu), indicating overall good quality.
- As the corn is commingled moving through the marketing channel, the average test weight in each ECA is not likely to fall below the minimum for U.S. No. 1 or No. 2 grade.
- BCFM of incoming corn was low with a 2013 U.S. Aggregate average of 0.9%, consisting primarily of broken corn. BCFM levels in almost all (97. 8%) of the corn samples were at or below the maximum of 3% allowed for U.S. No. 2 corn.
- The low average broken corn values in all three ECAs should minimize the need for cleaning and facilitate air flow during storage.
- The average foreign material values are low, indicating clean grain. The high levels of foreign material found in a few of the individual samples can be readily cleaned or commingled to minimize any significant handling problems in storage or marketing.
- Average total damage for 2013 was extremely low for incoming corn, with 95.7% having 3% or less damaged kernels, indicating that the corn should have good quality and store well. In addition, no heat damage was reported on any of the samples.
- Of the inbound elevator samples, 92.0% would grade U.S. No. 2 or better on all grade determining factors. Most elevators use U.S. No. 2 criteria as the base for pricing and discounts in domestic transactions. Over time, subsequent handling, drying, and storage may cause quality to be lower.
- The 2013 crop samples contained more moisture and more variability in moisture content, potentially requiring more drying at the point of first delivery than in the previous two years. The drying may result in additional stress cracking and breakage as the corn moves to export. This high average moisture combined with the larger range in moisture also indicates the need for segregation by moisture content and careful attention to drying and storing practices.

III. QUALITY TEST RESULTS | 2013 HARVEST

SUMMARY: GRADE FACTORS AND MOISTURE

	2013 Harvest					2012 Harvest			2011 Harvest		
	No. of Samples[1]	Avg.	Std. Dev.	Min.	Max.	No. of Samples[1]	Avg.	Std. Dev.	No. of Samples[1]	Avg.	Std. Dev.
U.S. Aggregate											
Test Weight (lb/bu)	610	57.9	1.51	50.9	62.9	637	58.8*	1.21	474	58.1*	1.49
Test Weight (kg/hl)	610	74.5	1.95	65.5	81.0	637	75.6*	1.56	474	74.8*	1.92
BCFM (%)	610	0.9	0.61	0.1	5.8	637	0.8	0.53	474	1.0	0.65
Broken Corn (%)	610	0.7	0.46	0.1	3.9	637	0.7	0.42	474	0.8*	0.52
Foreign Material (%)	610	0.2	0.23	0.0	2.5	637	0.2*	0.18	474	0.2	0.20
Total Damage (%)[2]	609	0.9	0.87	0.0	13.6	637	0.8	0.72	474	1.1*	0.92
Heat Damage (%)	610	0.0	0.00	0.0	0.0	637	0.0	0.0	474	0.0	0.0
Moisture (%)	610	17.3	2.24	10.9	28.2	637	15.3*	1.72	474	15.6*	1.56
Gulf											
Test Weight (lb/bu)	557	58.1	1.49	50.9	62.9	566	58.8*	1.24	364	58.3	1.48
Test Weight (kg/hl)	557	74.8	1.91	65.5	81.0	566	75.6*	1.59	364	75.0	1.91
BCFM (%)	557	0.8	0.59	0.1	5.8	566	0.8	0.52	364	0.9	0.62
Broken Corn (%)	557	0.7	0.45	0.1	3.9	566	0.7	0.41	364	0.7	0.49
Foreign Material (%)	557	0.2	0.22	0.0	2.5	566	0.1*	0.18	364	0.2	0.19
Total Damage (%)[2]	556	0.9	0.95	0.0	13.6	566	0.9	0.84	364	1.3*	1.09
Heat Damage (%)	557	0.0	0.00	0.0	0.0	566	0.0	0.00	364	0.0	0.00
Moisture (%)	557	17.7	2.38	10.9	28.2	566	15.8*	1.81	364	16.0*	1.67
Pacific Northwest											
Test Weight (lb/bu)	259	56.5	1.60	50.9	62.9	321	58.8*	1.15	182	57.3*	1.57
Test Weight (kg/hl)	259	72.8	2.06	65.5	81.0	321	75.7*	1.48	182	73.7*	2.03
BCFM (%)	259	1.1	0.70	0.1	5.8	321	0.9*	0.58	182	1.1	0.75
Broken Corn (%)	259	0.8	0.49	0.1	3.9	321	0.7	0.47	182	0.9	0.58
Foreign Material (%)	259	0.3	0.28	0.0	2.1	321	0.2*	0.17	182	0.2	0.23
Total Damage (%)[3]	259	0.6	0.64	0.0	11.0	321	0.5*	0.40	182	0.6	0.36
Heat Damage (%)	259	0.0	0.00	0.0	0.0	321	0.0	0.00	182	0.0	0.00
Moisture (%)	259	16.4	2.08	11.0	28.2	321	13.9*	1.42	182	14.7*	1.28
Southern Rail											
Test Weight (lb/bu)	313	58.3	1.56	50.9	62.9	366	58.6*	1.19	149	58.5	1.39
Test Weight (kg/hl)	313	75.1	2.00	65.5	81.0	366	75.5*	1.53	149	75.3	1.79
BCFM (%)	313	0.9	0.63	0.1	5.8	366	0.9	0.53	149	1.1*	0.67
Broken Corn (%)	313	0.7	0.46	0.1	3.9	366	0.7	0.42	149	0.9*	0.53
Foreign Material (%)	313	0.2	0.25	0.0	2.5	366	0.2	0.18	149	0.2*	0.18
Total Damage (%)	313	1.0	0.74	0.0	11.0	366	0.7*	0.60	149	1.3*	0.90
Heat Damage (%)	313	0.0	0.00	0.0	0.0	366	0.0	0.00	149	0.0	0.00
Moisture (%)	313	16.6	1.74	10.9	28.2	366	14.7*	1.75	149	14.9*	1.42

*Indicates averages in 2012 were significantly different from 2013, and 2011 averages were significantly different from 2013 based on a 2-tailed t-test at the 95% level of significance.

[1]Due to the ECA results being composite statistics, the sum of the sample numbers from the three ECAs is greater than the U.S. Aggregate.

[2]One result of extremely high total damage was dropped because the sample showed evidence of mold developing during transit as a result of 27.9% moisture.

[3]The Relative ME for predicting the harvest population average exceeded ±10%.

C. Chemical Composition

Chemical composition of corn is important because the components of protein, starch and oil are of significant interest to end users. The chemical composition attributes are not grade factors. However, they provide additional information related to nutritional value for livestock and poultry feeding, for wet milling uses, and other processing uses of corn. Unlike many physical attributes, chemical composition values are not expected to change significantly during storage or transport.

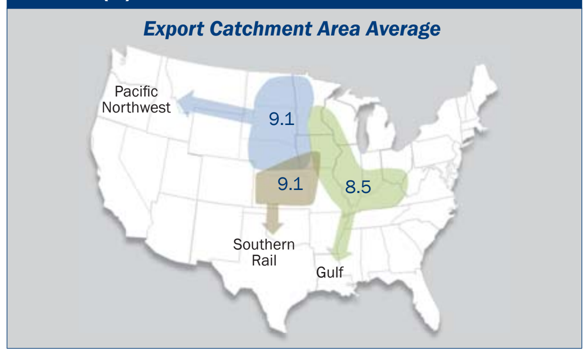
1. Protein

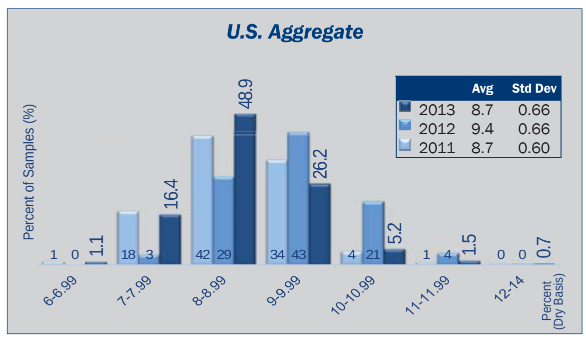
Protein is very important for poultry and livestock feeding. It supplies essential sulfur-containing amino acids and helps to improve feed conversion efficiency. Protein is usually inversely related to starch content. Results are reported on a dry basis.

RESULTS

- In 2013, the U.S. Aggregate protein averaged 8.7%, which was significantly lower than the 9.4% found in 2012, but the same as the 8.7% found in 2011.
- Protein ranged from 6.5 to 13.3% with a standard deviation of 0.66% for the U.S. Aggregate corn.
- Protein standard deviation in 2013 was similar to 0.66% and 0.60% found in 2012 and 2011, respectively.
- Protein was distributed with 48.9% between 8.0% and 8.99%, 26.2% between 9.0% and 9.99%, and 7.4% at 10.0% or higher.
- Protein averages for Gulf, Pacific Northwest, and Southern Rail ECAs were 8.5%, 9.1%, and 9.1%, respectively.

Protein (%)





III. QUALITY TEST RESULTS | 2013 HARVEST

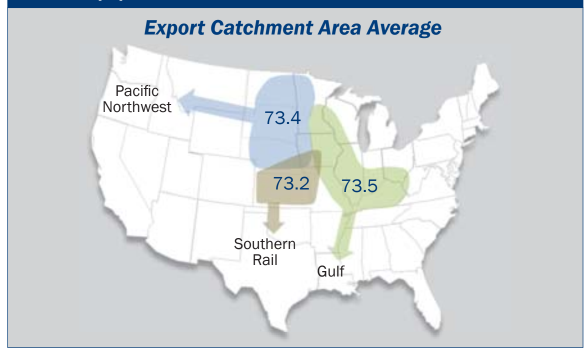
2. Starch

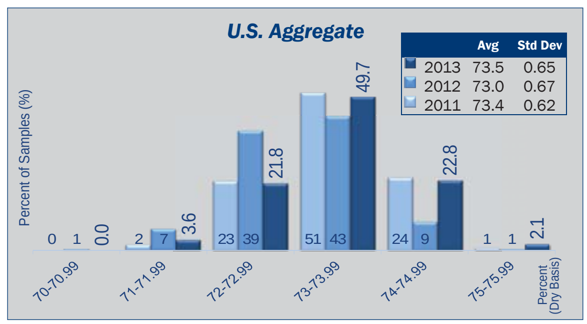
Starch is an important factor for corn used by wet millers and dry-grind ethanol manufacturers. High starch content is often indicative of good kernel maturation/filling conditions and reasonably high kernel densities. Starch is usually inversely related to protein content. Results are reported on a dry basis.

RESULTS

- The U.S. Aggregate starch averaged 73.5% in 2013, significantly above the 73.0% found in 2012, and higher than 73.4% found in 2011.
- Starch ranged from 71.1% to 75.9% with a standard deviation of 0.65% for the U.S. Aggregate.
- Starch was distributed with 21.8% between 72.0% and 72.99%, 49.7% between 73.0% and 73.99%, and 24.9% equal to or greater than 74.0%, and was similar to the distribution in 2011.
- Starch averages for the Gulf, Pacific Northwest, and Southern Rail ECAs were 73.5%, 73.4% and 73.2%, respectively.

Starch (%)





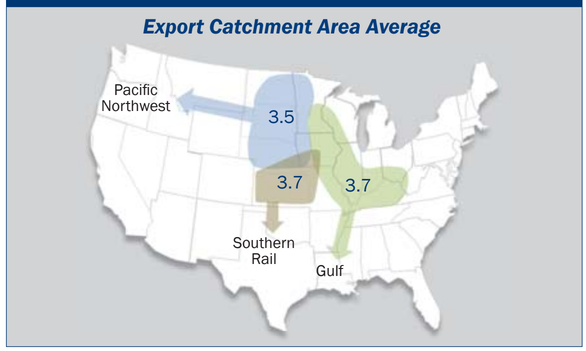
3. Oil

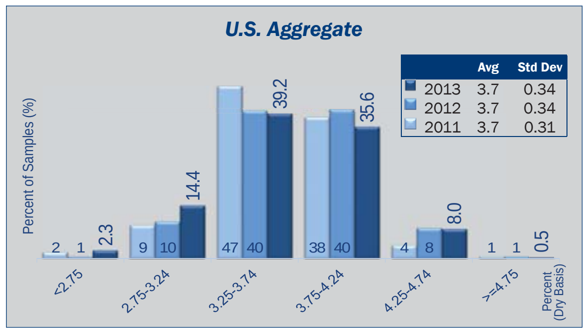
Oil is an essential component of poultry and livestock rations. It serves as an energy source, enables fat-soluble vitamins to be utilized, and provides certain essential fatty acids. Oil is also an important co-product of corn wet and dry milling. Results are reported on a dry basis.

RESULTS

- U.S. Aggregate oil averaged 3.7% in 2013. Average oil has been fairly constant over the three years.
- Oil ranged from 2.0 to 5.0% with a standard deviation of 0.34% for the U.S. Aggregate.
- Oil standard deviation in 2013 was similar to 0.34% and 0.31% found in 2012 and 2011, respectively.
- Oil was distributed with 39.2% of the samples at 3.25 to 3.74%, and 35.6% of samples at 3.75 to 4.24% and 8.5% at 4.25% and higher.
- Oil averages for Gulf, Pacific Northwest, and Southern Rail ECAs were 3.7%, 3.5% and 3.7%, respectively.

Oil (%)



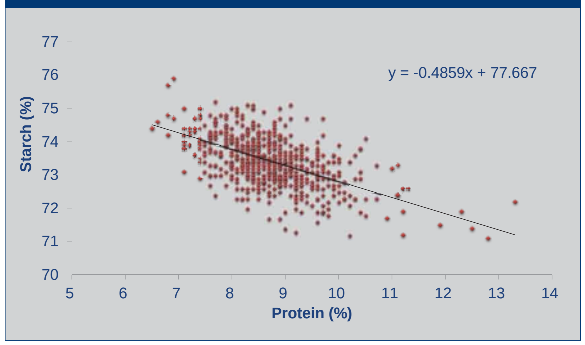


III. QUALITY TEST RESULTS | 2013 HARVEST

SUMMARY: CHEMICAL COMPOSITION

- The lower protein in 2013 compared to 2012 is likely attributable to the 2012 crop experiencing the drought. During the 2012 growing season, available nitrogen was distributed over fewer corn metric tons per hectare (or fewer bushels per acre), causing protein percentages to be higher in 2012 than in 2013 or 2011. The U.S. Aggregate average protein in 2013 is most likely closer to the long run average protein level.
- Starch content (73.5%) was significantly higher in 2013 compared to 73.0% in 2012, but nearly the same as that found in 2011. Since starch and protein are the two largest components in corn, when the percentage of one goes up the other usually goes down. This relationship is illustrated in the adjacent figure showing a weak but negative correlation between starch and protein. The correlation coefficient is -0.57. The higher starch may indicate good kernel filling that should be desirable for corn wet milling.
- Since the phase-out of high-oil corn from past years, oil content has been fairly constant averaging about 3.7%, (standard deviation 0.34%) during the past three years.

Starch vs Protein



	2013 Harvest					2012 Harvest			2011 Harvest		
	No. of Samples[1]	Avg.	Std. Dev.	Min.	Max.	No. of Samples[1]	Avg.	Std. Dev.	No. of Samples[1]	Avg.	Std. Dev.
U.S. Aggregate											
Protein (Dry Basis %)	610	8.7	0.66	6.5	13.3	637	9.4*	0.66	474	8.7	0.60
Starch (Dry Basis %)	610	73.5	0.65	71.1	75.9	637	73.0*	0.67	474	73.4	0.62
Oil (Dry Basis %)	610	3.7	0.34	2.0	5.0	637	3.7*	0.34	474	3.7	0.31
Gulf											
Protein (Dry Basis %)	557	8.5	0.64	6.5	13.3	566	9.3*	0.66	364	8.7*	0.63
Starch (Dry Basis %)	557	73.5	0.67	71.1	75.9	566	73.1*	0.67	364	73.5	0.64
Oil (Dry Basis %)	557	3.7	0.35	2.0	5.0	566	3.8	0.35	364	3.7	0.32
Pacific Northwest											
Protein (Dry Basis %)	259	9.1	0.69	6.8	13.3	321	9.4*	0.67	182	8.5*	0.52
Starch (Dry Basis %)	259	73.4	0.61	71.2	75.7	321	72.8*	0.66	182	73.6*	0.56
Oil (Dry Basis %)	259	3.5	0.33	2.0	4.5	321	3.7*	0.31	182	3.6*	0.26
Southern Rail											
Protein (Dry Basis %)	313	9.1	0.78	7.1	13.3	366	9.5*	0.64	149	9.1	0.62
Starch (Dry Basis %)	313	73.2	0.64	71.1	75.2	366	72.9*	0.68	149	73.1	0.65
Oil (Dry Basis %)	313	3.7	0.34	2.0	4.8	366	3.7	0.32	149	3.7	0.33

**Indicates averages in 2012 were significantly different from 2013, and 2011 averages were significantly different from 2013 based on a 2-tailed t-test at the 95% level of significance.*
[1]Due to the ECA results being composite statistics, the sum of the sample numbers from the three ECAs is greater than the U.S. Aggregate.

D. Physical Factors

Physical factors are other quality attributes that are neither grading factors nor chemical composition. Tests for physical factors provide additional information about the processing characteristics of corn for various uses, as well as its storability and potential for breakage in handling. The storability, the ability to withstand handling, and the processing performance of corn are influenced by corn's morphology. Corn kernels are morphologically made up of four parts, the germ or embryo, the tip cap, the pericarp or outer covering, and the endosperm. The endosperm represents about 82% of the kernel, and consists of soft (also referred to as floury or opaque) endosperm and of horneous (also called hard or vitreous) endosperm as shown to the right. The endosperm contains primarily starch and protein, the germ contains oil and some proteins, and the pericarp and tip cap are mostly fiber.

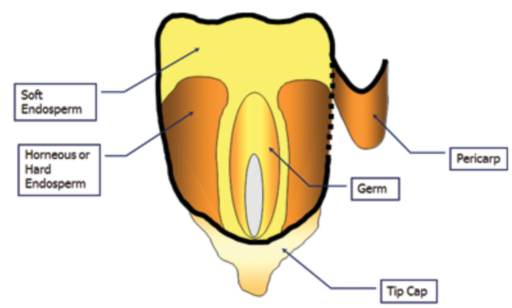


Illustration courtesy of K. D. Rausch University of Illinois

The following tests reflect these intrinsic parts of the corn kernels, in addition to the growing and handling conditions that affect corn quality.

1. Stress Cracks

Stress cracks are internal fissures in the horneous (hard) endosperm of a corn kernel. The pericarp of a stress-cracked kernel is typically not damaged, so the outward appearance of the kernel may appear unaffected at first glance even if stress cracks are present.

The cause of stress cracks is pressure buildup due to large moisture and temperature gradients within the kernel's horneous endosperm. This can be likened to the internal cracks that appear when an ice cube is dropped into a lukewarm beverage. The internal stresses do not build up as much in the soft, floury endosperm as in the hard, horneous endosperm; therefore, corn with a higher percentage of horneous endosperm is more susceptible to stress cracking than softer kernels with a lower percent of horneous endosperm. A kernel may have one, two, or multiple cracks. High-temperature drying is the most common cause of stress cracks. The impact of high levels of stress cracks on various uses includes:

- General: Increased susceptibility to breakage during handling, leading to increased broken corn needing to be removed during cleaning operations for processors, and possible reduced grade/value.
- Wet Milling: Lower starch yield because the starch and protein are more difficult to separate. Stress cracks may also alter steeping requirements.
- Dry Milling: Lower yield of large flaking grits (the prime product of many dry milling operations).
- Alkaline Cooking: Non-uniform water absorption leading to overcooking or undercooking, which affects the process balance.

Growing conditions will affect crop maturity, timeliness of harvest, and the need for artificial drying which will influence the degree of stress cracking found from region to region. For example, late maturity or late harvest caused by weather-related factors such as rain-delayed planting or cool temperatures may increase the need for artificial drying, thus potentially increasing the occurrence of stress cracks.

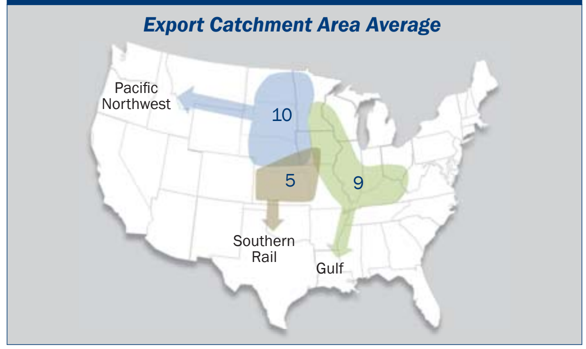
Stress crack measurements include stress cracks (the percent of kernels with at least one crack) and stress crack index (SCI) which is the weighted average of single, double and multiple stress cracks. Stress cracks measure only the number of kernels with stress cracks whereas SCI shows the severity of cracking. For example, if half the kernels have only single stress cracks, stress cracks are 50% and the SCI is 50. However, if all the cracks are multiple stress cracks, indicating a higher potential for handling issues, stress cracks remain at 50% but the SCI becomes 250. Lower values for stress cracks and the SCI are always better. In years with high levels of stress cracks, the SCI is valuable because high SCI numbers (perhaps 300 to 500) indicate the sample had a very high percent of multiple stress cracks. Multiple stress cracks are somewhat more detrimental to quality changes than single stress cracks.

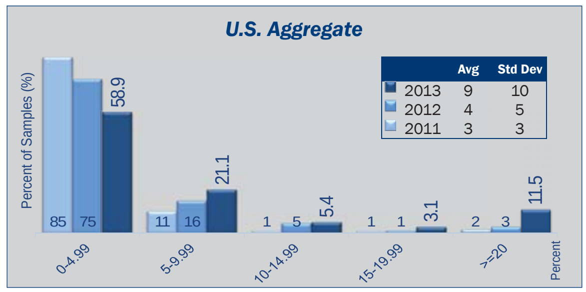
III. QUALITY TEST RESULTS | 2013 HARVEST

RESULTS

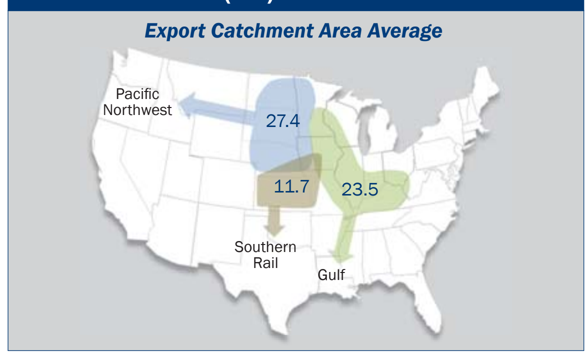
- Stress cracks of U.S. Aggregate corn averaged 9% in 2013 which was significantly higher than the 4% found in 2012 and 3% found in 2011.
- Stress cracks ranged from 0 to 86% with a standard deviation of 10% (5% and 3% in 2012 and 2011, respectively).
- Stress cracks distribution showed 80.0% (90.8% in 2012 and 96.0% in 2011) of samples with less than 10% stress cracks.
- In 2013, there were 11.5% with stress cracks above 20% which is higher than the 3% in 2012 or 2% in 2011.
- Stress crack averages for the Gulf, Pacific Northwest, and Southern Rail ECAs were 9%, 10% and 5%, respectively.
- SCI had a U.S. Aggregate average of 22.8 which is significantly higher than the 9.3 found in 2012 and 4.6 found in 2011.
- The SCI had a range of 0 to 324 with a standard deviation of 35.1 in 2013, much higher than the 14.1 in 2012 or 6.0 in 2011.
- Of the samples, 85.7% had SCI of less than 40, which is lower than the 95.0% of the samples in 2012 that had SCI of less than 40. However, 9.2% had SCI greater than 80 which is more than the 2.0% in 2012 or 1.0% in 2011.
- SCI averages for the Gulf, Pacific Northwest, and Southern Rail ECAs were 23.5, 27.4 and 11.7, respectively.
- Stress crack index and stress crack percentages were both lower for the Southern Rail ECA.

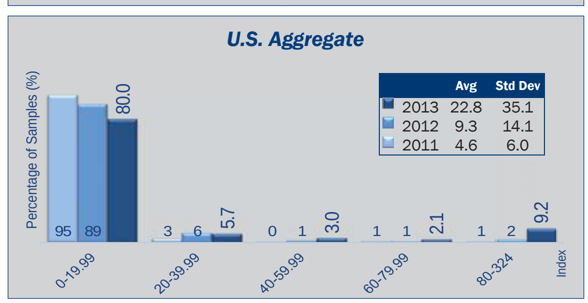
Stress Cracks (%)





Stress Crack Index (SCI)





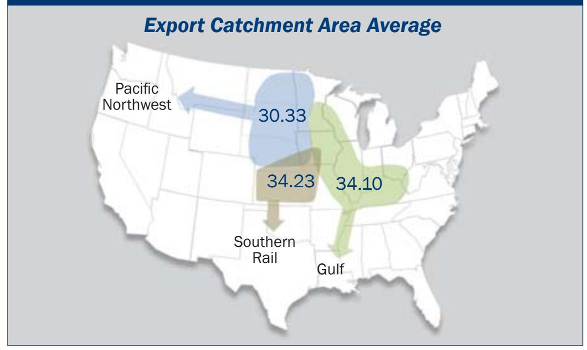
2. 100-Kernel Weight

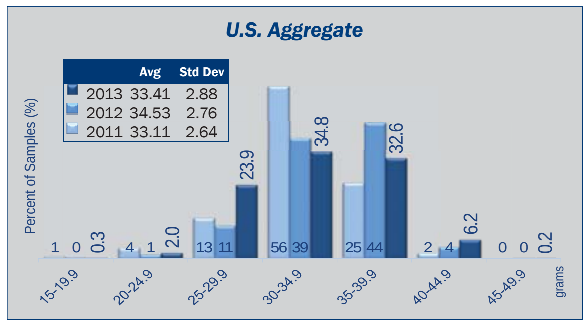
100-kernel (100-k) weight indicates larger kernel size as 100-k weights increase. Kernel size affects drying rates. As kernel size increases, the volume-to-surface area ratio becomes higher, and as the ratio gets higher, drying becomes slower. In addition, large uniform-sized kernels often enable higher flaking grit yields in dry milling. Kernel weights tend to be higher for specialty varieties of corn that have high amounts of horneous (hard) endosperm.

RESULTS

- 100-k weights of U.S. Aggregate samples averaged 33.41 g in 2013, compared to 34.53 g in 2012, but similar to 33.11 g in 2011.
- 100-k weights ranged from 18.07 to 45.09 g. The 100-k weight standard deviation of 2.88 g in 2013 was similar to standard deviations of 2.76 g and 2.64 g for the two previous years.
- The 100-k weights were distributed so that 39.0% of the aggregate samples had 100-k weights of 35 g or greater in 2013, compared to 48.3% in 2012 and 26.2% in 2011.
- 100-k weights for the Pacific Northwest ECA were lowest with 30.33 g compared to the Gulf and Southern Rail ECAs averaged 34.10 and 34.23 g, respectively.

100-k Weight (g)





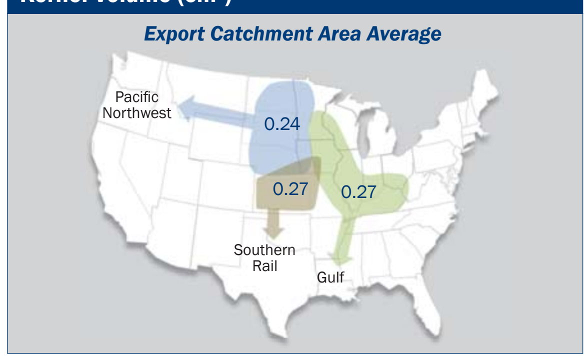
3. Kernel Volume

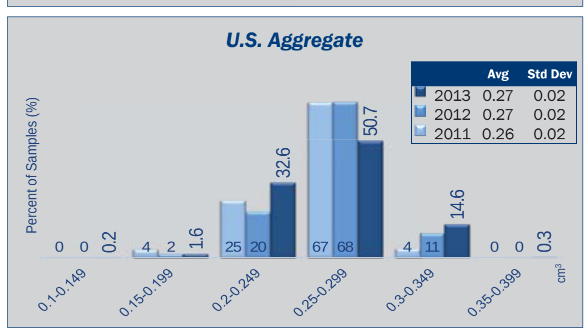
Kernel volume in cm³ is often indicative of growing conditions. If conditions are dry, kernels may be smaller than average. If drought hits later in the season, kernels may have lower fill. Small or round kernels are more difficult to degerm. Additionally, small kernels may lead to increased cleanout losses for processors and higher yields of fiber.

RESULTS

- Kernel volume averaged 0.27 cm³ for U.S. Aggregate corn in 2013 which was the same as the 0.27 cm³ found in 2012 and higher than 0.26 cm³ found in 2011.
- Kernel volumes ranged from 0.15 to 0.36 cm³. Kernel volume standard deviations remained nearly constant at 0.02 cm³ over all three years.
- The kernel volumes were distributed so that 14.9% of the aggregate samples had kernel volumes of 0.3 cm³ or greater in 2013, compared to 10.9% in 2012 and 4.0% in 2011.
- Kernel volumes for the Gulf, Pacific Northwest and Southern Rail ECAs averaged 0.27, 0.24, and 0.27 cm³, respectively.
- The Pacific Northwest ECA had lower kernel volumes and lower 100-k weights than the other two ECAs.

Kernel Volume (cm³)





III. QUALITY TEST RESULTS | 2013 HARVEST

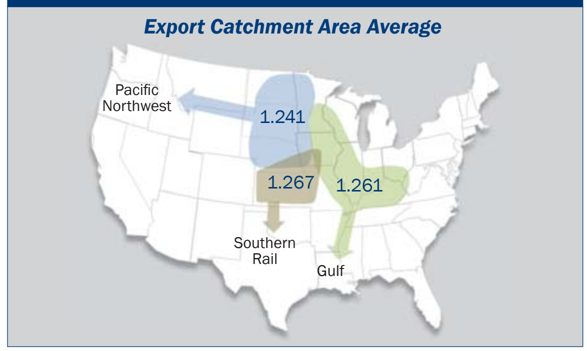
4. Kernel True Density

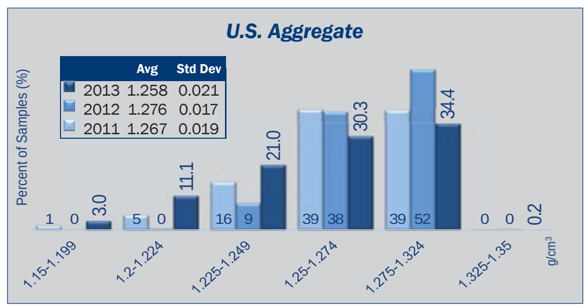
Kernel true density is calculated as the weight of a 100-k sample divided by the volume, or displacement, of those 100 kernels. True density is a relative indicator of kernel hardness, which is useful for alkaline processors and dry millers. True density, as a relative indicator of hardness, may be affected by the genetics of the corn hybrid and the growing environment. Corn with higher density is typically less susceptible to breakage in handling than lower density corn, but it is also more at risk for the development of stress cracks if high-temperature drying is employed. True densities above 1.30 g/cm^3 would indicate very hard corn desirable for dry milling and alkaline processing. True densities near the 1.275 g/cm^3 level and below tend to be softer, but will process well for wet milling and feed use.

RESULTS

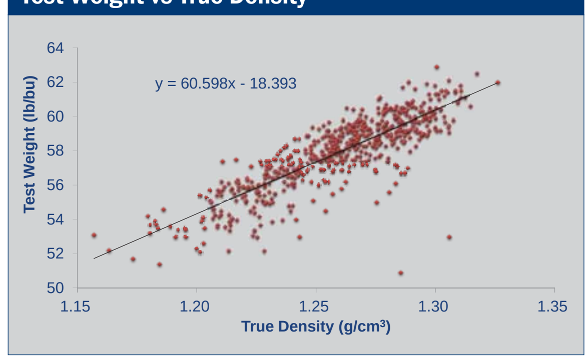
- Kernel true density averaged 1.258 g/cm^3 for U.S. Aggregate corn in 2013 which is significantly lower than the 1.276 g/cm^3 found in 2012 and the 1.267 g/cm^3 found in 2011.
- In 2013, true densities ranged from 1.157 to 1.326 g/cm^3. True density standard deviation was 0.021 in 2013, compared to 0.017 and 0.019 g/cm^3 in 2012 and 2011, respectively.
- Kernel true densities were distributed so that only 34.6% of the samples were at or above 1.275 g/cm^3 in 2013 compared to 52.3% of the samples in 2012 and 39.0% in 2011. This would indicate kernels in 2013 tend to have softer endosperm than in the two previous years.
- In 2013, kernel true densities for the Gulf, Pacific Northwest and Southern Rail ECAs averaged 1.261, 1.241, and 1.267 g/cm^3, respectively. Similarly, the lowest test weight (56.5 lb/bu) was also found in the Pacific Northwest ECA.
- Similarly, test weight was significantly lower (57.9 lb/bu) in 2013 than in 2012 (58.8 lb/bu) and also somewhat lower than the 58.1 lb/bu found in 2011. The adjacent figure illustrates the positive relationship between kernel true density and test weight for the 2013 samples. The correlation coefficient was 0.84.

Kernel True Density (g/cm^3)





Test Weight vs True Density



5. Whole Kernels

Though the name suggests some inverse relationship between whole kernels and BCFM, the whole kernels test conveys different information than the broken corn portion of the BCFM test. Broken corn is defined solely by the size of the material. Whole kernels, as the name implies, is the percent of fully intact kernels in the sample.

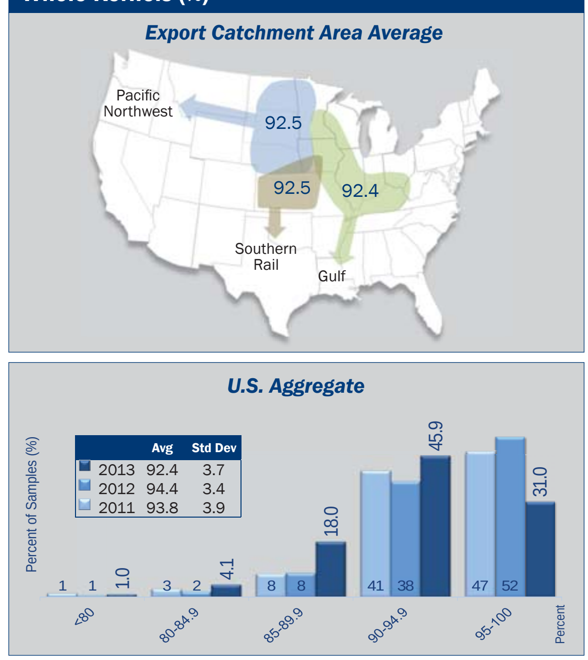
The exterior integrity of the corn kernel is very important for two key reasons. First, it affects water absorption for alkaline cooking operations. Kernel nicks or cracks allow water to enter the kernel faster than intact or whole kernels. Too much water uptake during cooking can result in expensive shutdown time and/or products that do not meet specifications. Some companies even pay extra premiums, above contracted premiums, for contracted corn delivered above a specified level of whole kernels.

Second, an intact whole kernel is important for all corn that has to be stored or handled. Fully intact whole kernels are less susceptible to storage molds and breakage in handling. While hard endosperm texture lends itself to preservation of more whole kernels than soft corn, the primary factor in delivering whole kernels is handling during and after harvest. This begins with the combine configuration followed by the type, number and length of conveyance required to go from the farm to end user. All subsequent handling will generate additional breakage to some degree. Harvesting at higher moisture contents (e.g., greater than 25%) will usually lead to more damage to grain than harvesting at lower moisture levels (less than 18%).

RESULTS

- Percent of whole kernels averaged 92.4% for U.S. Aggregate corn which was significantly lower than the 94.4% in 2012 and 93.8% in 2011.
- In 2013, whole kernels ranged from 73.6 to 99.6%. The standard deviation of 3.7% was similar to 3.4% and 3.9% in the previous two years.
- Of the U.S. Aggregate samples, 76.9% of the samples tested had 90% or higher whole kernels, compared to 89.5% in 2012 and 88.2% in 2011.
- Percent of whole kernel averages for Gulf, Pacific Northwest, and Southern Rail were 92.4%, 92.5%, and 92.5%, respectively. Thus, the percentages of whole kernels were essentially constant across all ECAs.
- Percent of whole kernels while lower than the previous two years was still relatively high when farm corn was delivered to local elevators.

Whole Kernels (%)



III. QUALITY TEST RESULTS | 2013 HARVEST

6. Horneous Endosperm

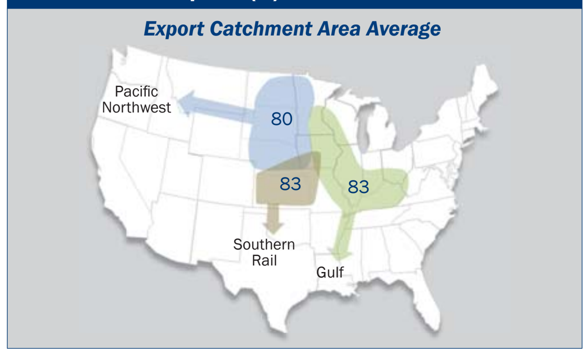
The horneous endosperm test measures the percent of horneous or hard endosperm with a potential value from 70 to 100%. The greater the amount of horneous endosperm relative to soft endosperm, the harder the corn kernel is said to be. The degree of hardness is important depending on the type of processing. Hard corn is needed to produce high yields of large flaking grits in dry milling. Medium-high to medium hardness is desired for alkaline cooking. Moderate to soft hardness is used for wet milling and livestock feeding.

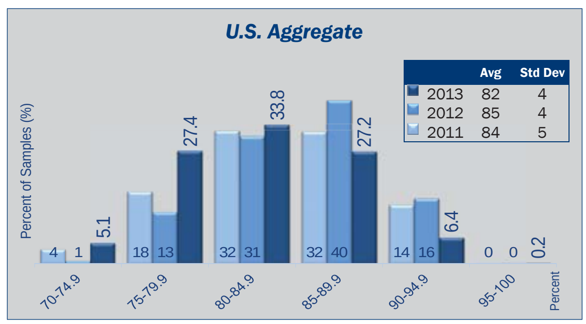
Hardness has been correlated to breakage susceptibility, feed utilization/efficiency and starch digestibility. As a test of overall hardness, there is no good or bad value for horneous endosperm; there is only a preference by different end users for particular ranges. Many dry millers and alkaline cookers would like greater than 90% horneous endosperm, while wet millers and feeders would typically like values between 70% and 85%. However, there are certainly exceptions in user preference.

RESULTS

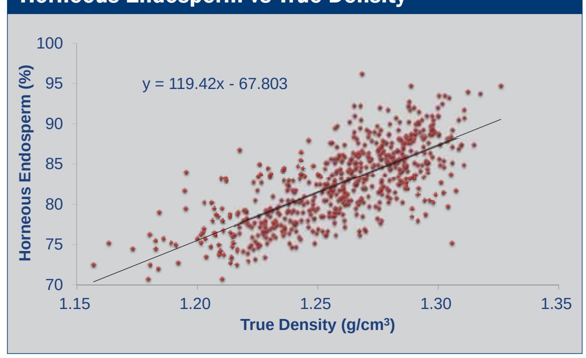
- Horneous endosperm averaged 82% for U.S. Aggregate corn in 2013 and was down from 85% in 2012, and 84% in 2011 but was still relatively high for commodity corn.
- Of the U.S. Aggregate samples, 67.6% were equal to or greater than 80% horneous endosperm in 2013, which was considerably below the 87% found in 2012 and 78% found in 2011.
- Horneous endosperm averages for Gulf, Pacific Northwest, and Southern Rail were 83%, 80%, and 83%, respectively.
- Horneous endosperm ranged from 71 to 96% in 2013 compared to 74 to 97% in 2012. Thus, the lower percentages of horneous endosperm found in 2013 are consistent with the lower levels of true density found in 2013. The adjacent figure shows the weak but positive relationship (a correlation coefficient of 0.73) between horneous endosperm and true density for the 2013 samples.

Horneous Endosperm (%)





Horneous Endosperm vs True Density



SUMMARY: PHYSICAL FACTORS

- While average stress cracks and SCI were higher in 2013 than in 2012 and 2011, stress cracks were still sufficiently low.
- Average 100-k weights were lower in 2013 than in 2012 but similar to those in 2011. Average kernel volumes were the same as those in 2012. Kernel weights, volumes and true densities were much lower for the Pacific Northwest ECA than for the Gulf and Southern Rail ECAs.
- Kernel true densities were significantly lower in 2013 than in 2012 and also somewhat lower than those in 2011. Similar to true density, U.S. Aggregate average test weight and horneous endosperm percentages were lower in 2013 than in 2012. The horneous endosperm average of 82% indicates corn will be moderately lower in hardness than the previous two years but this average is still relatively hard for commodity corn.
- The average percentage of whole kernels was lower than that found for the previous two years. This still means that 92.4% of the kernels had pericarps fully intact which should store well and in combination with relatively low stress cracks should enable low breakage in handling.
- The moderately lower true density combined with relatively high starch content should indicate good availability of corn for wet milling.

III. QUALITY TEST RESULTS | 2013 HARVEST

SUMMARY: PHYSICAL FACTORS

	2013 Harvest					2012 Harvest			2011 Harvest		
	No. of Samples[1]	Avg.	Std. Dev.	Min.	Max.	No. of Samples[1]	Avg.	Std. Dev.	No. of Samples[1]	Avg.	Std. Dev.
U.S. Aggregate											
Stress Cracks (%)	610	9	10	0	86	637	4*	5	474	3*	3
Stress Crack Index[2]	610	22.8	35.1	0	324	637	9.3*	14.1	474	4.6*	6.0
100-Kernel Weight (g)	610	33.41	2.88	18.07	45.09	637	34.53*	2.76	474	33.11	2.64
Kernel Volume (cm^3)	610	0.27	0.02	0.15	0.36	637	0.27*	0.02	474	0.26*	0.02
True Density (g/cm^3)	610	1.258	0.021	1.157	1.326	637	1.276*	0.017	474	1.267*	0.019
Whole Kernels (%)	610	92.4	3.7	73.6	99.6	637	94.4*	3.4	474	93.8*	3.9
Horneous Endosperm (%)	610	82	4	71	96	637	85*	4	474	84*	5
Gulf											
Stress Cracks (%)[2]	556	9	11	0	86	566	4*	5	364	3*	3
Stress Crack Index[2]	556	23.5	39.5	0	324	566	9.9*	15.5	364	4.6*	6.3
100-Kernel Weight (g)	556	34.10	2.94	18.07	45.09	566	34.79*	2.78	364	33.66*	2.63
Kernel Volume (cm^3)	556	0.27	0.02	0.15	0.36	566	0.27*	0.02	364	0.26*	0.02
True Density (g/cm^3)	556	1.261	0.020	1.157	1.326	566	1.276*	0.017	364	1.271*	0.019
Whole Kernels (%)	556	92.4	3.8	73.6	99.6	566	94.4*	3.5	364	94.0*	3.9
Horneous Endosperm (%)	556	83	4	71	96	566	85*	4	364	85*	5
Pacific Northwest											
Stress Cracks (%)[2]	259	10	10	0	72	321	4*	4	182	3*	3
Stress Crack Index[2]	259	27.4	31.1	0	232	321	8.5*	11.5	182	5.2*	6.6
100-Kernel Weight (g)	259	30.33	2.70	18.07	43.64	321	34.07*	2.51	182	31.27*	2.59
Kernel Volume (cm^3)	259	0.24	0.02	0.15	0.34	321	0.27*	0.02	182	0.25*	0.02
True Density (g/cm^3)	259	1.241	0.022	1.157	1.314	321	1.277*	0.016	182	1.252*	0.021
Whole Kernels (%)	259	92.5	3.3	76.2	99.4	321	94.1*	3.3	182	93.6*	3.9
Horneous Endosperm (%)	259	80	3	72	95	321	86*	4	182	84*	4
Southern Rail											
Stress Cracks (%)[2]	312	5	6	0	72	366	3*	4	149	2*	2
Stress Crack Index[2]	312	11.7	16.5	0	232	366	7.2*	10.6	149	2.9*	3.0
100-Kernel Weight (g)	312	34.23	2.87	18.07	44.87	366	33.89	3.07	149	33.39*	2.80
Kernel Volume (cm^3)	312	0.27	0.02	0.15	0.35	366	0.27*	0.02	149	0.26*	0.02
True Density (g/cm^3)	312	1.267	0.020	1.157	1.317	366	1.275*	0.016	149	1.273*	0.017
Whole Kernels (%)	312	92.5	3.5	76.2	99.4	366	94.7*	2.9	149	93.2	3.8
Horneous Endosperm (%)	312	83	4	71	96	366	85*	4	149	83	4

**Indicates averages in 2012 were significantly different from 2013, and 2011 averages were significantly different from 2013 based on a 2-tailed t-test at the 95% level of significance.*

[1]Due to the ECA results being composite statistics, the sum of the sample numbers from the three ECAs is greater than the U.S. Aggregate.

[2]The Relative ME for predicting the harvest population average exceeded ±10%.

E. Mycotoxins

Mycotoxins are toxic compounds produced by fungi that occur naturally in grains. When consumed at elevated levels, mycotoxins may cause sickness in humans and animals. While several mycotoxins have been found in corn grain, aflatoxins and deoxynivalenol (DON or vomitoxin) are considered to be two of the important mycotoxins.

As in 2011 and 2012, the 2013 harvest samples were tested for aflatoxins and DON for this year's report. Since the production of mycotoxins is heavily influenced by growing conditions, the objective of the *Harvest Quality Reports* is strictly to report on instances when aflatoxins or DON are detected in the corn crop at harvest. No specific levels of the mycotoxins are reported.

The *Harvest Quality Reports* review of mycotoxins is NOT intended to predict the presence or level at which mycotoxins might appear in U.S. corn exports. Due to the multiple stages of the U.S. grain merchandising channel and the laws and regulations guiding the industry, the levels at which mycotoxins appear in corn exports are less than what might first appear in the corn as it comes out of the field. In addition, this report is not meant to imply that this assessment will capture all the instances of mycotoxins across the 12 states or three Export Catchment Areas (ECAs) surveyed. The *Harvest Quality Reports* results should be used only as one indicator of the potential for mycotoxin presence in the corn as the crop comes out of the field. As the Council accumulates several years of the *Harvest Quality Reports*, year-to-year patterns of mycotoxin presence in corn at harvest will be seen. The *U.S. Grains Council Corn Export Cargo Quality Report 2013/14* will report corn quality at export points and will be a more accurate indication of mycotoxin presence in the 2013/14 U.S. corn export shipments.

1. Assessing the Presence of Aflatoxins and DON

A weighted and systematic testing at least 25% of the targeted 600 samples across the entire sampled area was conducted to assess the impact of the 2013 growing conditions on total aflatoxins and DON development in the U.S. corn crop. The sampling criteria, described in the "Survey and Statistical Analysis Methods" section, resulted in a targeted number of 179 samples tested for mycotoxins.

A threshold referred to as the Limit of Detection (LOD) was used to determine whether or not a detectable level of the mycotoxin appeared in the sample. The LOD for the analytical kits used for this 2013/14 report was 2.5 parts per billion (ppb) for aflatoxins and 0.3 parts per million (ppm) for DON. Details on the testing methodology employed in this study for the mycotoxins are in the "Testing Analysis Methods" section.

III. QUALITY TEST RESULTS | 2013 HARVEST

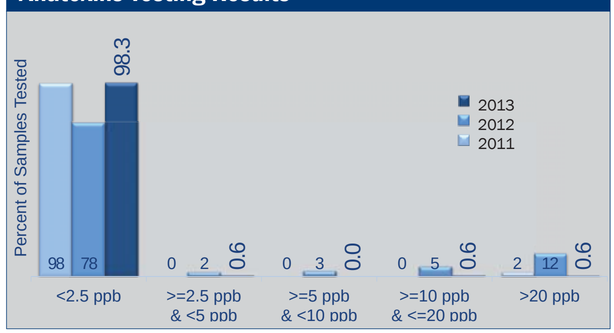
2. Aflatoxins Testing Results

A total of 179 samples were analyzed for aflatoxins in 2013. This is about the same number of samples (177) tested for aflatoxins in 2012. Results of the 2013 survey are as follows:

- One hundred seventy six (176) samples, or 98.3% of the 179 samples, had no detectable levels of aflatoxins (below the 2.5 ppb LOD). In 2012 and 2011, 78.0% and 97.9% of the samples tested had no detectable levels of aflatoxins, respectively.
- One sample, or 0.6% of the 179 samples, showed aflatoxin levels greater than or equal to the LOD of 2.5 ppb, but less than 5 ppb.
- No samples, or 0.0% of the 179 samples, showed aflatoxin levels greater than or equal to 5 ppb, but less than 10 ppb.
- One sample, or 0.6%, of the 179 samples, showed aflatoxin levels greater than or equal to 10 ppb, but less than or equal to the FDA action level of 20 ppb.
- These results denote that 178 samples, or 99.4% of the 179 sample test results in 2013, were below or equal to the FDA action level of 20 ppb, compared to 88.1% and 97.9% of the samples tested in 2012 and 2011, respectively.
- One sample, or 0.6% of the 179 samples, tested above the FDA action level of 20 ppb. The 2012 and 2011 percentage for samples with aflatoxin levels exceeding 20 ppb were 11.9% and 2.1%, respectively.

Comparing the 2013 aflatoxin survey results to the 2012 and 2011 results suggests that there were fewer incidents of aflatoxins among all Agricultural Statistical Districts (ASDs) in 2013 than in the 2012 crop seasons and about the same as in 2011. The lower proportion of samples with aflatoxin levels exceeding the FDA action level in 2013 and 2011 than in 2012 may be due, in part, to more favorable (less stressful) weather conditions when compared to similar environmental conditions in 2012 (see the "Crop and Weather Conditions" section for more information on the 2013 growing conditions). Weather during spring 2013 and 2011 was cool and wet compared to a more extensive drought in 2012.

Aflatoxins Testing Results



3. DON (Deoxynivalenol or Vomitoxin) Testing Results

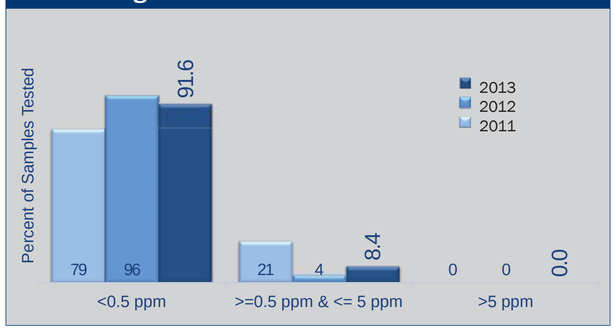
A total of 179 samples were analyzed collectively for DON in 2013. This is about the same number of samples (177) tested for aflatoxins in 2012. Results of the 2013 survey are shown below:

- One hundred sixty four (164) samples, or 91.6% of the 179 samples, tested less than the 0.5 ppm.
- Fifteen (15) samples, or 8.4% of the 179 samples, tested greater than or equal to 0.5 ppm, but less than or equal to the FDA advisory level of 5 ppm.
- All 179 samples, or 100%, tested below or equal to the FDA advisory level of 5 ppm.

Comparing the 2013 DON survey results to 2012 and 2011 survey results indicates that there were less DON contaminations in 2013 than in the 2011 crop season and about the same as in the 2012 crop season.

- The 2013 percentage for samples that tested below 0.5 ppm (91.6%) is about the same as in 2012 (96.0%), but higher than the 78.7% observed in 2011.
- In 2013, 100% percent of the samples tested at or below 5 ppm, which is the same as was observed in 2012 and 2011.

DON Testing Results



4. Mycotoxin Background: General

The levels at which the fungi produce the mycotoxins are impacted by the fungus type and the environmental conditions under which the corn is produced and stored. Because of these differences, mycotoxin production varies across the U.S. corn producing areas and across years. In some years, the growing conditions across the corn production regions might not produce elevated levels of any mycotoxins. While in other years, the environmental conditions in a particular area might be conducive to production of a particular mycotoxin to levels that impact the corn's use for human and livestock consumption. Humans and livestock are sensitive to mycotoxins at varying levels. As a result, the U.S. Food and Drug Administration (FDA) have issued action levels for aflatoxins and advisory levels for DON by intended use.

Action levels specify precise limits of contamination above which the agency is prepared to take regulatory action. Action levels are a signal to the industry that FDA believes it has scientific data to support regulatory and/or court action if a toxin or contaminant is present at levels exceeding the action level if the agency chooses to do so. If import or domestic feed supplements are analyzed in accordance with valid methods and found to exceed applicable action levels, they are considered adulterated and may be seized and removed from interstate commerce by FDA.

Advisory levels provide guidance to the industry concerning levels of a substance present in food or feed that are believed by the agency to provide an adequate margin of safety to protect human and animal health. While FDA reserves the right to take regulatory enforcement action, enforcement is not the fundamental purpose of an advisory level.

A source of additional information is the National Grain and Feed Association (NGFA) guidance document titled "FDA Regulatory Guidance for Toxins and Contaminants" found at http://www.ngfa.org/wp-content/uploads/NGFAComplianceGuide-FDARegulatoryGuidanceforMycotoxins8-2011.pdf.

5. Mycotoxin Background: Aflatoxins

The most important type of mycotoxin associated with corn grain is aflatoxin. There are several types of aflatoxin produced by different species of Aspergillus with the most prominent species being A. flavus. Growth of the fungus and aflatoxin contamination of grain can occur in the field prior to harvest or in storage. However, contamination prior to harvest is considered to cause most of the problems associated with aflatoxin. A. flavus grows well in hot, dry environmental conditions or where drought occurs over an extended period of time. It can be a serious problem in the southern United States where hot and dry conditions are more common. The fungus usually attacks only a few kernels on the ear and often penetrates kernels through wounds produced by insects. Under drought conditions, it also grows down silks into individual kernels.

There are four types of aflatoxin naturally found in foods – aflatoxins B1, B2, G1 and G2. These four aflatoxins are commonly referred to as aflatoxins or total aflatoxins. Aflatoxin B1 is the most commonly found aflatoxin in food and feed and is also the most toxic. Research has shown that B1 is a potent naturally occurring carcinogen in animals, with a strong link to human cancer incidence. Additionally, dairy cattle will metabolize aflatoxin to a different form of aflatoxin called aflatoxin M1 which may accumulate in milk.

Aflatoxins are toxic in humans and animals by primarily attacking the liver. The toxicity can occur from short-term consumption of very high doses of aflatoxin-contaminated grain or long-term ingestion of low levels of aflatoxins, possibly resulting in death in poultry and ducks, the most sensitive of the animal species. Livestock may experience reduced feed efficiency or reproduction, and both humans' and animals' immune systems may be suppressed as a result of ingesting aflatoxins.

The FDA has established action levels for aflatoxin M1 in milk intended for human consumption and aflatoxins in human food, grain and livestock feed (see table below).

FDA has established additional policies and legal provisions concerning the blending of corn with levels of aflatoxins exceeding these threshold levels. In general, FDA currently does not permit the blending of corn containing aflatoxin with uncontaminated corn to reduce the aflatoxin content of the resulting mixture to levels acceptable for use as human food or animal feed.

Corn exported from the United States must be tested for aflatoxins according to Federal law. Unless the contract exempts this requirement, testing must be conducted by FGIS. Corn above the FDA action level of 20 ppb cannot be exported unless other strict conditions are met. This results in relatively low levels of aflatoxins in exported grain.

Aflatoxins Action Level	Criteria
0.5 ppb (Aflatoxin M1)	*Milk intended for human consumption*
20 ppb	*For corn and other grains intended for immature animals (including immature poultry) and for dairy animals, or when the animal's destination is not known*
20 ppb	*For animal feeds, other than corn or cottonseed meal*
100 ppb	*For corn and other grains intended for breeding beef cattle, breeding swine or mature poultry*
200 ppb	*For corn and other grains intended for finishing swine of 100 pounds or greater*
300 ppb	*For corn and other grains intended for finishing (i.e., feedlot) beef cattle and for cottonseed meal intended for beef cattle, swine or poultry*

Source: FDA and USDA GIPSA, http://www.gipsa.usda.gov/Publications/fgis/broch/b-aflatox.pdf

6. Mycotoxin Background: DON (Deoxynivalenol) or Vomitoxin

DON is another mycotoxin of concern to some importers of corn. It is produced by certain species of Fusarium, the most important of which is Fusarium graminearum (Gibberellazeae) which also causes Gibberella ear rot (or red ear rot). Gibberellazeae can develop when warm or moderate and wet weather occurs at flowering. The fungus grows down the silks into the ear, and in addition to producing DON, it produces conspicuous red discoloration of kernels on the ear. The fungus can also continue to grow and rot ears when corn is left standing in the field. Mycotoxin contamination of corn caused by Gibberellazeae is associated with excessively postponing harvest and/or storing high-moisture corn.

DON is mostly a concern with monogastric animals where it may cause irritation of the mouth and throat. As a result, the animals may eventually refuse to eat the DON-contaminated corn and may have low weight gain, diarrhea, lethargy, and intestinal hemorrhaging. It may cause suppression of the immune system resulting in susceptibility to a number of infectious diseases.

The FDA has issued advisory levels for DON. For products containing corn, the advisory levels are:

- 5 ppm in grains and grain co-products for swine, not to exceed 20% of their diet,
- 10 ppm in grains and grain co-products for chickens and cattle, not to exceed 50% of their diet, and
- 5 ppm in grains and grain co-products for all other animals, not to exceed 40% of their diet.

FGIS is not required to test for DON on corn bound for export markets, but will perform either a qualitative or quantitative test for DON at the buyer's request.

IV. CROP AND WEATHER CONDITIONS | 2013 HARVEST

HIGHLIGHTS

Weather plays a large role in the corn planting process, growing conditions, and grain development, which, in turn, impacts final grain yield and quality. Overall, 2013 was a delayed growing year in the U.S. Corn Belt, with much of the area experiencing a cool, wet spring, then drought stress and cool conditions in summer, and cool, wet weather for harvest. The following highlights the key events of the 2013 growing season:

- Record flooding and cool weather delayed planting and crop growth in areas of 10 of the 12 states studied, but helped alleviate the majority of the long-term drought areas of 2012.
- An intense, short-term drought occurred in the summer for most of the Gulf and Pacific Northwest growing regions, but the severity was offset by cool temperatures and plentiful groundwater from spring rains.
- The delayed planting and cool summer delayed grain maturation, then rains and early snows prevented timely harvests in many Gulf and Pacific Northwest fields.
- Overall, the good pollination weather, combined with abundant groundwater and cool summer temperatures, led to a record total U.S. corn production in 2013.

The following sections describe how the 2013 growing season weather impacted the corn yield and quality in the U.S. Corn Belt.

A. Planting and Early Growth Conditions – Spring (March – May)

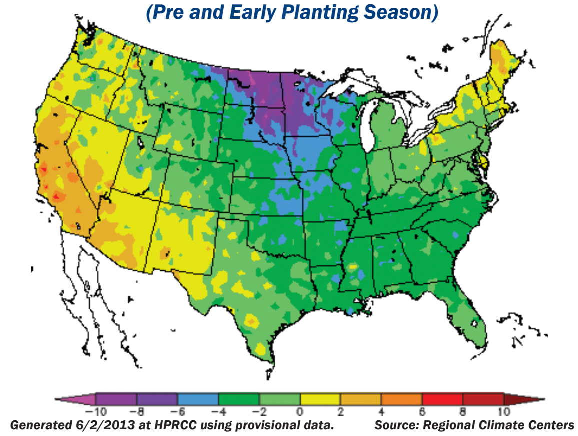
Timely planting was adversely impacted by cold temperatures, snow, and rain

Weather factors impacting corn yield and quality include the amount of precipitation and the temperature just prior to and during the corn-growing season. These weather factors interact with the corn variety and the soil fertility to influence final grain yield and quality. Grain yield is a function of the number of plants per acre, the number of kernels per plant, and the weight of each kernel. Cold or wet weather at planting could reduce plant numbers, or hinder plant growth, which may result in lower yields. Some dryness at planting time is beneficial, as it promotes a deeper root system to access water later in the season.

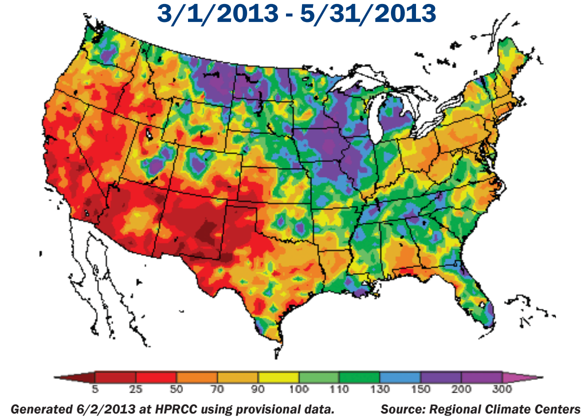
Overall, 2013 had a cool, wet spring, especially the Gulf and northern Pacific Northwest growing areas, resulting in producers switching to soybeans, or not planting at all. Across the United States, there were over 3.5 million acres that were anticipated for corn, but were never planted to corn.

While the eastern part of the Gulf ECA warmed up in April, the rest of the Corn Belt had record late rains and snowfall, even in early May. However, there was a large temperature swing in mid-May. In Nebraska, one town experienced a temperature shift from 0.6 to 37.8°C over two days. Producers rushed to the fields when they dried out and caught up to the average percent of corn planted by the end of May.

Departure from Normal Temperature (°F)
3/1/2013 - 5/31/2013
(Pre and Early Planting Season)



Percent of Normal Precipitation
3/1/2013 - 5/31/2013



B. Pollination and Grain Fill Conditions – Summer (June – August)

Near normal temperatures in June and cool July with scattered rainfall

June 2013 saw continued flooding in pockets across the region, improving the long-term drought by helping to replenish the groundwater. However, some fields in these flooded areas were destroyed, thus decreasing harvested corn acres.

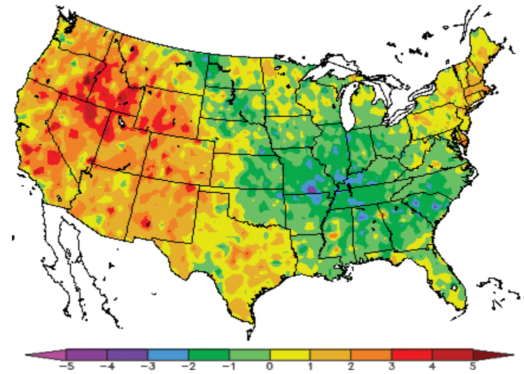
Corn pollination typically occurs in July, and at pollination time, higher than average temperatures or lack of rain typically reduces the number of kernels. The weather conditions during the grain filling period in July and August are critical to final grain composition. During this time, moderate rainfall and cooler than average temperatures, especially overnight temperatures, promote starch accumulation and increased yields. Moderate rainfall also aids nitrogen uptake for continued photosynthesis and grain protein and starch accumulation.

From July to mid-August 2013, the majority of the Gulf ECA experienced a flash drought (defined as intense, short-term lack of precipitation necessary for proper plant growth), with limited rainfall. However, cooler than average temperatures and plentiful groundwater helped lessen the severity of the flash drought on grain growth and development.

The Palmer Z index is a relative scale, indicating how monthly moisture conditions depart from normal, ranging from short-term agricultural drought to extreme wetness. The map indicates dry conditions with red and dark red, while sufficient to excess moisture is indicated by darker shades of green. The August 2013 map of the Palmer Z index shows the flash drought areas, mostly in the Gulf and eastern Pacific Northwest ECAs, while areas in the western Pacific Northwest and Southern Rail ECAs had plentiful water.

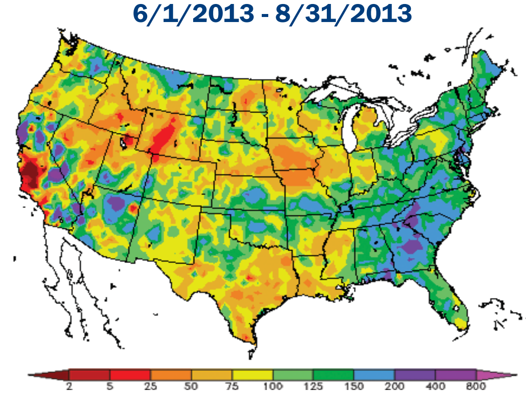
Despite the flash drought conditions, the cool weather in July and the first half of August, especially during grain fill, led to good starch accumulation and excellent yields in many fields. Hot weather came in late August, further stressing many flash drought stricken fields. This hot weather impeded the uptake and assimilation of nitrogen and its transport to the grain, thereby reducing grain protein concentration in the Gulf growing region. Those plants that were able to withstand the heat wave continued to increase their yield through August and September.

Departure from Normal Temperature (ºF)
6/1/2013 - 8/31/2013



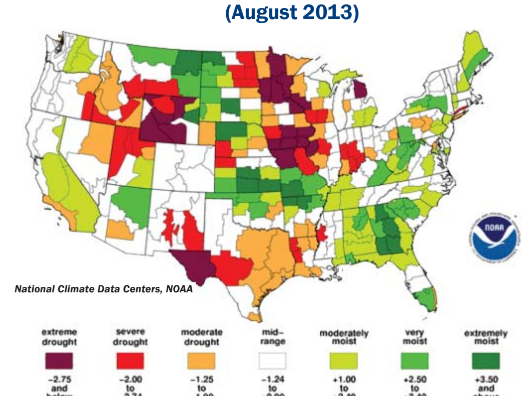
Generated 9/11/2013 at HPRCC using provisional data. Source: Regional Climate Centers

Percent of Normal Precipitation
6/1/2013 - 8/31/2013



Generated 9/2/2013 at HPRCC using provisional data. Source: Regional Climate Centers

Palmer Z Index
Short-Term Conditions
(August 2013)



C. Harvest Conditions (September – October +)

Harvest moved along slowly accompanied by differing crop conditions

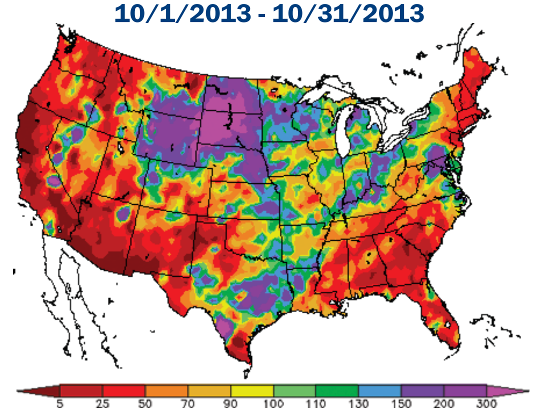
At the end of the growing season, dry down of the grain is dependent upon sunshine, temperature, humidity levels, and soil dryness. Corn can most effectively dry down with the least adverse impact on quality with sunny, warm days with low humidity. Another weather concern at the end of the growing season is freezing temperatures. Early freezing before the grain can sufficiently dry down may lead to lower test weight, and the wetter grain may be susceptible to greater breakage than drier grain during harvest.

Typically, 80% of the U.S. corn is harvested by the end of October. However, harvest in 2013 was delayed by two to three weeks on average. The corn reached maturity more slowly than normal because of the late planting and cool summer, therefore attaining the dry down stage later than average. Fields that were drought stressed had non-uniform maturation, with adjacent areas of mature and green plants. In addition, areas across all twelve states experienced either cooler than normal temperatures, higher than average precipitation in the form of either snow or rain, or a combination of both. These weather conditions delayed harvest further and/or prompted producers to harvest fields with areas of high-moisture grain trying to minimize fungus and mycotoxin development.

In total, the 2013 weather of floods, droughts, a late summer heat wave, and early snowstorms in the Dakotas combined to decrease harvested acreage by 8% from the originally planted area.

The summer growing conditions and the overall cool, wet harvest weather were not conducive to aflatoxin development in the majority of the growing area of the states surveyed for this *Harvest Report 2013/14*. On the other hand, warm and wet weather during flowering and delayed maturation (resulting in wet grain) and harvest in some areas may have led to some DON development.

Percent of Normal Percipitation (%)
10/1/2013 - 10/31/2013



Generated 11/11/2013 at HPRCC using provisional data. Source: Regional Climate Centers

D. Comparison of the 2013, 2012 and 2011 Crop Years

2013 and 2011 experienced similar weather patterns while 2012 was characterized by the drought

While both springs of 2013 and 2011 were colder and wetter than normal with delayed planting, 2013 had a later planting season than 2011. On the other hand, 2012 started out with warm, dry weather, encouraging early planting. The summers of 2012 and 2011 had above average heat in the Gulf and Southern Rail ECAs. While the summer of 2013 was cool with pockets of flash drought, 2012 had the most extensive drought. Plants matured the quickest and had the earliest harvest in 2012, followed by 2011. The most delayed harvests were in 2013 because of the cool, wet, weather combined with the delayed maturity from late planting and a cool summer.

V. U.S. CORN PRODUCTION, USAGE AND OUTLOOK | 2013 HARVEST

A. U.S. Corn Production[1]

1. U.S. Average Production and Yields

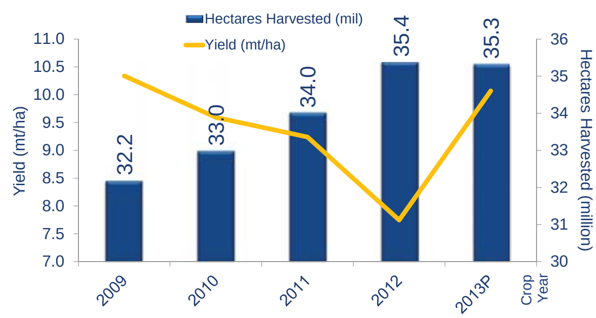
- According to the November 2013 USDA World Agricultural Supply and Demand Estimates (WASDE) report, average U.S. yield for the 2013 crop is projected to be 10.1 mt/ha (160.4 bu/ac). This is 2.4 mt/ha (37.0 bu/ac) higher than the 2012 corn crop and the second highest average yield on record.

- The number of hectares harvested in 2013 is projected to be 35.3 million (87.2 mil ac). This is 0.1 mil ha (0.2 mil ac) less than in 2012, yet the second largest number of hectares for the last 80 years.

- Total U.S. corn production for 2013 is projected to be 355.3 mmt (13,989 mil bu). This is about 81.5 mmt (3,209 mil bu) higher than 2012 and the largest U.S. corn crop on record.

- Despite the slightly lower harvested hectares in 2013 than in 2012, the projected record total production in 2013 was due to significantly higher yields in the key U.S. corn production areas.

U.S. Corn Yield and Harvested Area



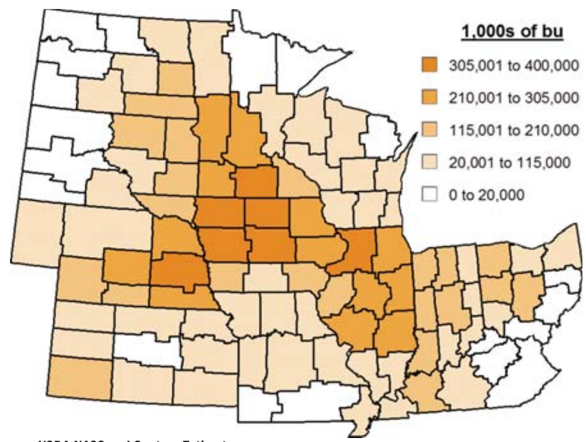
Source: USDA NASS

[1] mt - metric ton; mmt - million metric tons; ha - hectare; bu - bushel; mil bu - million bushels; ac - acre.

2. ASD and State Level Production

The geographic areas included in the *Harvest Report* encompass the highest corn producing areas in the United States. This can be seen on the map showing projected 2013 corn production by USDA Agricultural Statistical District (ASD).

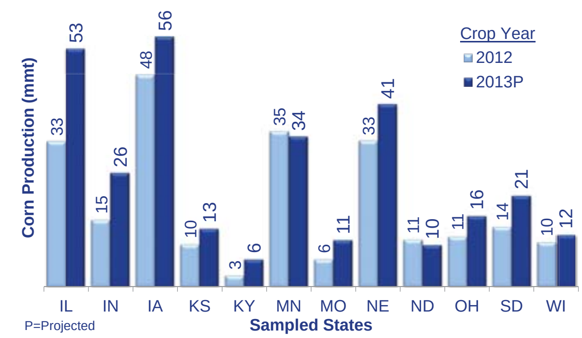
U.S. Corn Production by ASD (2013P)



Source: USDA NASS and Centrec Estimates

Corn production in Iowa, Illinois and Nebraska increased significantly from 2012 to 2013, while Minnesota corn production was slightly lower in 2013 compared to 2012. Other than in North Dakota, corn production in the remaining eight states was higher in 2013 than in 2012.

U.S. Corn Production by State



Source: USDA NASS

The U.S. Corn Production table summarizes the differences in both quantity (mmt) and percentages between 2012 and projected 2013 corn production for each state. Also included is an indication of the relative changes in acres and yield between 2012 and projected 2013. The green bar indicates a relative increase and the red bar indicates a relative decrease from 2012 to projected 2013. This illustrates that acres were largely unchanged to slightly lower, while yield changes were considerably higher with the exception of Minnesota and North Dakota.

U.S. Corn Production

State	2012	2013P	Difference MMT	Difference Percent	Relative % Change* Acres	Relative % Change* Yield
Illinois	33	53	21	64%		
Indiana	15	26	10	69%		
Iowa	48	56	9	18%		
Kansas	10	13	4	37%		
Kentucky	3	6	4	138%		
Minnesota	35	34	(1)	-3%		
Missouri	6	11	4	69%		
Nebraska	33	41	8	25%		
North Dakota	11	10	(1)	-11%		
Ohio	11	16	5	41%		
South Dakota	14	21	7	52%		
Wisconsin	10	12	2	16%		
Total	274	355	81	30%		

****Green indicates 2013 is higher than 2012 and red indicates 2013 is lower than 2012; bar height indicates the relative amount.***

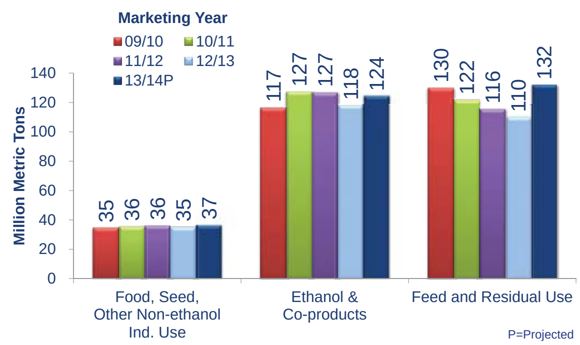
P=Projected

Source: USDA NASS

B. U.S. Corn Use and Ending Stocks

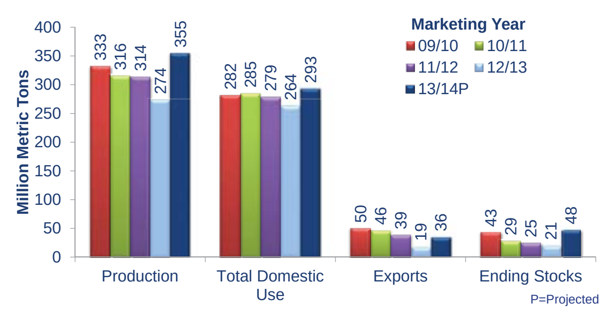
- U.S. corn use for food, seed and other non-ethanol industrial purposes has remained fairly constant since the 2009/2010 marketing year (MY09/10).
- Corn use for ethanol production has continued to support overall domestic use during the past four completed marketing years, with much of the demand driven by the Renewable Fuels Standard mandate.
- Direct consumption of corn as a feed ingredient in domestic livestock and poultry rations had a downward trend the past four completed marketing years. Several factors were driving this decline in use including decreasing domestic beef demand, tight corn supplies, and high corn prices. This trend was accompanied by increased production and use of distiller's dried grains with solubles (DDGS) (a co-product of ethanol production) in livestock and poultry diets, thus increasing the indirect consumption of corn by livestock and poultry.
- U.S. corn exports during MY12/13 were about half the previous marketing year, mostly due to tight U.S. corn supplies and high corn prices dampening U.S. competitiveness in the global market.
- The 2012 drought and lower production greatly drew down the MY12/13 ending stocks and dropped the stocks-to-use ratio.

U.S. Corn Use



Source: USDA WASDE and ERS

U.S. Corn Production and Disappearance



Source: USDA WASDE and ERS

C. Outlook

1. U.S. Outlook

- The ample U.S. corn supply for projected MY13/14 is pushing corn prices downward while supporting its use in the domestic market, resulting in a projected overall increase in domestic use of 11% from MY12/13.
- Domestic corn use for livestock and poultry feeding and for residual use is expected to be about 20% higher in MY13/14 than in MY12/13 and at the highest level since MY08/09. Many factors are driving this demand including the decline in the relative price of corn to other feedstuffs and the return to profitable U.S. livestock production.
- Corn use for food, seed and non-ethanol industrial (FSI) purposes is expected to be 4% higher in MY13/14 than in MY12/13, most likely due to ample supply and lower prices.
- MY13/14 estimated corn use for ethanol is slightly higher than the previous marketing year (5%). Actual domestic use of corn for ethanol production will depend on domestic consumption (influenced by biofuels policy and ethanol prices), net ethanol trade and the change in ethanol stock levels.
- U.S. corn exports during MY13/14 are off to a strong start because of lower prices increasing the competitiveness of U.S. corn on the world market. The projected exports for the current marketing year are significantly higher than last year (up 92%). However, actual MY13/14 exports meeting expectations will most likely be dependent on corn prices remaining relatively low.
- MY13/14 corn ending stocks in the United States are projected to be more than double the ending stocks of the previous year marketing primarily because of the large corn crop. This will result in a much higher stocks-to-use ratio than for MY12/13.

2. International Outlook

Global Supply

- Global corn production during MY13/14 is expected to be a record-setting year, primarily due to the large U.S. corn crop.
- Greater production in Ukraine, China, Russia, Serbia, and several EU countries such as Poland and Germany will offset significantly lower production in Brazil and smaller decreases in countries such as Kenya, Argentina, and Paraguay.
- In addition to higher U.S. exports, total non-U.S. exports are also expected to be slightly higher in MY13/14 than in MY12/13.
- Exports from Ukraine, Serbia, Russia, and some EU countries are expected to be higher in MY13/14, offsetting lower exports from Brazil, India, and Argentina.

Global Demand

- Global use is expected to increase around 11% in MY13/14 from MY12/13.
- Year-over-year increases in imports are expected in Mexico, China, Japan, South Korea, Egypt, Colombia, Iran, and Kenya, while decreased imports are projected for the European Union 27 (EU 27), Turkey, and Indonesia.

V. U.S. CORN PRODUCTION, USAGE AND OUTLOOK | 2013 HARVEST

U.S. CORN SUPPLY AND USAGE SUMMARY BY MARKETING YEAR

Metric Units	09/10	10/11	11/12	12/13	13/14P
Acreage (million hectares)					
Planted	35.0	35.7	37.2	39.4	38.6
Harvested	32.2	33.0	34.0	35.4	35.3
Yield (mt/ha)	10.3	9.6	9.2	7.7	10.1
Supply (million metric tons)					
Beginning stocks	42.5	43.4	28.6	25.1	20.9
Production	332.6	316.2	314.0	273.8	355.3
Imports	0.2	0.7	0.7	4.1	0.6
Total Supply	375.3	360.2	343.3	303.1	376.9
Usage (million metric tons)					
Food, seed, other non-ethanol ind. use	34.8	35.7	36.3	35.4	36.8
Ethanol and co-products	116.6	127.5	127.0	118.1	124.5
Feed and residual	130.2	121.9	115.7	110.1	132.1
Exports	50.3	46.5	39.2	18.6	35.6
Total Use	331.9	331.6	318.2	282.2	328.9
Ending Stocks	43.4	28.6	25.1	20.9	47.9
Average Farm Price ($/mt*)	139.76	203.93	244.87	271.25	161.41-192.90

English Units	09/10	10/11	11/12	12/13	13/14P
Acreage (million acres)					
Planted	86.4	88.2	91.9	97.2	95.3
Harvested	79.5	81.4	84.0	87.4	87.2
Yield (bu/ac)	164.7	152.8	147.2	123.4	160.4
Supply (million bushels)					
Beginning stocks	1,673	1,708	1,128	989	824
Production	13,092	12,447	12,360	10,780	13,989
Imports	8	28	29	162	25
Total Supply	14,774	14,182	13,517	11,932	14,837
Usage (million bushels)					
Food, seed, other non-ethanol ind. use	1,370	1,407	1,428	1,395	1,450
Ethanol and co-products	4,591	5,019	5,000	4,648	4,900
Feed and residual	5,126	4,799	4,557	4,333	5,200
Exports	1,979	1,830	1,543	731	1,400
Total Use	13,066	13,055	12,528	11,108	12,950
Ending Stocks	1,708	1,128	989	824	1,887
Average Farm Price ($/bu*)	3.55	5.18	6.22	6.89	4.10-4.90

P-Projected
* Farm prices are weighted averages based on volume of farm shipment.
Average farm price for 13/14P based on WASDE November projected price

Source: USDA WASDE and ERS

A. Overview

The key points for the survey design and sampling and statistical analysis for this *Harvest Report 2013/14* are as follows:

- Following the methodology developed for the *Harvest Reports 2011/12 and 2012/13*, the Council proportionately stratified the samples according to Agricultural Statistical Districts (ASDs) across 12 key corn producing states representing 99% of U.S. corn exports.
- A total of 600 samples collected from the 12 states was targeted to achieve a maximum ±10% relative margin of error (Relative ME) at the 95% confidence level.
- A total of 610 unblended corn samples pulled from inbound farm-originated trucks was received from local elevators from Sept. 9 through Dec. 4, 2013, and tested.
- A proportionate stratified sampling technique was used for the mycotoxin testing across the ASDs in the 12 states surveyed for the other quality factors. This sampling resulted in 179 samples being tested for aflatoxins and DON.
- Weighted averages and standard deviations following standard statistical techniques for proportionate stratified sampling were calculated for the U.S. Aggregate and the three Export Catchment Areas (ECAs).
- To evaluate the statistical validity of the samples, the Relative ME was calculated for each of the quality attributes at the U.S. Aggregate and the three ECA levels. The Relative ME for the quality factor results was less than ±10% except for three attributes – total damage, stress cracks and stress crack index (SCI). While the lower level of precision for these quality factors is less than desired, these levels of Relative ME do not invalidate the estimates.
- Two-tailed t-tests at the 95% confidence level were calculated to measure statistical differences between the 2013 and 2012 and the 2013 and 2011 quality factor averages.

Agricultural Statistical Districts (ASDs)

B. Survey Design and Sampling

1. Survey Design

For this *Harvest Report 2013/14*, the target population was yellow commodity corn from the 12 key U.S. corn producing states representing about 99% of U.S. corn exports. The Council applied a ***proportionate stratified, random sampling*** technique to ensure a sound statistical sampling of the U.S. corn crop at the first stage of the marketing channel. Three key characteristics define the sampling technique: the ***stratification*** of the population to be sampled, the ***sampling proportion*** per stratum, and the ***random sample*** selection procedure.

Stratification involves dividing the survey population of interest into distinct, non-overlapping subpopulations called strata. For this study, the survey population was corn produced in areas likely to export corn to foreign markets. The U.S. Department of Agriculture (USDA) divides each state into several Agricultural Statistical Districts (ASDs) and estimates corn production for each ASD. The USDA corn production data, accompanied by foreign export estimates, were used to define the survey population in 12 key corn producing states representing 99% of U.S. corn exports (Source: USDA/

GIPSA). The ASDs were the subpopulations or strata used for this corn quality survey. From those data, the Council calculated each ASD's proportion of the total production and foreign exports to determine the ***sampling proportion*** (the percent of total samples per ASD) and ultimately, the number of corn samples to be collected from each ASD. The number of samples collected for the *Harvest Report 2013/14* differed from ASD to ASD because of the different shares of estimated production and foreign export levels.

The ***number of samples collected was established*** so the Council could estimate the true averages of the various quality factors with a certain level of precision. The level of precision chosen for the *Harvest Report 2013/14* was a relative margin of error (Relative ME) no greater than ±10%, estimated with a 95% level of confidence. A Relative ME of ±10% is a reasonable target for biological data such as these corn quality factors.

To determine the number of samples for the targeted Relative ME, ideally the population variance (i.e., the variability of the quality factor in the corn at harvest) for each of the quality factors should be used. The more variation among the levels or values of a quality factor, the more samples needed to estimate the true mean with a given confidence limit. In addition, the variances of the quality factors typically differ from one another. As a result, different sample sizes for each of the quality factors would be needed for the same level of precision.

Since the population variances for the seventeen quality factors evaluated for this year's corn crop were not known, the variance estimates from the *Harvest Report 2012/13* were used as proxies. The variances and ultimately the estimated number of samples needed for the Relative ME of ±10% for 14 quality factors were calculated using the 2012 results of 637 samples. Broken corn, foreign material, and heat damage were not examined. Stress crack index (SCI), with a Relative ME of 12%, was the only quality factor for which the Relative ME exceeded ±10% for the U.S. Aggregate. Based on these data, a total sample size of 600 would allow the Council to estimate the true averages of the quality characteristics with the desired level of precision for the U.S. Aggregate with the exception of SCI.

The same approach of proportionate stratified sampling was used for the mycotoxin testing of the corn samples as for the testing of the grade, moisture, chemical and physical characteristics. In addition to using the same sampling approach, the same level of precision of a Relative ME of ±10%, estimated with a 95% level of confidence, was desired. Testing at least 25% of the total number of targeted samples (600) was estimated to provide that level of precision. In other words, testing at least 150 samples would provide a 95% confidence level that the percent of tested samples with aflatoxin results below the FDA action level of 20 parts per billion (ppb) would have a Relative ME less than or equal to ±10%. In addition, it was estimated that the percent of tested samples with DON results below the FDA advisory level of 5 parts per million (ppm) would also have a Relative ME less than or equal to ±10%, estimated with a 95% level of confidence. The proportionate stratified sampling approach also required testing at least one sample from each ASD in the sampling area. To meet the sampling criteria of testing 25% of the total number of targeted samples (600) and at least one sample from each ASD, the targeted number of samples to test for mycotoxins was 179 samples.

2. Sampling

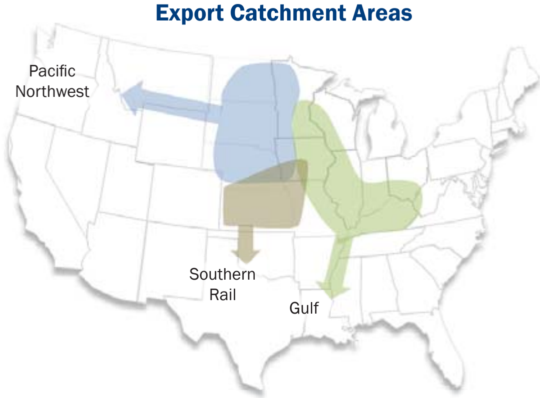
The ***random selection*** process was implemented by soliciting local grain elevators in the 12 states by mail, fax, e-mail and phone. Postage-paid sample kits were mailed to elevators agreeing to provide the 2050 to 2250-gram corn samples requested. Samples were collected from the elevators when at least 30% of the corn in their area had been harvested. The 30% harvest threshold was established to avoid receiving old crop corn samples as farmers cleaned out their bins for the current crop or new crop harvested earlier than normal for reasons such as elevator premium incentives. The individual samples were pulled from inbound farm-originated trucks when the trucks underwent the elevators' normal testing procedures. The number of samples each elevator provided for the survey depended on the targeted number of samples needed from the ASD along with the number of elevators willing to provide samples. A maximum of four samples from each physical location was collected. A total of 610 unblended corn samples pulled from inbound farm-originated trucks was received from local elevators from Sept. 9 through Dec. 4, 2013, and tested.

C. Statistical Analysis

The sample test results for the grade factors, moisture, chemical composition, and physical factors were summarized as the U.S. Aggregate and also by three composite groups that supply corn to each of three major export channels, labeled Export Catchment Areas (ECAs), as follows:

- The Gulf ECA consists of areas that typically export corn through the U.S. Gulf ports;
- The Pacific Northwest (PNW) ECA includes areas that export corn through Pacific Northwest and California ports; and
- The Southern Rail ECA comprises areas generally exporting corn to Mexico.

Export Catchment Areas



In analyzing the sample test results, the Council followed the standard statistical techniques employed for proportionate stratified sampling, including ***weighted averages*** and ***standard deviations***. In addition to the weighted averages and standard deviations for the U.S. Aggregate, weighted averages and standard deviations were estimated for the composite ECAs. The geographic areas from which exports flow to each of these ECAs overlap due to available transportation modes. Therefore, composite statistics for each ECA were calculated based on estimated proportions of grain flowing to each ECA. As a result, corn samples could be reported in more than one ECA. These estimations were based on industry input, export data, and evaluation of studies of grain flow in the United States.

The Relative ME was calculated for each of the quality factors for the U.S. Aggregate and each of the ECAs. The Relative ME was less than ±10% for all the quality attributes except for SCI for the U.S. Aggregate, total damage, stress cracks and SCI for the Pacific Northwest ECA, and stress cracks and SCI for the Gulf and Southern Rail ECAs. The Relative ME for total damage, stress cracks and SCI was as follows:

	Relative ME		
	Total Damage	Stress Cracks	SCI
U.S. Aggregate			*12%*
Gulf ECA		*11%*	*14%*
Pacific Northwest ECA	*13%*	*12%*	*14%*
Southern Rail ECA		*12%*	*16%*

While the lower level of precision for these quality factors is less than desired, these levels of Relative ME do not invalidate the estimates. Footnotes in the summary tables for "Grade Factors and Moisture" and "Physical Factors" indicate the attributes for which the Relative ME exceeds ±10%.

References in the "Quality Test Results" section to statistical and/or significant differences between 2013 and 2012 and 2013 and 2011 test results were validated by two-tailed t-tests at the 95% confidence level. The t-tests were calculated between results in the *Harvest Report 2011/12* and the *Harvest Report 2013/14* and the *Harvest Report 2012/13* and the *Harvest Report 2013/14*.

VII. TESTING ANALYSIS METHODS | 2013 HARVEST

The corn samples (each about 2200 grams) were sent directly from the local grain elevators to the Illinois Crop Improvement Association's Identity Preserved Grain Laboratory (IPG Lab) in Champaign, Illinois. Upon arrival, the samples were dried, if needed, to a suitable moisture content to prevent any subsequent deterioration during the testing period. Next the sample was split into two 1100-gram subsamples using a Boerner divider. The divider splits the complete sample into two while keeping the attributes of the grain sample evenly distributed between the two subsamples. One subsample was delivered to the Champaign-Danville Grain Inspection (CDGI) for grading. CDGI is the official grain inspection service provider for east-central Illinois as designated by USDA's Federal Grain Inspection Service (FGIS). The grade testing procedures were in accordance with FGIS's *Grain Inspection Handbook* and are described in the following section. The other subsample was analyzed at IPG Lab for the chemical composition and other physical factors following either industry norms or well-established procedures in practice for many years. IPG Lab has received accreditation under the ISO/IEC 17025:2005 International Standard.

A. Corn Grading Factors

1. Test Weight

Test weight is a measure of the quantity of grain required to fill a specific volume (Winchester bushel). Test weight is a part of the FGIS Official U.S. Standards for Corn grading criteria.

The test involves filling a test cup of known volume through a funnel held at a specific height above the test cup to the point where grain begins to pour over the sides of the test cup. A strike-off stick is used to level the grain in the test cup, and the grain remaining in the cup is weighed. The weight is then converted to and reported in the traditional U.S. unit, pounds per bushel (lb/bu).

2. Broken Corn and Foreign Material (BCFM)

Broken corn and foreign material (BCFM) is part of the FGIS Official U.S. Standards for Corn.

This test determines the amount of matter that passes through a 12/64th inch round-hole sieve and all matter other than corn that remains on the top of the sieve. Broken corn is defined as all material passing through a 12/64th inch round-hole sieve and retained on a 6/64th inch round-hole sieve. Foreign material is defined as all material passing through the 6/64th inch round-hole sieve and the coarse non-corn material retained on top of the 12/64th sieve. BCFM is reported as a percentage of the initial sample by weight.

3. Total Damage/Heat Damage

Total damage is part of the FGIS Official U.S. Standards for Corn grading criteria.

A representative working sample of 250 grams of BCFM-free corn is visually examined by a properly trained individual for content of damaged kernels. Types of damage include blue-eye mold, cob rot, dryer-damaged kernels (different from heat-damaged kernels), germ-damaged kernels, heat-damaged kernels, insect-bored kernels, mold-damaged kernels, mold-like substance, silk-cut kernels, surface mold (blight), surface mold, mold (pink Epicoccum), and sprout-damaged kernels. Total damage is reported as the weight percentage of the working sample that is total damaged grain.

Heat damage is a subset of total damage and consists of kernels and pieces of corn kernels that are materially discolored and damaged by heat. Heat-damaged kernels are determined by a properly trained individual visually inspecting a 250-gram sample of BCFM-free corn. Heat damage, if found, is reported separately from total damage.

B. Moisture

The moisture recorded by the elevators' electronic moisture meters at the time of delivery is reported. Electronic moisture meters sense an electrical property of grains called the dielectric constant that varies with moisture. The dielectric constant rises as moisture content rises.

C. Chemical Composition

1. NIR Proximate Analysis – Corn

Proximates are the major components of the grain. For corn, the NIR Proximate Analysis includes oil content, protein content, and starch content (or total starch). This procedure is nondestructive to the corn.

Chemical composition tests for protein, oil, and starch were conducted using a 400 to 450-gram sample in a whole-kernel Foss Infratec 1229 Near-Infrared Transmittance (NIT) instrument. The NIT was calibrated to chemical tests, and the standard error of predictions for protein, oil, and starch were about 0.2%, 0.3%, and 0.5%, respectively. Results are reported on a dry matter basis (percent of non-water material).

2. Stress Crack Analysis

Stress cracks are evaluated by using a backlit viewing board to accentuate the cracks. A sample of 100 intact kernels with no external damage is examined kernel by kernel. The light passes through the horneous or hard endosperm so the severity of the stress crack damage in each kernel can be evaluated. Kernels are sorted into four categories: (1) no cracks; (2) 1 crack; (3) 2 cracks; and (4) more than 2 cracks. Stress cracks, expressed as a percent, are all kernels containing one, two or more than two cracks divided by 100 kernels. Lower levels of stress cracks are always better since higher levels of stress cracks lead to more breakage in handling. If stress cracks are present, singles are better than doubles or multiples. Some corn end users will specify the acceptable level of cracks based on the intended use.

Stress crack index (SCI) is a weighted average of the stress cracks. This measurement indicates the severity of stress cracking. SCI is calculated as

SCI = [SSC x 1] + [DSC x 3] + [MSC x 5]

Where

SSC is the percentage of kernels with only one crack,

DSC is the percentage of kernels with exactly two cracks, and

MSC is the percentage of kernels with more than two cracks.

The SCI can range from 0 to 500, with a high number indicating numerous multiple stress cracks in a sample, which is undesirable for most uses.

3. Whole Kernels

In the whole kernels test, 50 grams of cleaned (BCFM-free) corn are inspected kernel by kernel. Cracked, broken, or chipped grain, along with any kernels showing significant pericarp damage are removed, the whole kernels are weighed, and the result is reported as a percentage of the original 50 gram sample. Some companies perform the same test, but report the "cracked & broken" percentage. A whole kernels score of 97% equates to a cracked & broken rating of 3%.

D. Physical Factors

1. 100-Kernel Weight, Kernel Volume and Kernel True Density

The 100-kernel weight is determined from the average weight of two 100-kernel replicates using an analytical balance that measures to the nearest 0.1 mg. The averaged 100-kernel weight is reported in grams.

The kernel volume for each 100-kernel replicate is calculated using a helium pycnometer and is expressed in cm^3/kernel. Kernel volumes usually range from 0.18-0.30 cm^3 per kernel for small and large kernels, respectively.

True density of each 100 kernel sample is calculated by dividing the mass (or weight) of the 100 externally sound kernels by the volume (displacement) of the same 100 kernels. The two replicate results are averaged. True density is reported in grams per cubic centimeter (g/cm^3). True densities typically range from 1.16 to 1.35 g/cm^3 at "as is" moistures of about 12 to 15%.

4. Horneous Endosperm

The horneous (or hard) endosperm test is performed by visually rating 20 externally sound kernels, placed germ facing up, on a light table. Each kernel is rated for the estimated portion of the kernel's total endosperm that is horneous endosperm. Soft endosperm is opaque and will block light, while horneous endosperm is translucent. The rating is made from standard guidelines based on the degree to which the soft endosperm at the crown of the kernel extends down toward the germ. The average of horneous endosperm ratings for the 20 externally sound kernels is reported. Ratings of horneous endosperm are made on a scale of 70-100%, though most individual kernels fall in the 70-95% range.

E. Mycotoxin Testing

Detection of mycotoxins in corn is complex. The fungi producing the mycotoxins often do not grow uniformly in a field or across a geographic area. As a result, the detection of any mycotoxin in corn, if present, is highly dependent upon the concentration and distribution of the mycotoxin among kernels in a lot of corn, whether a truck load, a storage bin or a rail car.

The objective of the FGIS sampling process is to minimize underestimating or overestimating the true mycotoxin concentration since accurate results are imperative for corn exports. However, the objective of the *Harvest Report 2013/14* assessment of mycotoxins is only to report the frequency of occurrences of the mycotoxin in the current crop, but not specific levels of the mycotoxin in corn exports.

To report the frequency of occurrences of aflatoxins and DON for the *Harvest Report 2013/14*, IPG Lab performed the mycotoxin testing using FGIS protocol and approved test kits. FGIS's protocol requires a minimum of a 908-gram (2 pound) sample from trucks to grind for aflatoxin testing and approximately a 200-gram sample to grind for DON testing. For this study, a 1000-gram laboratory sample was subdivided from the 2-kg survey sample of shelled kernels for the aflatoxin analysis. The 1-kg survey sample was ground in a Romer Model 2A mill so that 60-75% would pass a 20 mesh screen. From this well-mixed ground material, a 50-gram test portion was removed for each mycotoxin tested. EnviroLogix AQ 109 BG and AQ 254 BG quantitative test kits were used for the aflatoxin and DON analysis, respectively. The DON was extracted with water (5:1), while the aflatoxins were extracted with 50% ethanol (2:1). The extracts were tested using the Envirologix QuickTox lateral flow strips, and the mycotoxins were quantified by the QuickScan system.

The EnviroLogix quantitative test kits report specific concentration levels of the mycotoxin if the concentration level exceeds a specific level called a "Limit of Detection" (LOD). The LOD is defined as the lowest concentration level that can be measured with an analytical method that is statistically different from measuring an analytical blank (absence of a mycotoxin). The LOD will vary among different analytical methods developed for different types of mycotoxins and commodity combinations. The LOD for the EnviroLogix AQ 109 BG and AQ 254 BG are 2.5 parts per billion (ppb) for aflatoxins and 0.3 parts per million (ppm) for DON.

A letter of performance has been issued by FGIS for the quantification of aflatoxins and DON using the Envirologix AQ 109 BG and AQ 254 BG kits, respectively.

VIII. U.S. CORN GRADES AND CONVERSIONS | 2013 HARVEST

U.S. CORN GRADES AND GRADE REQUIREMENTS

		Maximum Limits of		
		Damaged Kernels		
Grade	*Minimum Test Weight per Bushel (Pounds)*	*Heat Damaged (Percent)*	*Total (Percent)*	*Broken Corn and Foreign Material (Percent)*
U.S. No. 1	56.0	0.1	3.0	2.0
U.S. No. 2	54.0	0.2	5.0	3.0
U.S. No. 3	52.0	0.5	7.0	4.0
U.S. No. 4	49.0	1.0	10.0	5.0
U.S. No. 5	46.0	3.0	15.0	7.0

U.S. Sample Grade is corn that: (a) Does not meet the requirements for the grades U.S. Nos. 1, 2, 3, 4, or 5; or (b) Contains stones with an aggregate weight in excess of 0.1 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (Crotalaria spp.), 2 or more castor beans (Ricinus communis L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 8 or more cockleburs (Xanthium spp.), or similar seeds singly or in combination, or animal filth in excess of 0.20 percent in 1,000 grams; or (c) Has a musty, sour, or commercially objectionable foreign odor; or (d) Is heating or otherwise of distinctly low quality.

Source: Code of Federal Regulations, Title 7, Part 810, Subpart D, United States Standards for Corn

U.S. AND METRIC CONVERSIONS

Corn Equivalents		Metric Equivalents	
1 bushel =	56 pounds (25.40 kilograms)	1 pound =	0.4536 kg
39.368 bushels =	1 metric ton	1 hundredweight =	100 pounds or 45.36 kg
15.93 bushels/acre =	1 metric ton/hectare	1 metric ton =	2204.6 lbs
1 bushel/acre =	62.77 kilograms/hectare	1 metric ton =	1000 kg
1 bushel/acre =	0.6277 quintals/hectare	1 metric ton =	10 quintals
56 lbs/bushel =	72.08 kg/hectoliter	1 quintal =	100 kg
		1 hectare =	2.47 acres

U.S. GRAINS COUNCIL

20 F Street, NW Suite 600
Washington, DC 20001

Phone: (202) 789-0789
Fax: (202) 898-0522

Email: grains@grains.org
Website: grains.org

Western Hemisphere

Panama City
Tel: 011.507.315.1008
Fax: 011.507.315.0503
LTA@grains.org

Mexico

Mexico City
Tel: 011.52.55.5282.0244
Fax: 011.52.55.5282.0969
mexico@grains.org

Middle East and Africa

Tunis
Tel: 011.216.71.908.622
Fax: 011.216.71.906.165
tunis@usgrains.net

Egypt

Washington, D.C.
Tel: 202.789.0789
Fax: 202.898.0522
grains@grains.org

People's Republic of China

Beijing
Tel: 011.86.10.6505.1314
Fax: 011.86.10.6505.0236
grainsbj@grains.org.cn

Korea

Seoul
Tel: 011.82.2.720.1891
Fax: 011.82.2.720.9008
seoul@grains.org

Japan

Tokyo
Tel: 011.81.3.6206.1041
Fax: 011.81.3.6205.4960
tokyo@grains.org

Taiwan

Taipei
Tel1: 011.886.2.2508.0176
Tel2: 011.886.2.2507.5401
Fax: 011.886.2.2502.4851
taipei@grains.org

Southeast Asia

Kuala Lumpur
Tel: 011.60.3.2093.6826
Fax: 011.60.3.2093.2052
grains@grainsea.org

Developing Markets ■ Enabling Trade ■ Improving Lives