# U.S. Grains Council 2015/2016 Corn Harvest Quality Report

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Developing markets. >> Enabling trade. >> Improving lives.

# Quality, Reliability, Transparency

2015/2016 Corn
Harvest Quality Report

## U.S. Grains Council:

- Building partnerships based on trust
- Bridge to world's largest, most reliable grain supply

## Corn Harvest Quality Report:

- Reliable and comparable data
- Transparent and consistent methodology
- Early look at general harvest quality



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# Tools for Better Decision Making

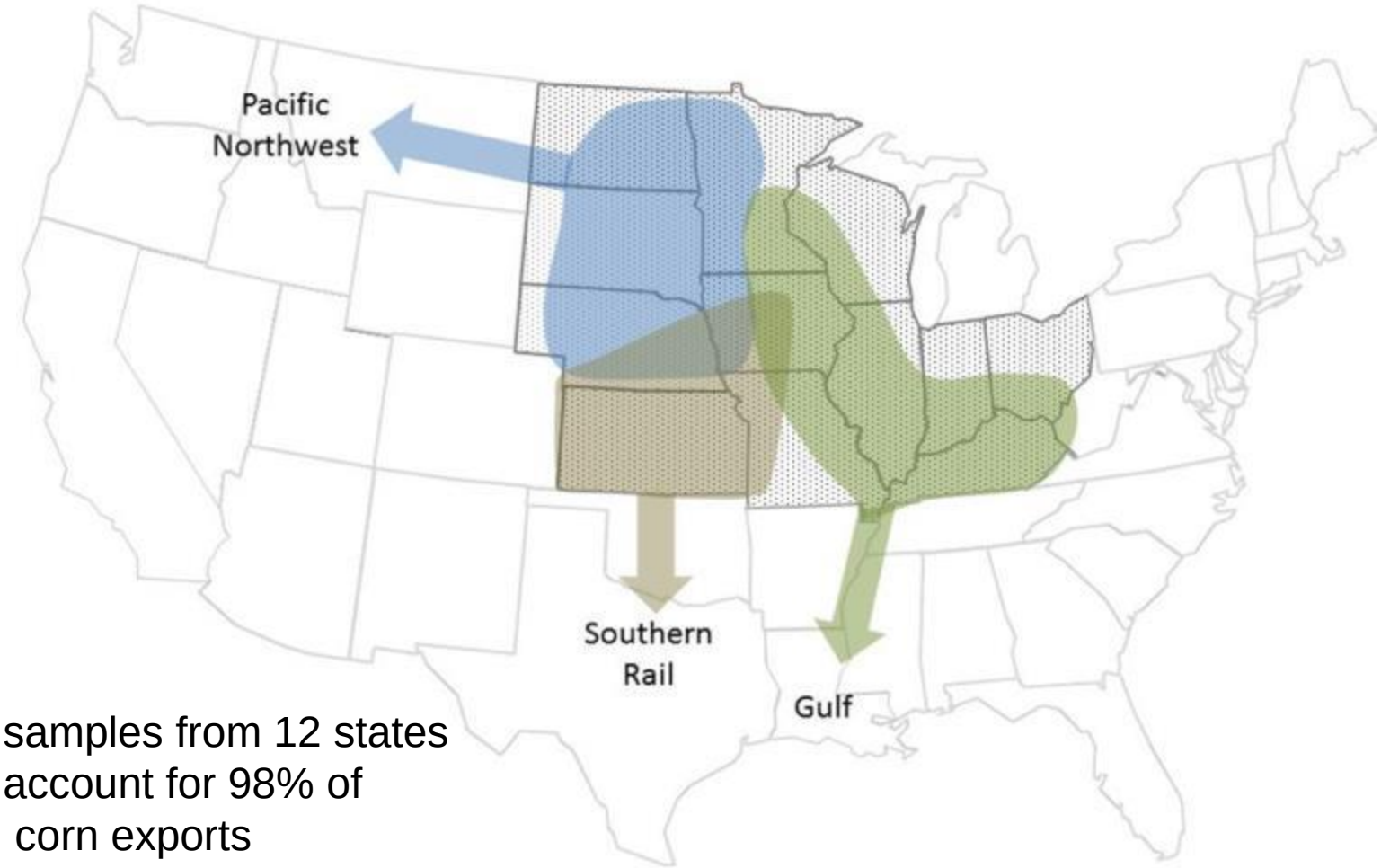


## 2015: Fifth year of this report

- Beginning to evaluate trends and factors that impact corn quality
- Annual Series: Enhancing knowledge over time
- Quality at export affected by many factors in the U.S. grain marketing system
- *Corn Export Cargo Quality Report* in March 2016 will report U.S. corn quality from samples at export points

# “Export Catchment Areas” (ECAs)

2015/2016 Corn
Harvest Quality Report




620 samples from 12 states that account for 98% of U.S. corn exports



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# Quality Factors Tested

2015/2016 Corn
Harvest Quality Report

## Grading Factors

- Test weight
- Broken corn/foreign material
- Total damage
- Heat damage

## Physical Factors

- Stress cracks/Stress crack index
- 100-kernel weight
- Kernel volume
- True density
- Whole kernels
- Horneous (hard) endosperm

## Moisture

## Chemical Composition

- Protein
- Starch
- Oil

## Mycotoxins

- Aflatoxins
- DON

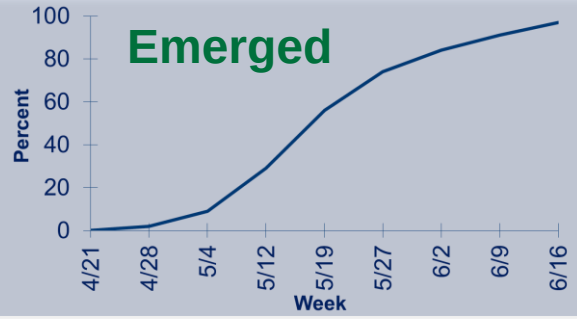
# 2015 Growing Conditions and Impact on Crop Development

2015/2016 Corn
Harvest Quality Report

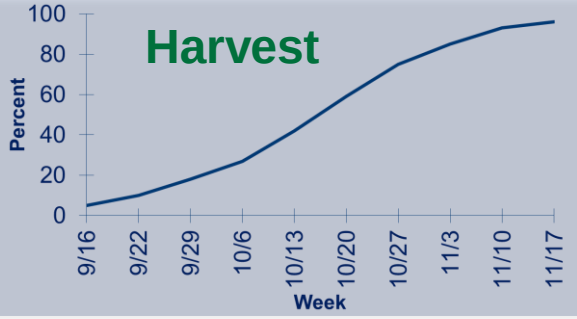
Warm, dry late April to early May, followed by very wet June

Cool daytime and warm nighttime temperatures, 4th record wettest summer

Cool August, warm & dry September & October








Condensed, early planting, abundant subsurface water

Minimal heat stress increased kernel filling with starch

Rapid natural dry-down and harvest; low breakage, stress cracks, disease, mycotoxin levels



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# 2015 Harvest Highlights

2015/2016 Corn
Harvest Quality Report

## Grade Factors

- Test weight: higher than 2014, 2013 and 4YA*; indicates good kernel filling and maturation
- BCFM: levels remained low; average well below the limit for No. 1 grade
- Total damage: lower levels with less variance than 2014; average well below the limit for No. 1 grade

## Moisture

- Lower than 2014, 2013 and 4YA

## Chemical Composition

- Lower protein, accompanied by high starch and oil concentration similar to 2014 but higher than 4YA

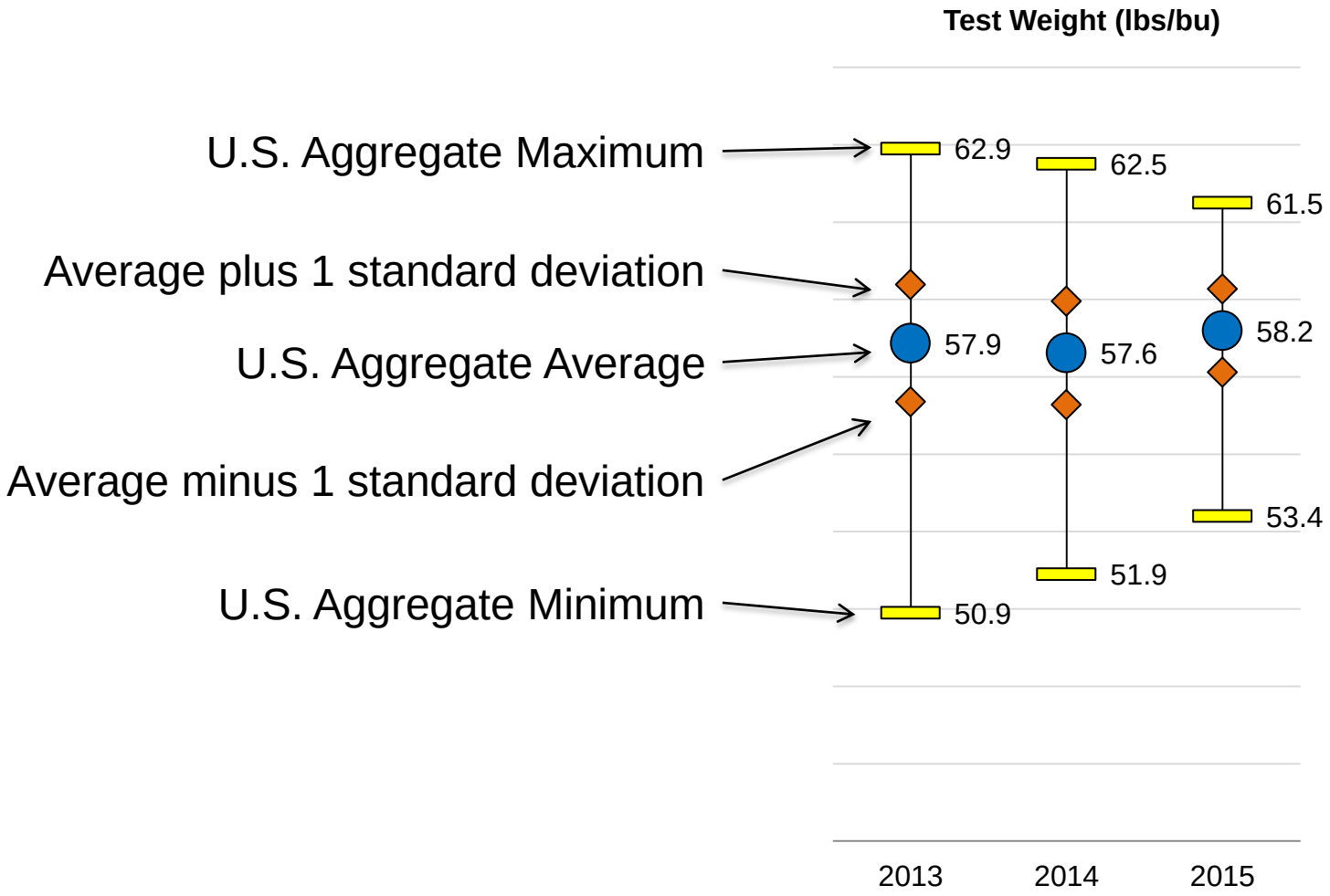
## Physical Factors

- Stress cracks and SCI: lower levels than 2014 and 4YA; susceptibility to breakage may be slightly less than last 2 years
- True density and horneous endosperm: lower than 2014 and 4YA
- Whole kernels: higher than 2014 and 4YA

**4YA: simple average of U.S. Aggregate average quality factor in 2011, 2012, 2013 and 2014*

# Test Results: Comparison

2015/2016 Corn
Harvest Quality Report



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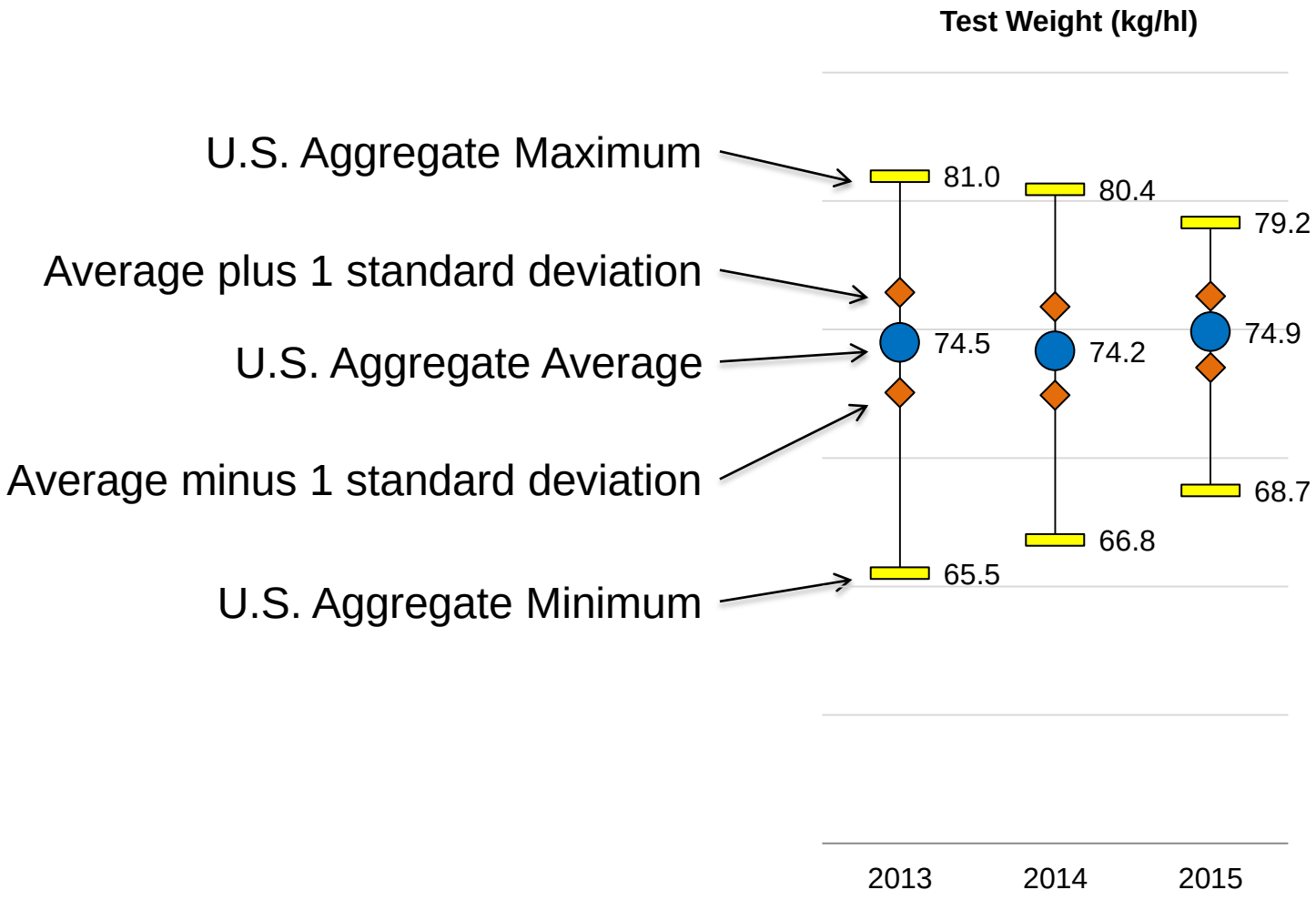
# Test Results: Comparison

2015/2016 Corn
Harvest Quality Report



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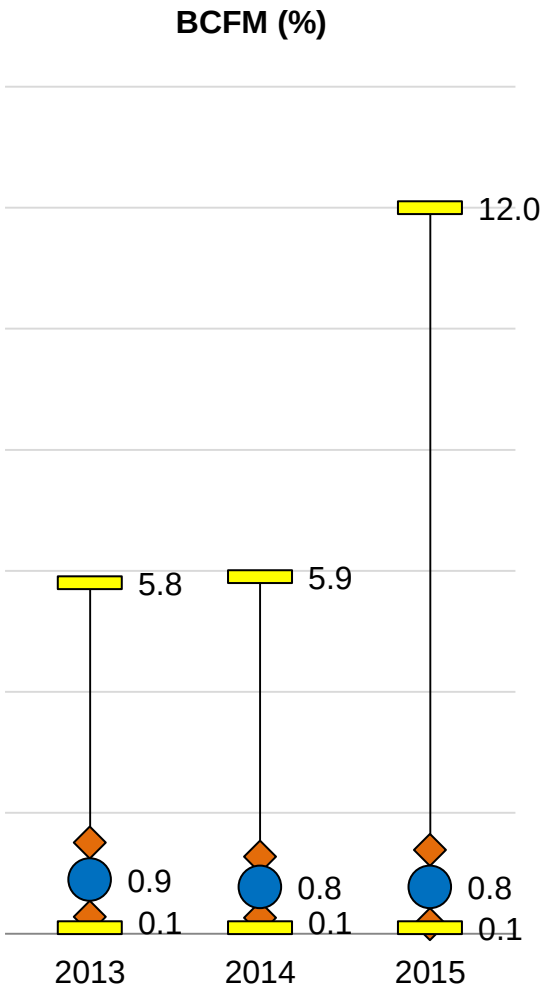
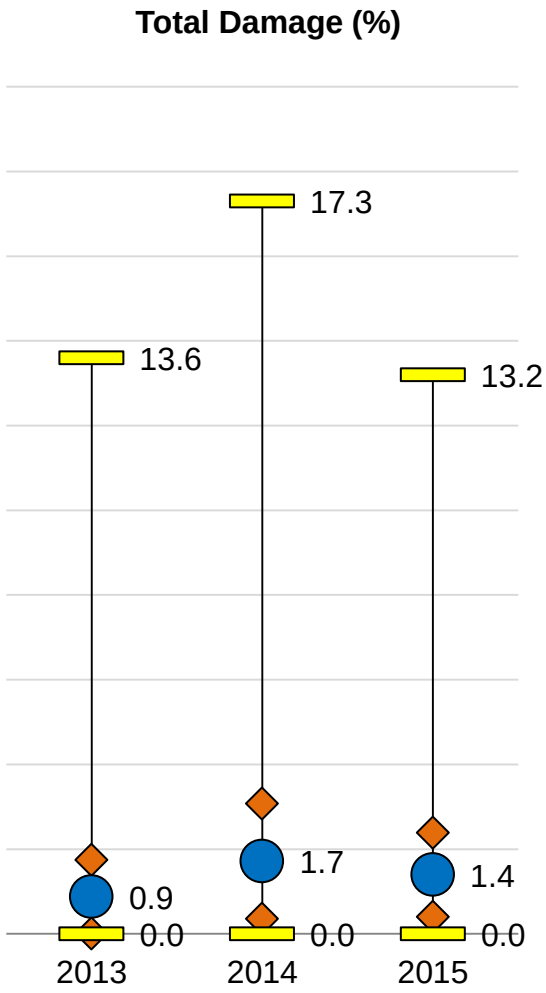
# Test Results: Comparison (cont'd)

2015/2016 Corn
Harvest Quality Report



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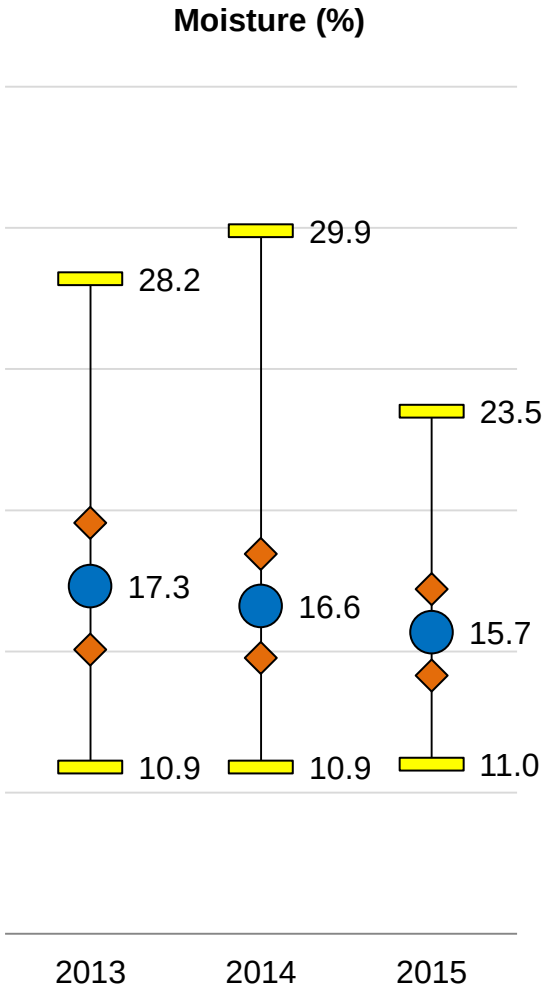
# Test Results: Comparison (cont'd)





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# Test Results: Comparison (cont'd)

2015/2016 Corn
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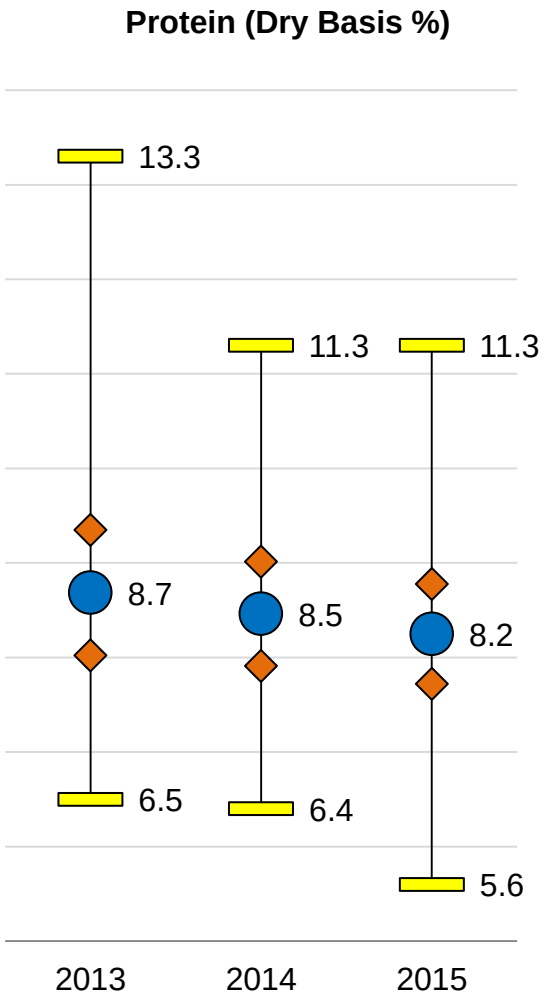


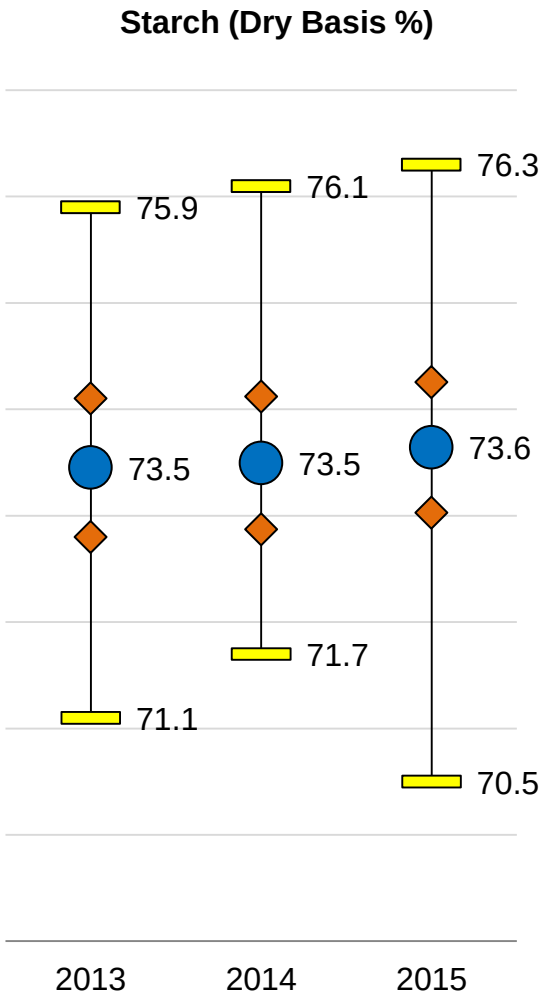


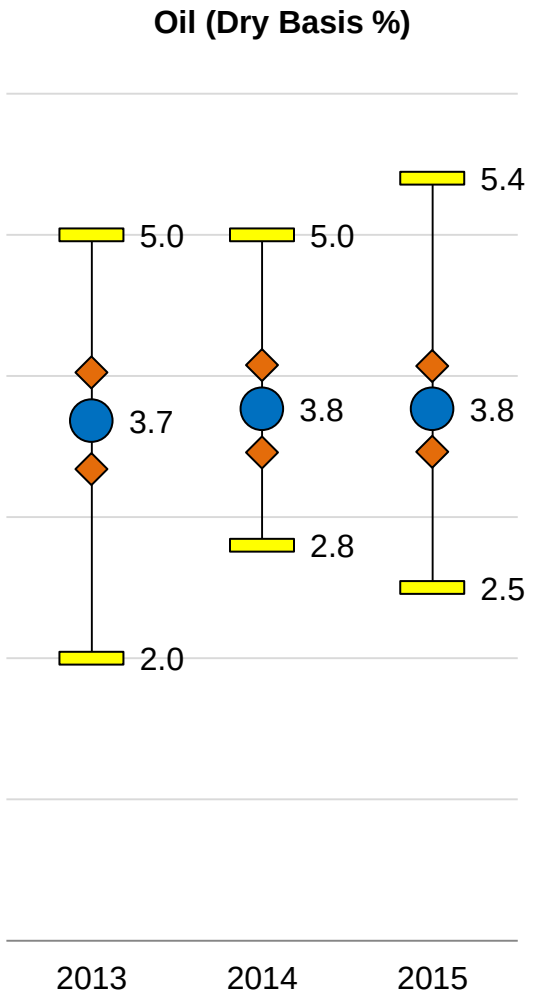




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# Test Results: Comparison (cont'd)

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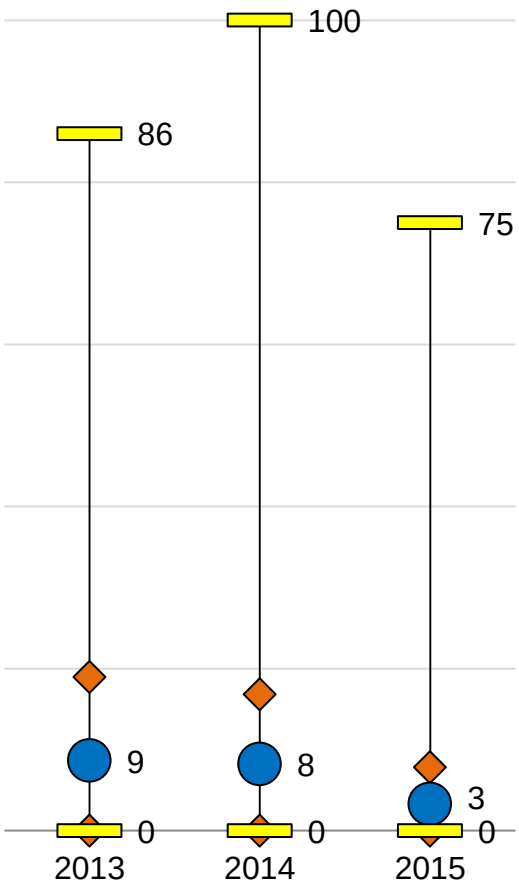
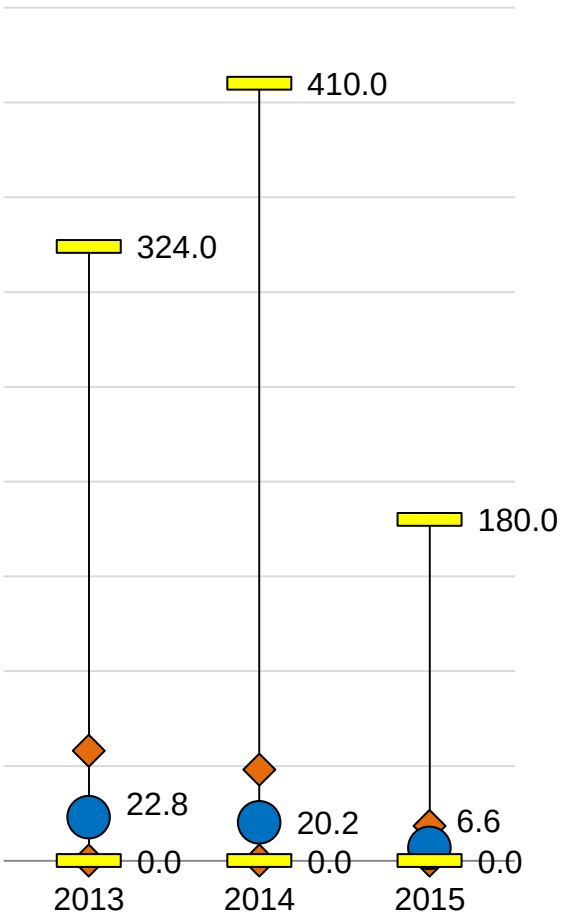
**Stress Cracks (%)**




**Stress Crack Index**



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# Test Results: Comparison (cont'd)

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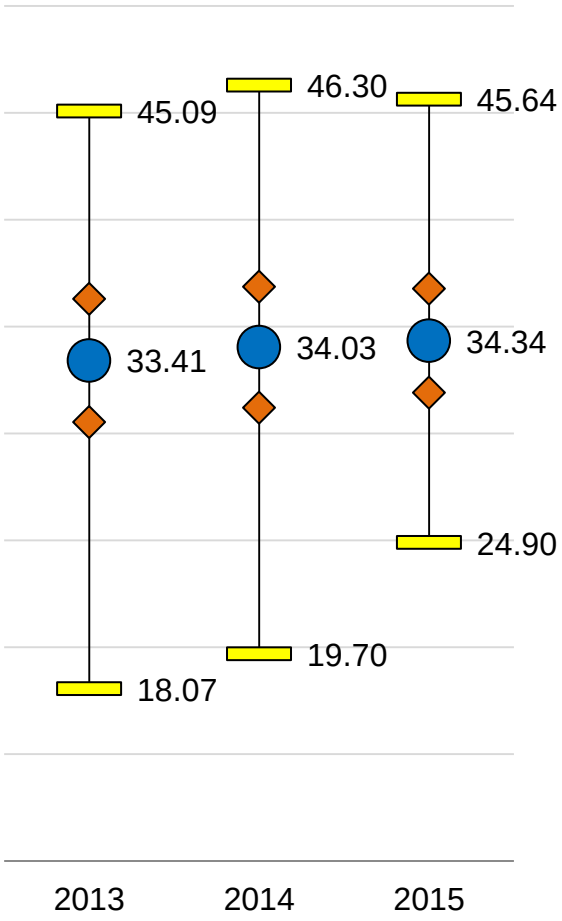
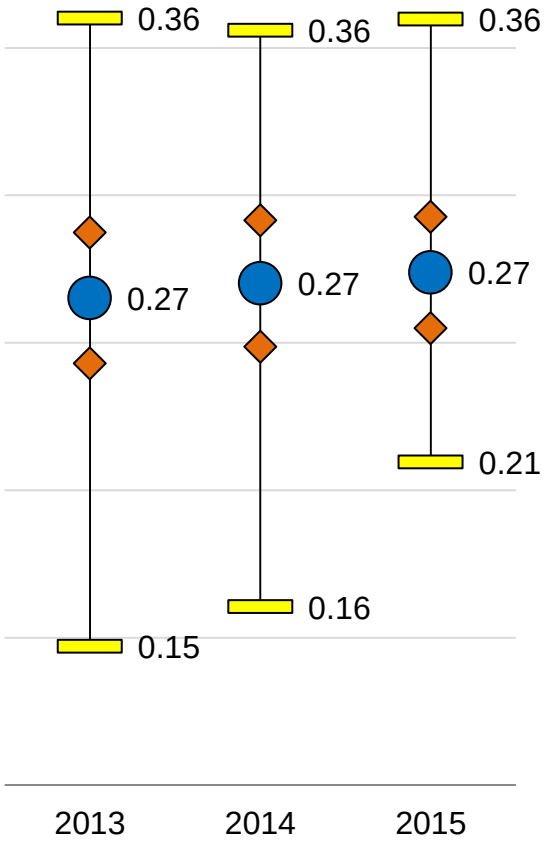
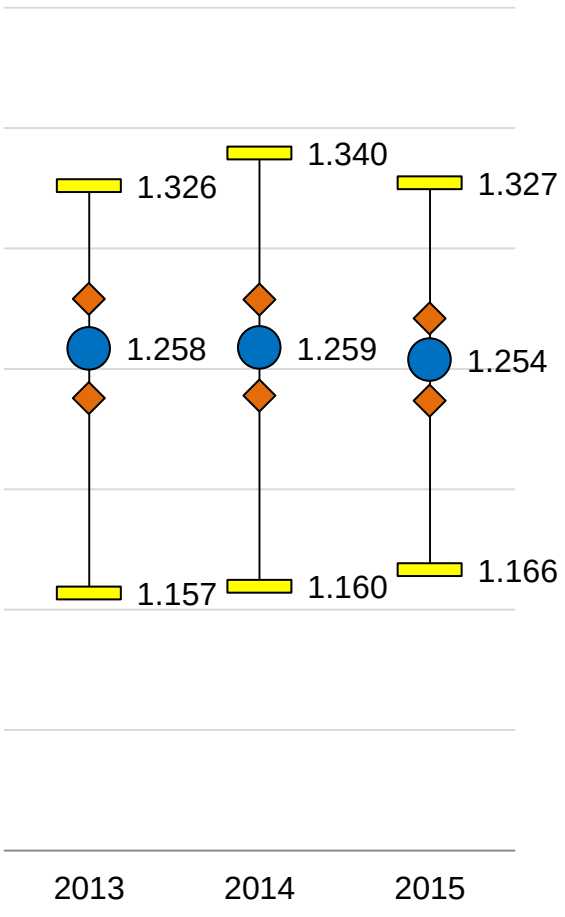
**100-Kernel Weight (g)**




**Kernel Volume ($cm^3$)**




**True Density ($g/cm^3$)**



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# Test Results: Comparison (cont'd)

2015/2016 Corn
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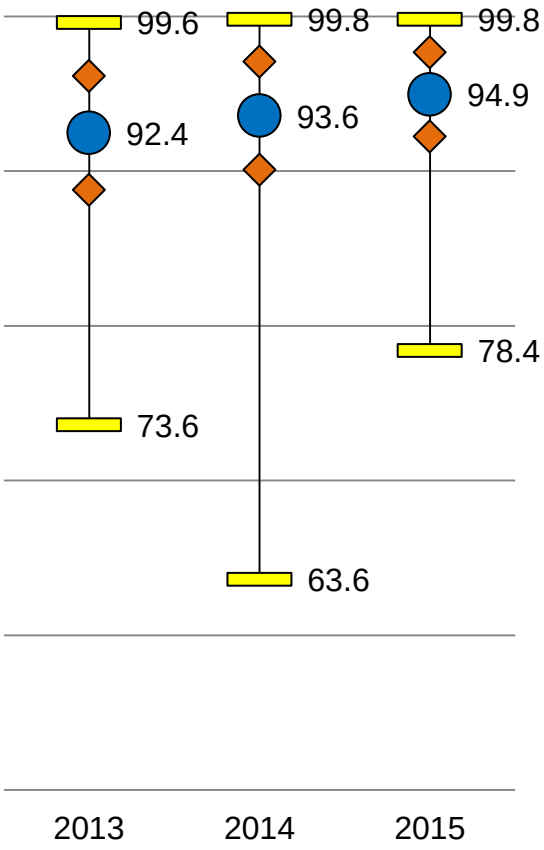
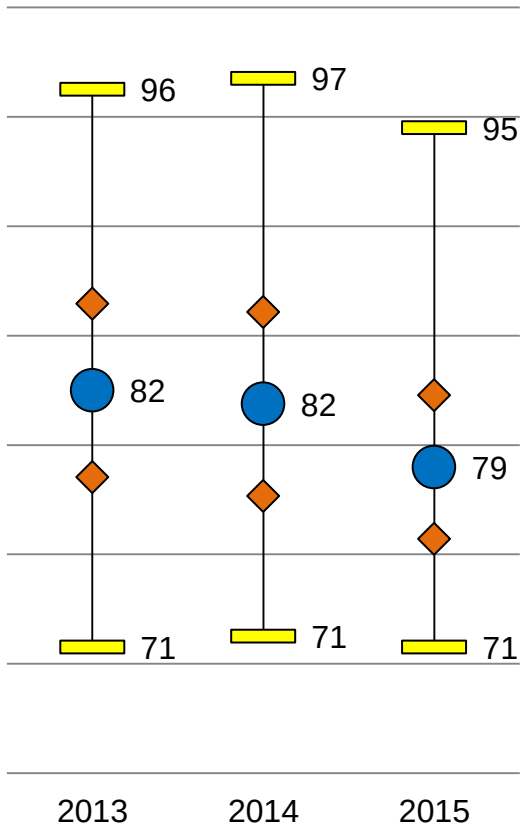
**Whole Kernels (%)**




**Horneous Endosperm (%)**



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# Test Results: Comparison (cont'd)



## Aflatoxins

- 100% of the samples tested below the FDA action level

## DON

- Lower incidences of DON were detected in the 2015 crop than in the 2014 and 2013 crops
- All samples tested below the FDA advisory level



# Grade Factors and Moisture

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# Grades and Grade Requirements

2015/2016 Corn
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| Grade | Min. Test Weight per Bushel (lb/bu) | --------- Maximum Limits of --------- Heat Damaged (%) | Total Damage (%) | BCFM (%) |
|---|---|---|---|---|
| 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 |

Source: USDA Federal Grain Inspection Service (FGIS)

# Grade Factors and Moisture

2015/2016 Corn
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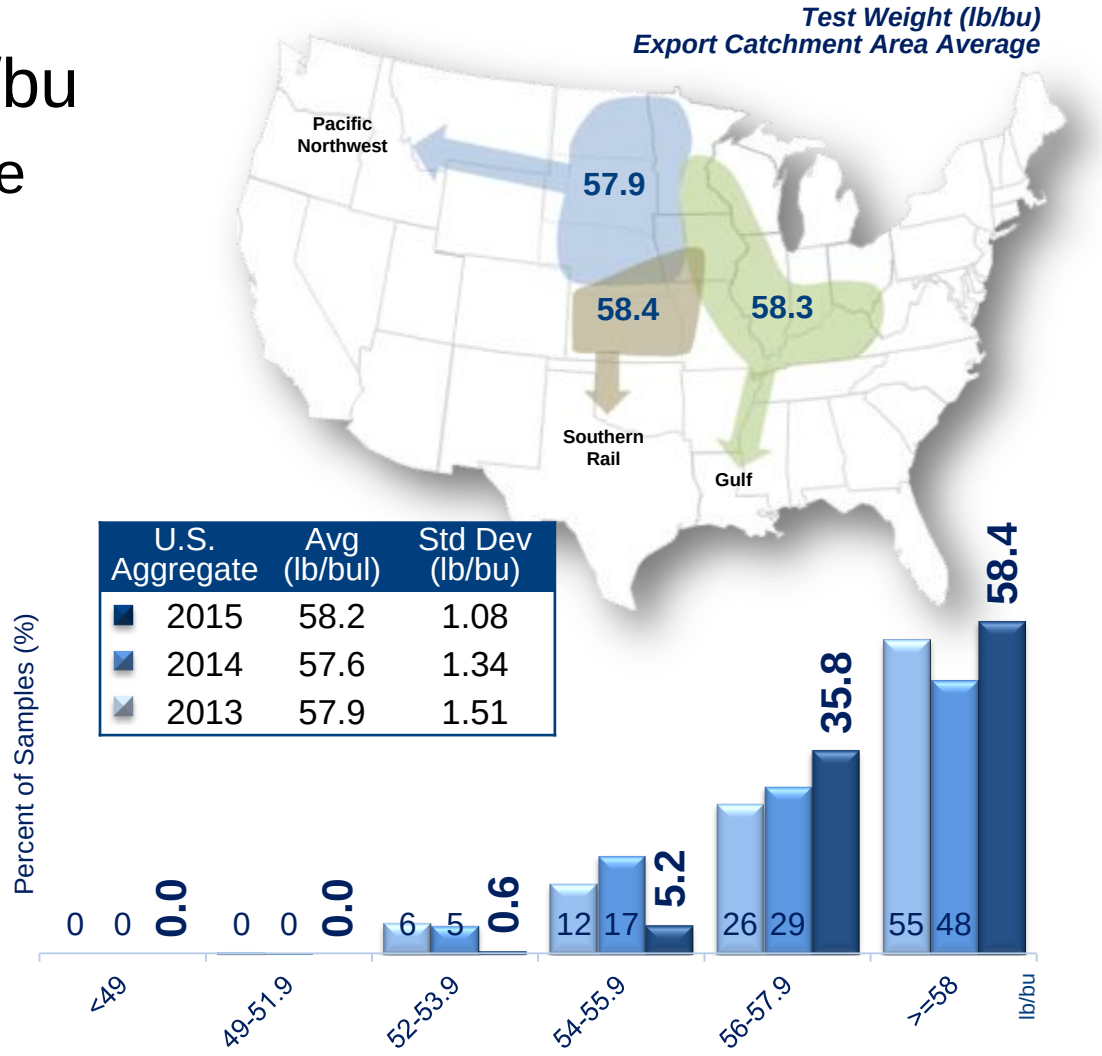
| | No. of Samples | Avg. | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| Test Weight (lb/bu) | 620 | 58.2 | 1.08 | 53.4 | 61.5 |
| Test Weight (kg/hl) | 620 | 74.9 | 1.38 | 68.7 | 79.2 |
| BCFM (%) | 620 | 0.8 | 0.61 | 0.1 | 12.0 |
| Broken Corn (%) | 620 | 0.6 | 0.42 | 0.0 | 7.5 |
| Foreign Material (%) | 620 | 0.2 | 0.27 | 0.0 | 4.5 |
| Total Damage (%) | 620 | 1.4 | 1.00 | 0.0 | 13.2 |
| Heat Damage (%) | 620 | 0.0 | 0.00 | 0.0 | 0.0 |
| Moisture (%) | 620 | 15.7 | 1.53 | 11.0 | 23.5 |

# Test Weight – U.S. Units

2015/2016 Corn
Harvest Quality Report

## U.S. Aggregate: 58.2 lb/bu

- Higher average and more uniform than 2014
- Indicates good kernel filling and maturation
- 94.2% above No. 1 grade minimum
- Southern Rail ECA had highest average



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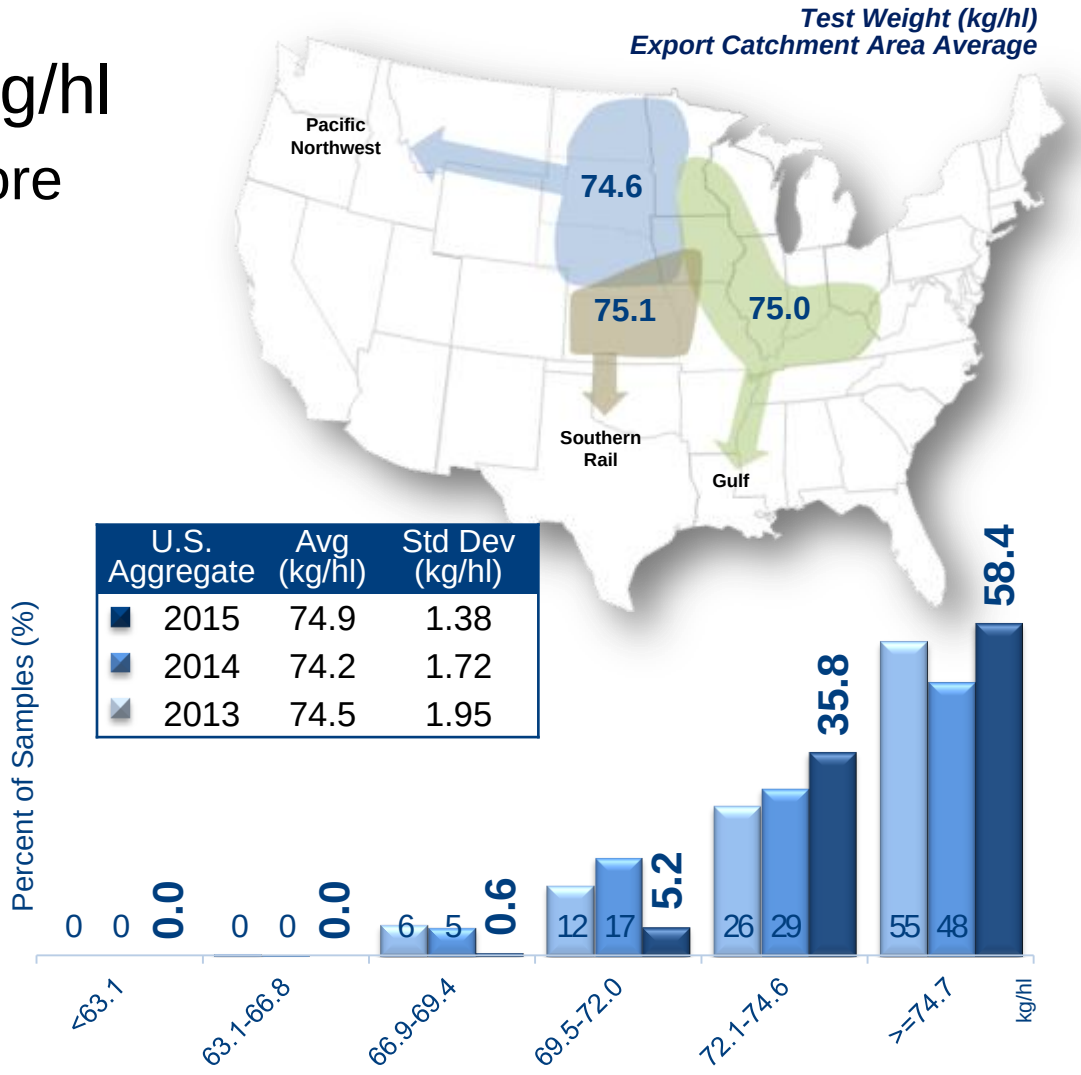
# Test Weight - Metric

2015/2016 Corn
Harvest Quality Report

- U.S. Aggregate: 74.9 kg/hl
  - Higher average and more uniform than 2014
  - Indicates good kernel filling and maturation
  - 94.2% above No. 1 grade minimum
  - Southern Rail ECA had highest average



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# Broken Corn/Foreign Material*

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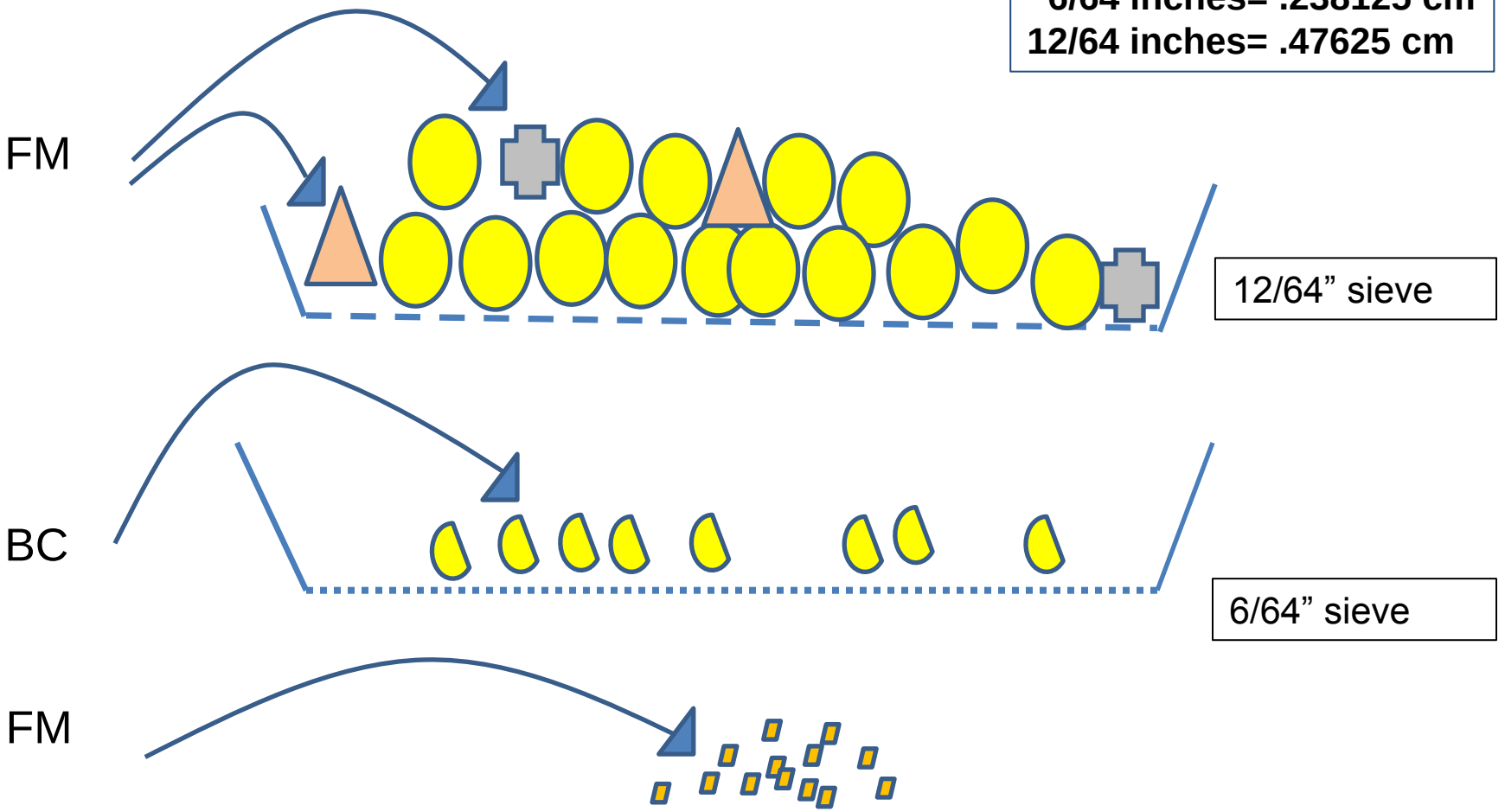
* Measured as % of weight

**6/64 inches= .238125 cm**
**12/64 inches= .47625 cm**



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# Broken Corn/Foreign Material (BCFM) (%)

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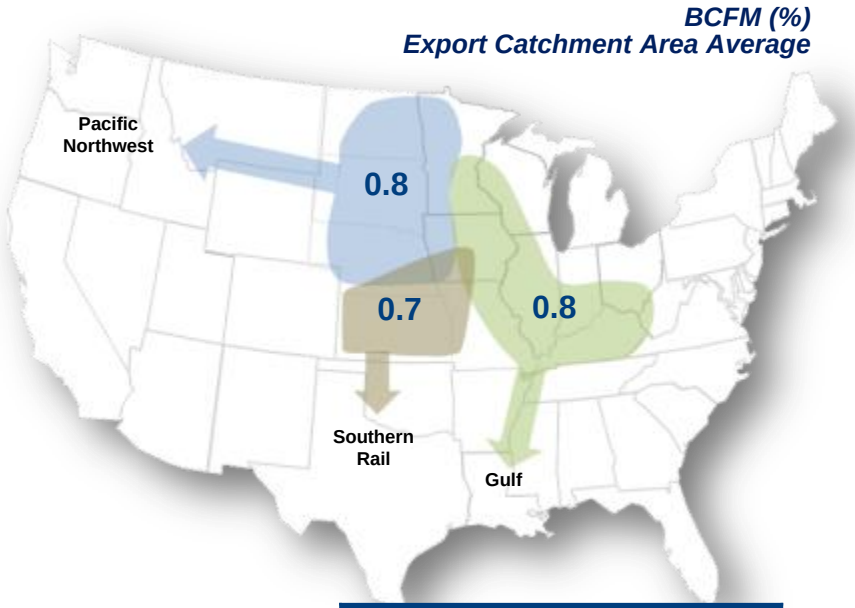
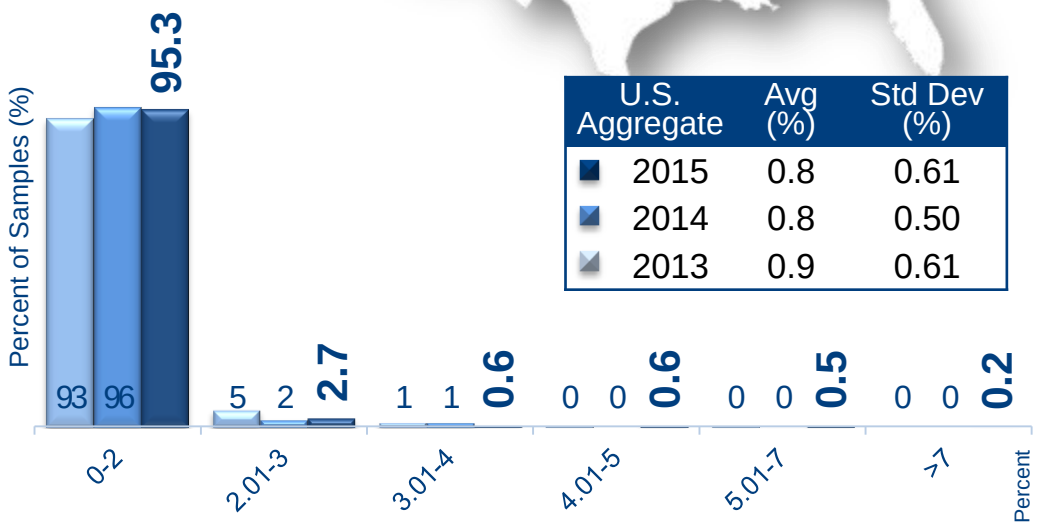
## U.S. Aggregate: 0.8%

- Average well below limit for No. 1 grade
- Average same as but less uniform than 2014 and 4YA
- Southern Rail ECA had the lowest average in 2015




| U.S. Aggregate | Avg (%) | Std Dev (%) |
|---|---|---|
| 2015 | 0.8 | 0.61 |
| 2014 | 0.8 | 0.50 |
| 2013 | 0.9 | 0.61 |



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# Broken Corn (%)

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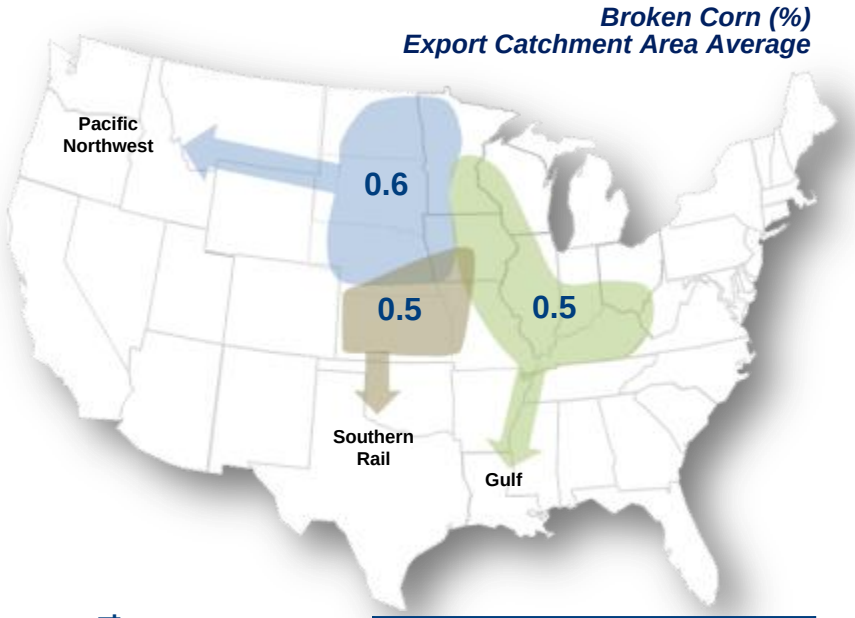
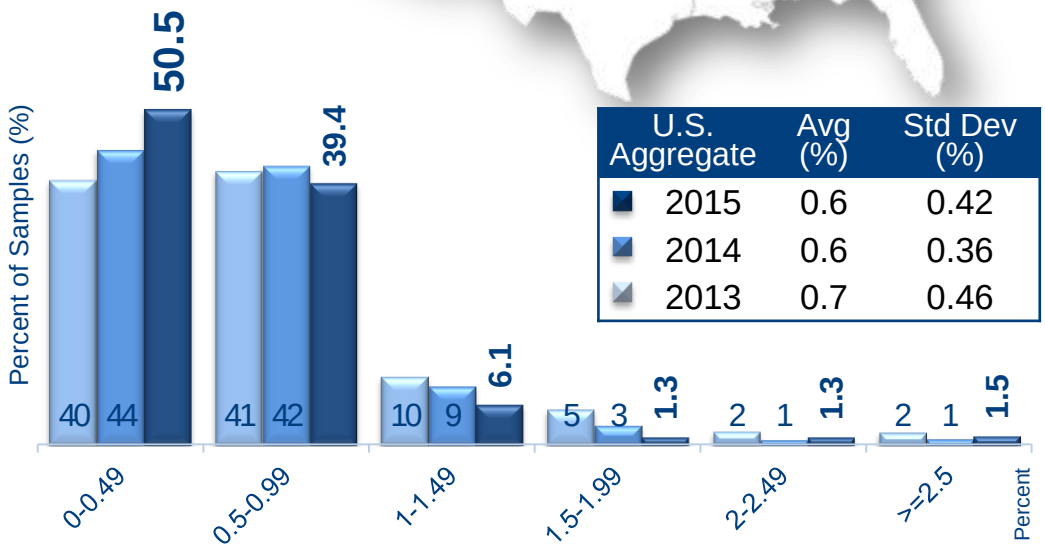
## U.S. Aggregate: 0.6%

- In nearly all samples, BCFM consisted mostly of broken corn, similar to previous years
- Average similar to previous years




| U.S. Aggregate | Avg (%) | Std Dev (%) |
|---|---|---|
| 2015 | 0.6 | 0.42 |
| 2014 | 0.6 | 0.36 |
| 2013 | 0.7 | 0.46 |



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# Foreign Material (%)

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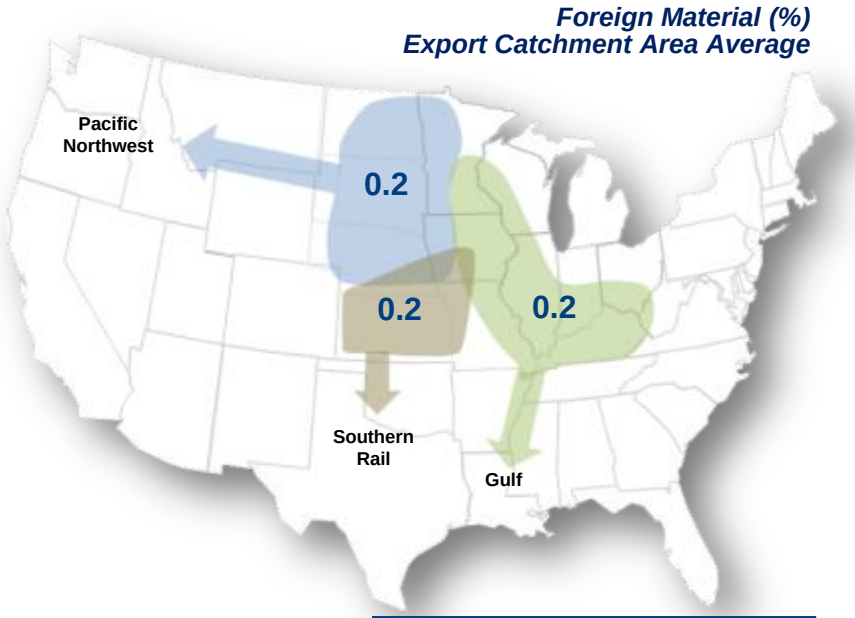
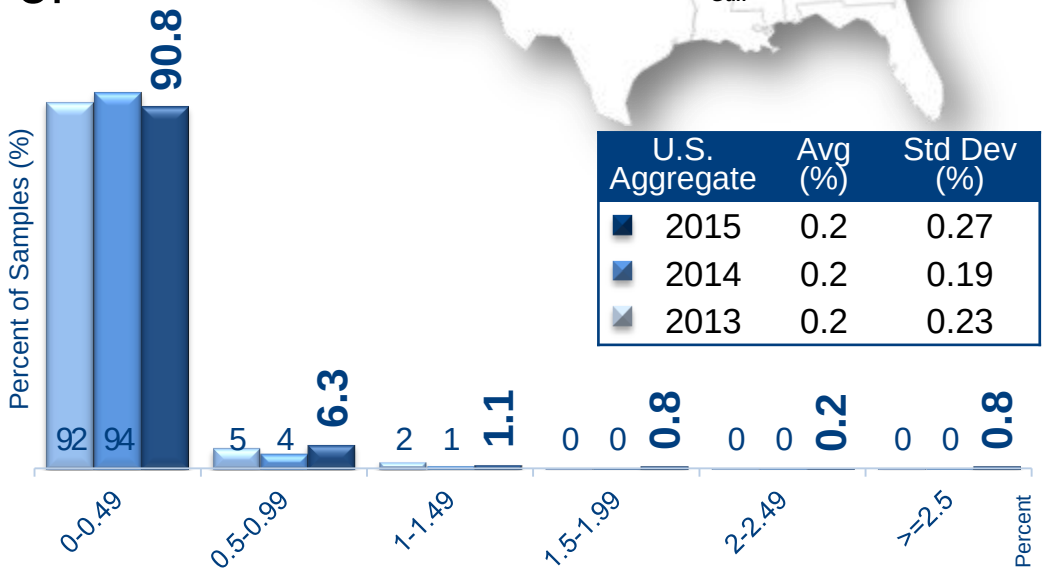
## U.S. Aggregate: 0.2%

- Foreign material has varied little across ECAs or over the years
- Combines appear to be efficiently removing most of the fine material




| U.S. Aggregate | Avg (%) | Std Dev (%) |
|---|---|---|
| 2015 | 0.2 | 0.27 |
| 2014 | 0.2 | 0.19 |
| 2013 | 0.2 | 0.23 |



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# Total Damage and Heat Damage (%)

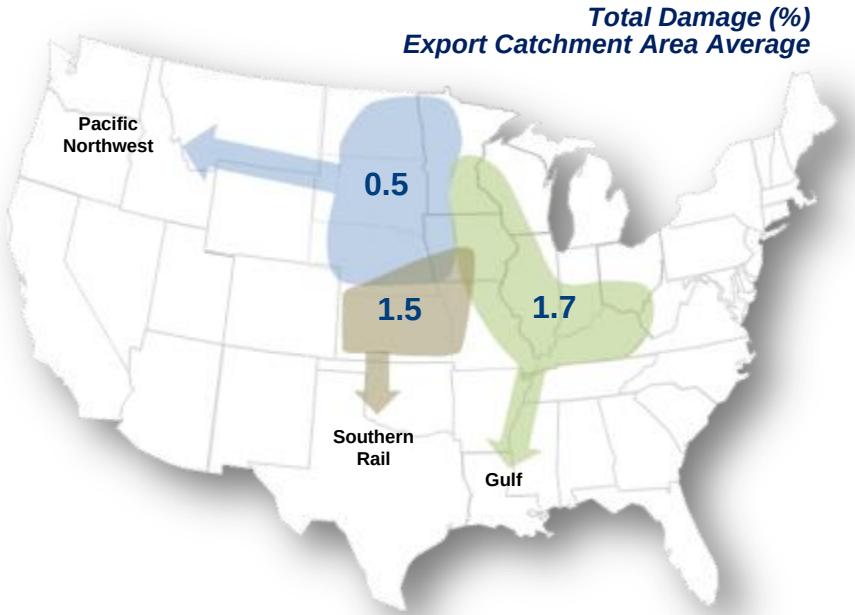
2015/2016 Corn
Harvest Quality Report

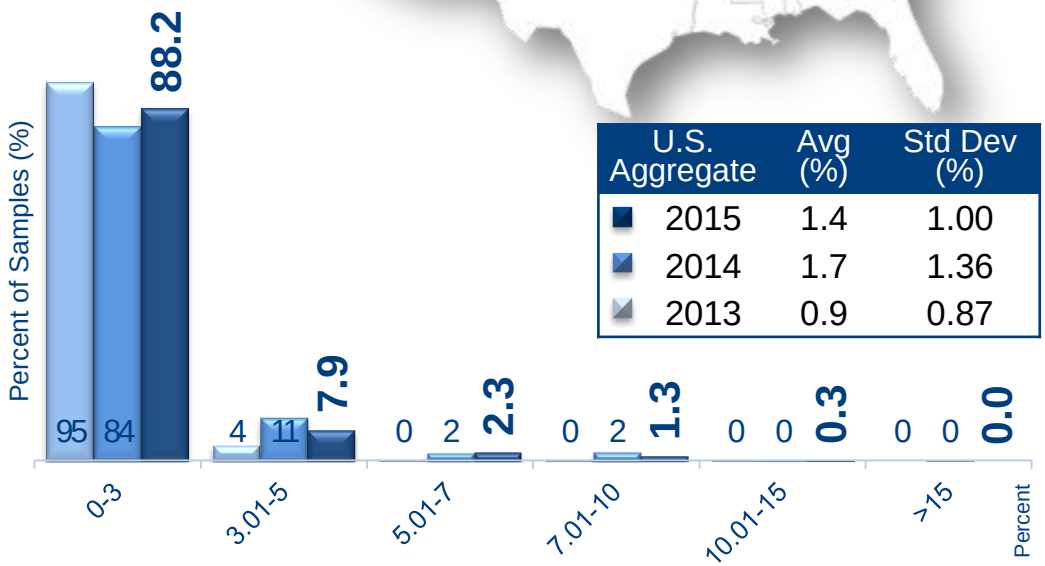
## Total Damage
## U.S. Aggregate: 1.4%

- 88.2% of samples met standard for No. 1 grade
- Lower than 2014 but slightly higher than 4YA
- Pacific Northwest ECA had lowest average for 4YA

## Heat Damage: Zero

- Same as previous years




| U.S. Aggregate | Avg (%) | Std Dev (%) |
|---|---|---|
| 2015 | 1.4 | 1.00 |
| 2014 | 1.7 | 1.36 |
| 2013 | 0.9 | 0.87 |



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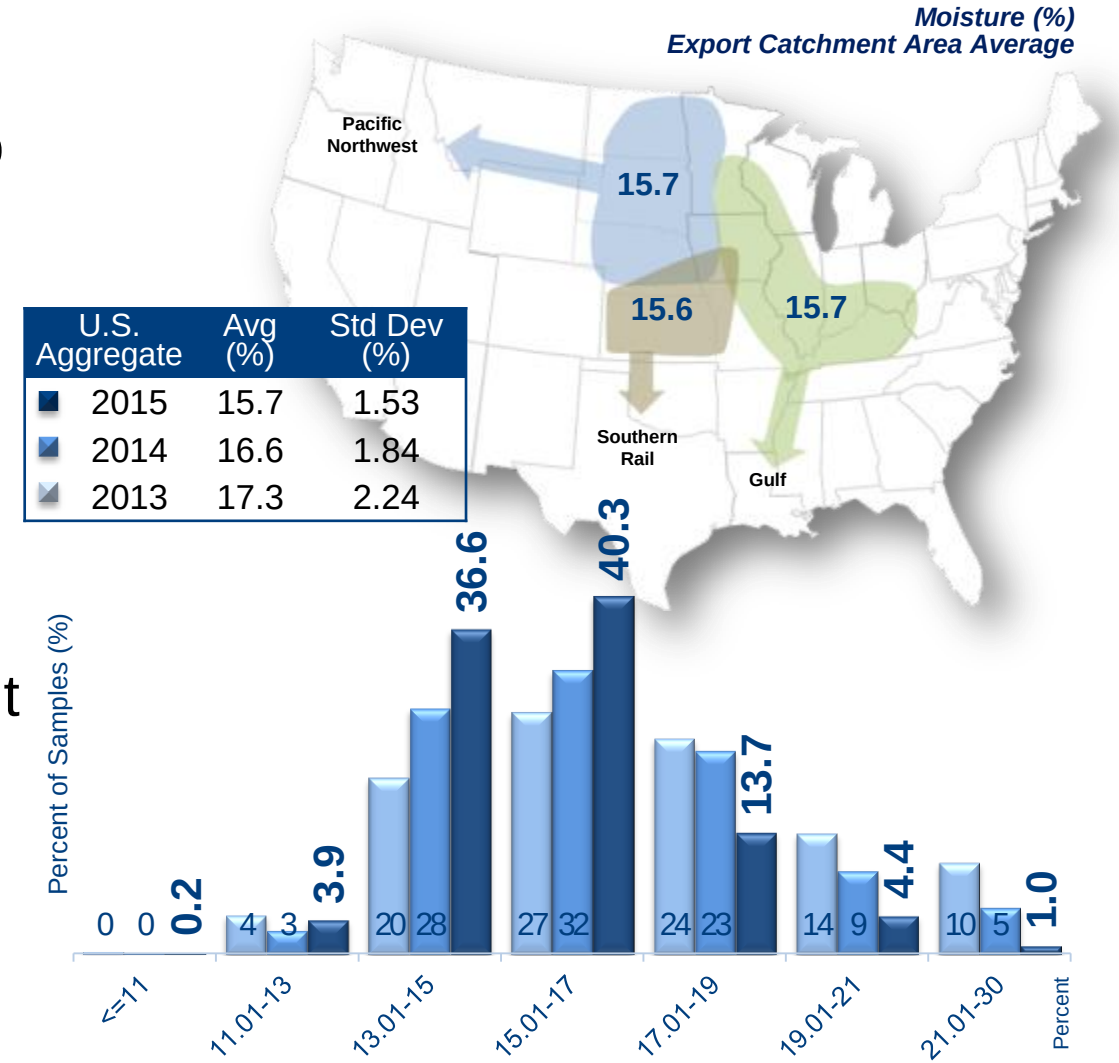
# Moisture (%)



Not a grade factor

U.S. Aggregate: 15.7%

- Lower average and variability than 2014 and 2013
- ECA differences:
  - Gulf: higher in previous years
  - 2015: more consistent harvest conditions across all areas, producing more uniform moisture contents



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# Chemical Composition

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# Chemical Composition

2015/2016 Corn
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**Protein**
- Important for poultry and livestock feeding
- Supplies essential amino acids

Influenced by genetics, crop yields, weather and available nitrogen during the growing season

**Starch**
- Important for wet millers and dry-grind ethanol manufacturers

**Oil**
- Important by-product of wet and dry milling
- Essential feed component

Influenced by genetics, weather and crop yields



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# Chemical Composition

2015/2016 Corn
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| | No. of Samples | Avg. | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| Protein (Dry Basis %) | 620 | 8.2 | 0.53 | 5.6 | 11.3 |
| Starch (Dry Basis %) | 620 | 73.6 | 0.61 | 70.5 | 76.3 |
| Oil (Dry Basis %) | 620 | 3.8 | 0.30 | 2.5 | 5.4 |

# Protein (Dry basis %)

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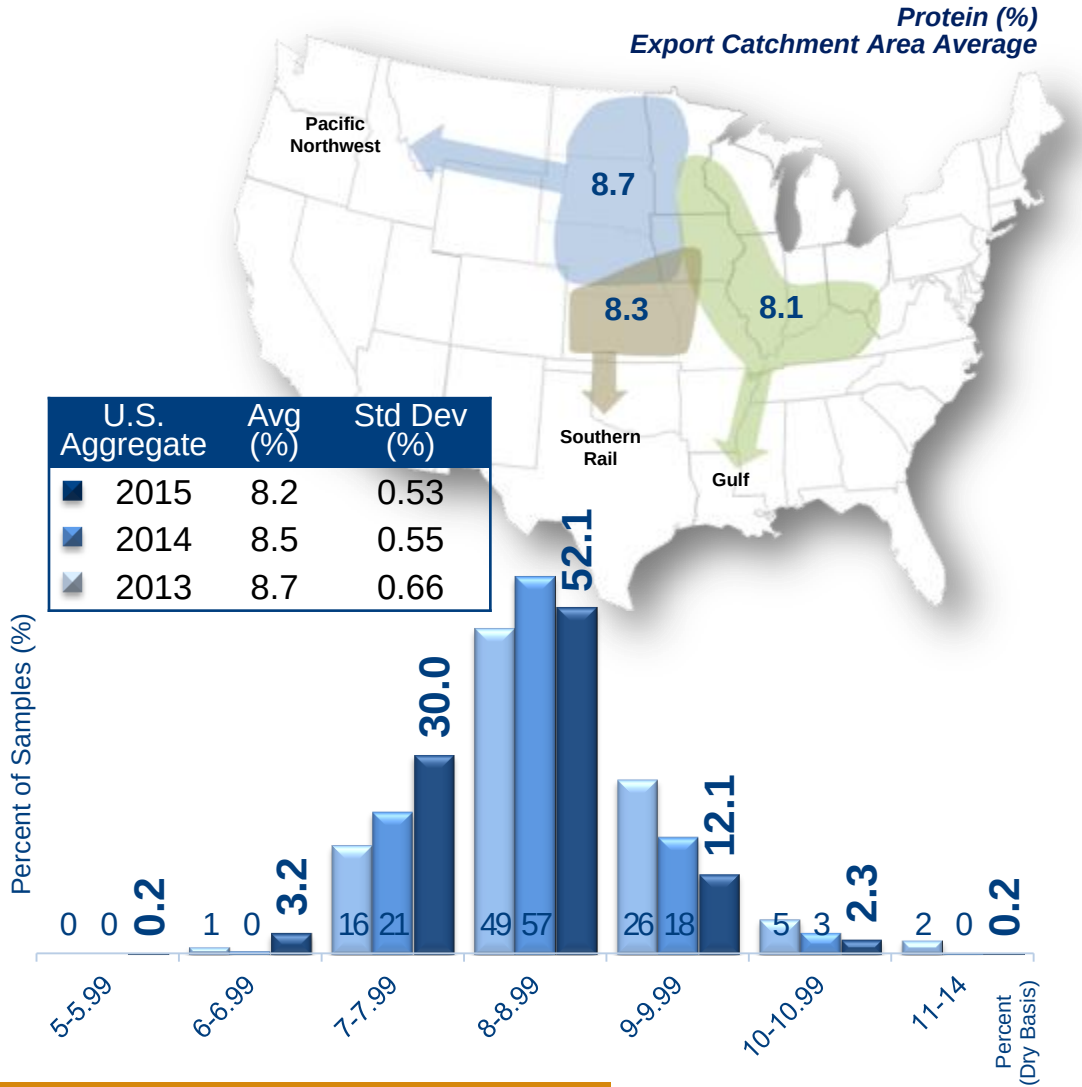
## U.S. Aggregate: 8.2%

- Lower levels in 2015 likely attributable to higher yields
- Available nitrogen was distributed across more bushels/acre, causing lower protein concentration
- Pacific Northwest ECA has had the highest protein the past 3 years



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# Starch (Dry basis %)

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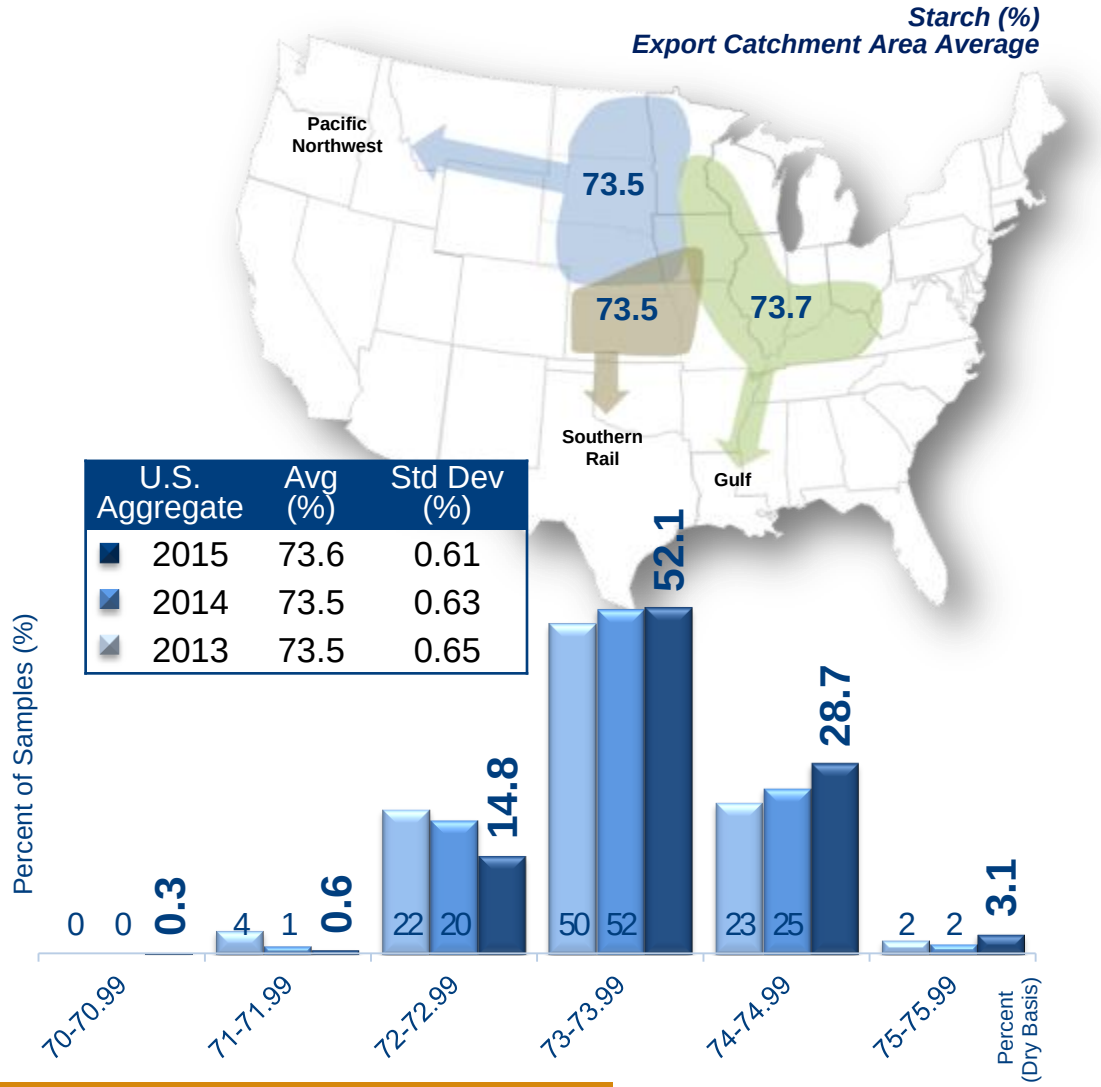
## U.S. Aggregate: 73.6%

- Slightly higher than 2014, 2013 and 4YA
- Gulf ECA tends to have higher average starch and lower protein concentration than the Pacific Northwest and Southern Rail ECAs



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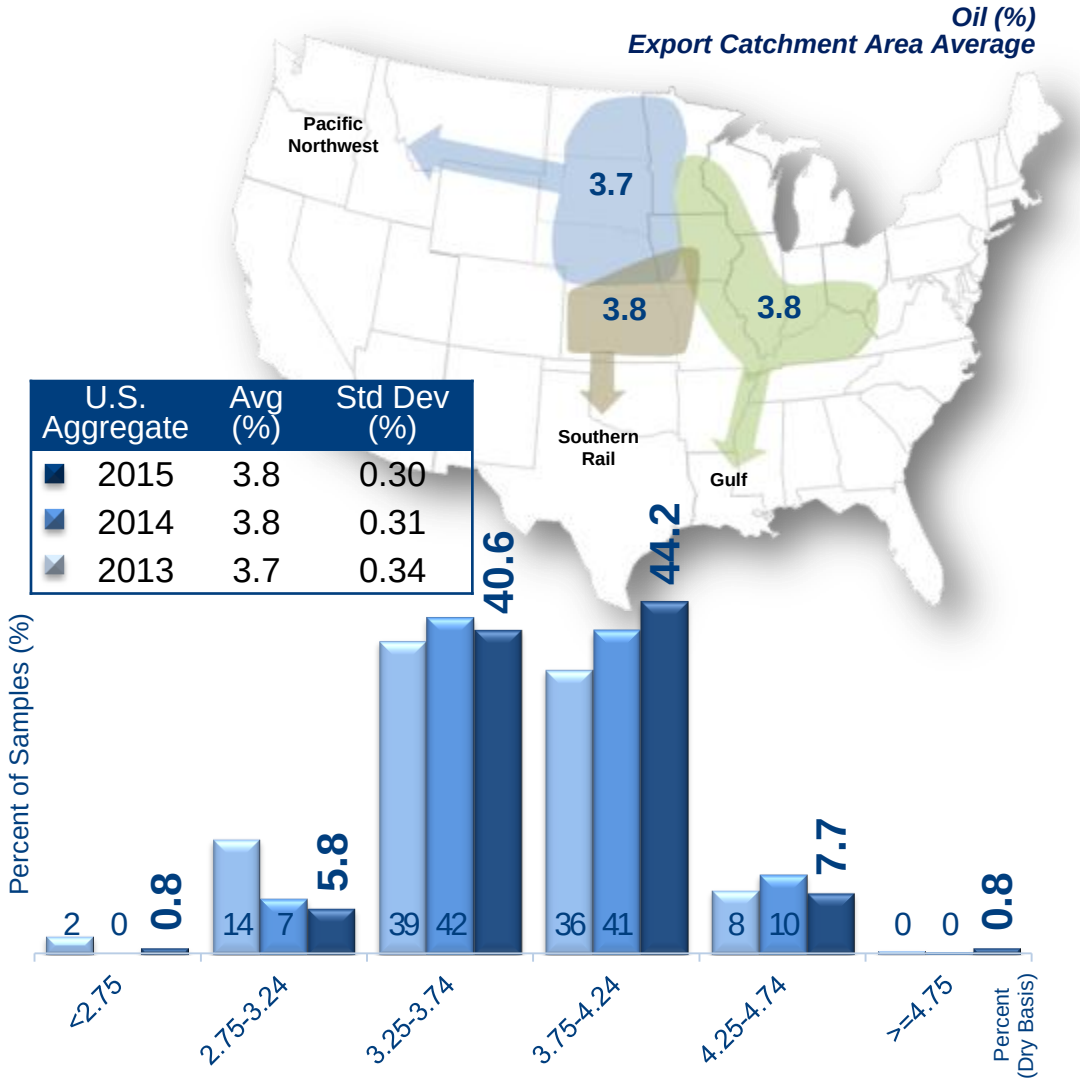
# Oil (Dry basis %)



## U.S. Aggregate: 3.8%

- Comparable concentration to 2014; slightly higher than 4YA
- Gulf and Southern Rail ECAs tend to have higher average oil concentration than Pacific Northwest ECA



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# Physical Factors

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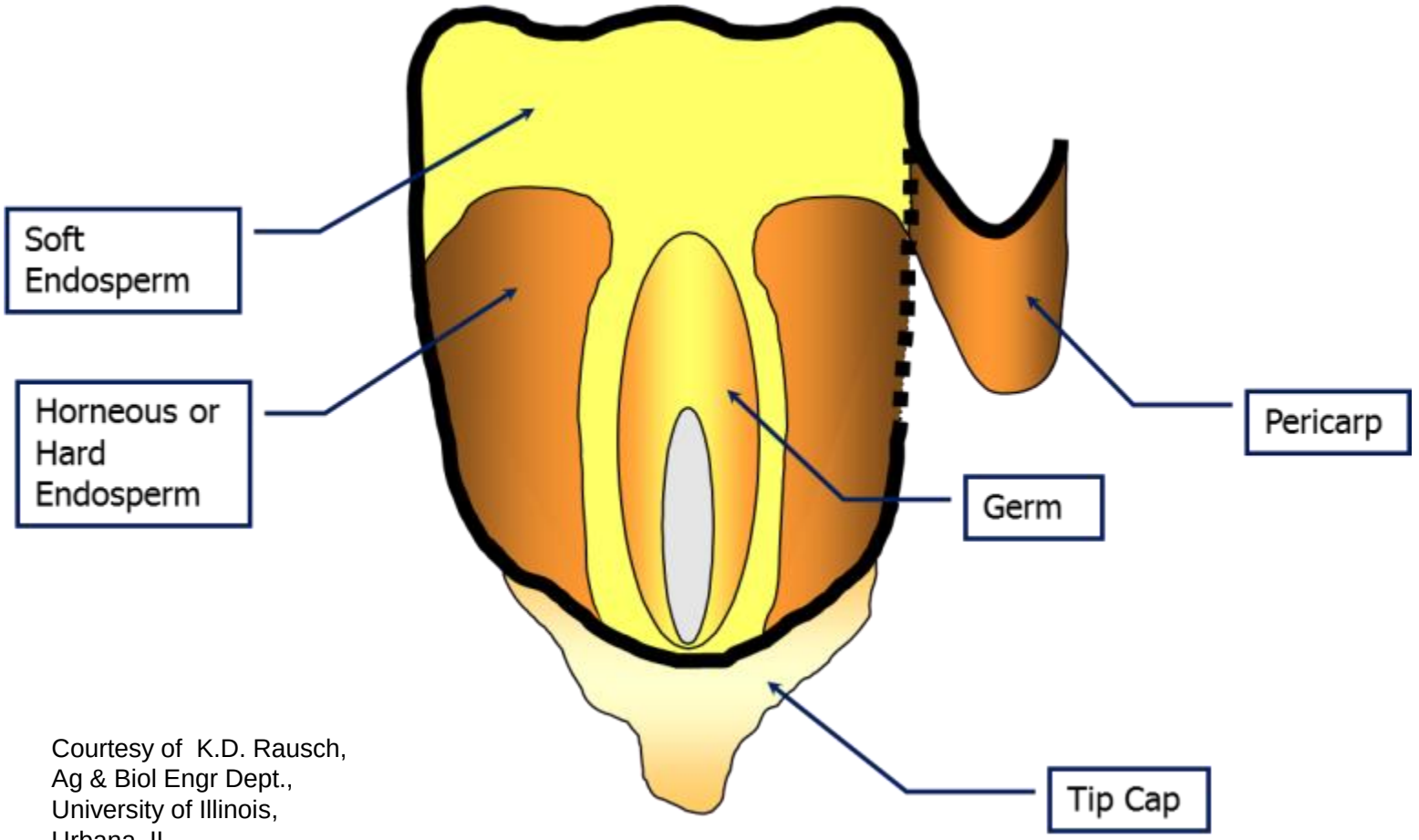
# Corn Morphology






Courtesy of K.D. Rausch,
Ag & Biol Engr Dept.,
University of Illinois,
Urbana, IL



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# Physical Factors – Overview



Related to processing characteristics, storability and potential for breakage

- Stress cracks
- Stress cracks index
- Kernel weight, volume and density
- Whole kernels
- Horneous (hard) endosperm



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# Physical Factors

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| | No. of Samples | Avg. | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| Stress Cracks (%) | 620 | 3 | 5 | 0 | 75 |
| Stress Crack Index | 620 | 6.6 | 11.7 | 0 | 180 |
| 100-Kernel Weight (g) | 620 | 34.34 | 2.43 | 24.90 | 45.64 |
| Kernel Volume ($cm^3$) | 620 | 0.27 | 0.02 | 0.21 | 0.36 |
| True Density ($g/cm^3$) | 620 | 1.254 | 0.017 | 1.166 | 1.327 |
| Whole Kernels (%) | 620 | 94.9 | 2.7 | 78.4 | 99.8 |
| Horneous Endosperm (%) | 620 | 79 | 3 | 71 | 95 |

# Stress Cracks



## Stress Cracks (%)

- Internal cracks in the horneous (hard) endosperm
- Most common cause is artificial drying
- Impacts breakage susceptibility, milling and alkaline cooking

## Stress Crack Index (SCI)

- Indicates severity of stress cracking
- Measures single, double and multiple stress cracks
- Range 0 – 500 (100 kernel sample)

# Stress Crack Index (SCI)

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% kernels with
1 stress crack

X 1

+

% kernels with
2 stress cracks

X 3

+

% kernels with
>2 stress cracks

X 5

= SCI



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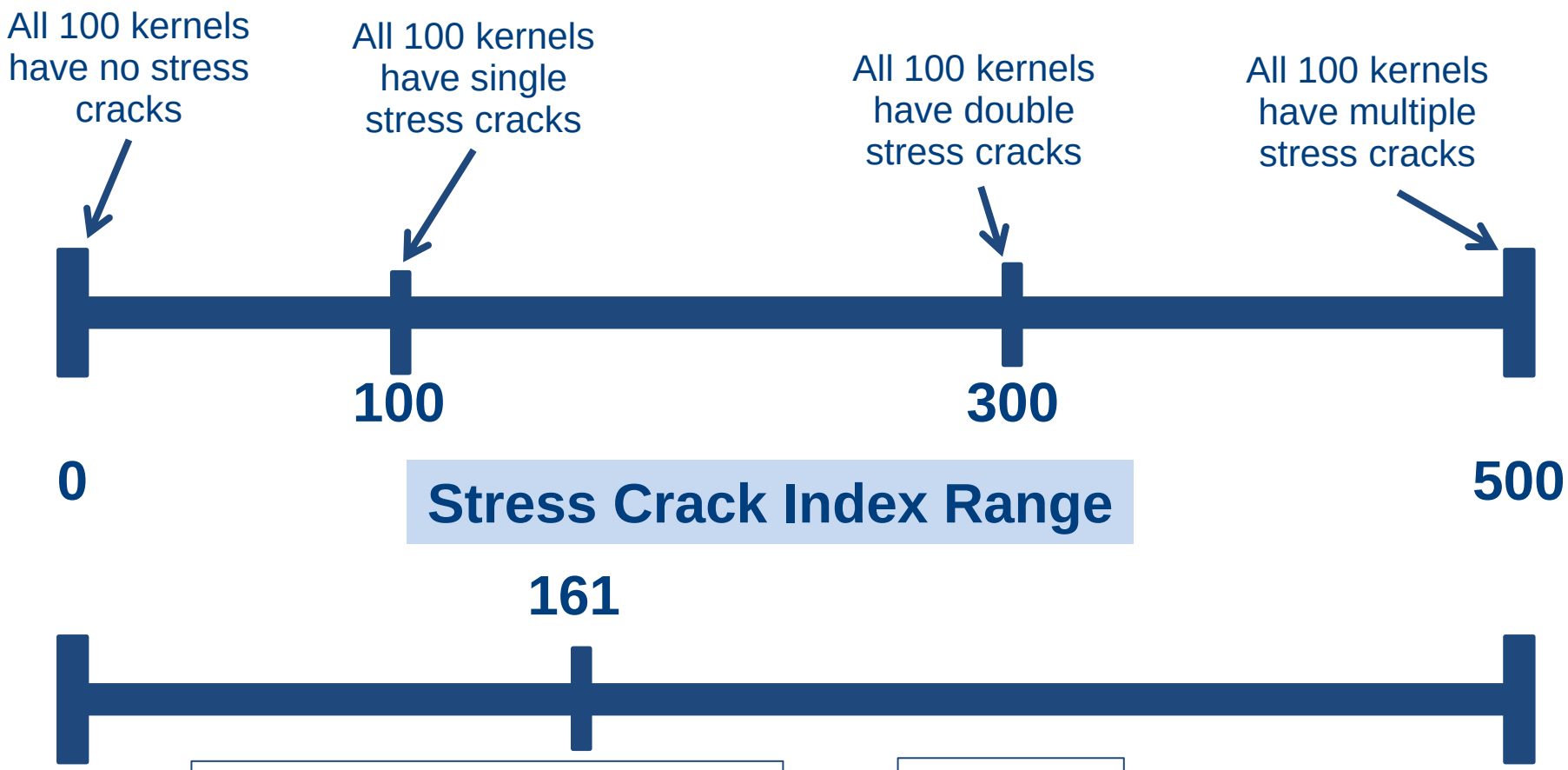
# Magnitude of SCI

2015/2016 Corn
Harvest Quality Report




**Example** **SC% = 43%**

SCI Calculation:

(4%[a] x 1) + (19%[b] x 3) + (20%[c] x 5) = **161**

a: 4 kernels
b: 19 kernels
c: 20 kernels



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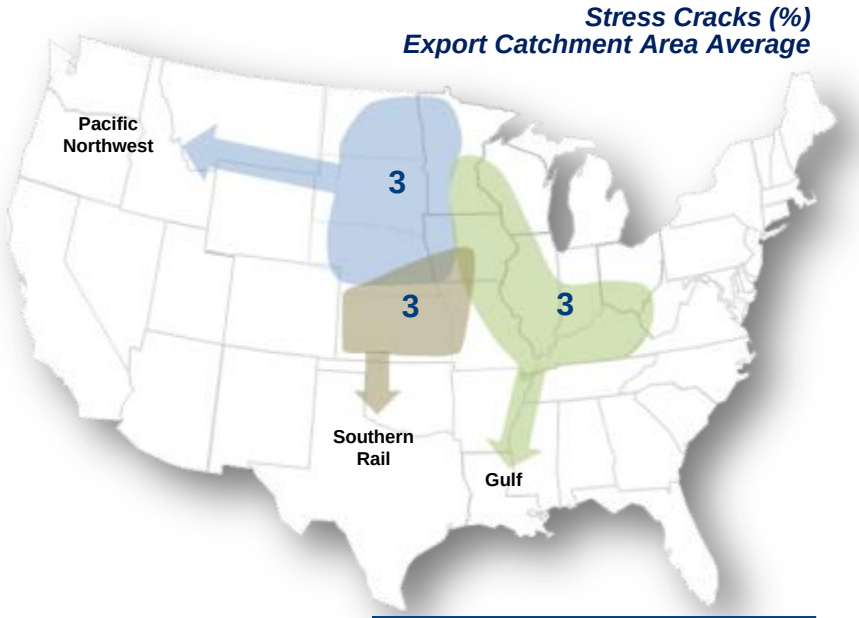
# Stress Cracks (%)

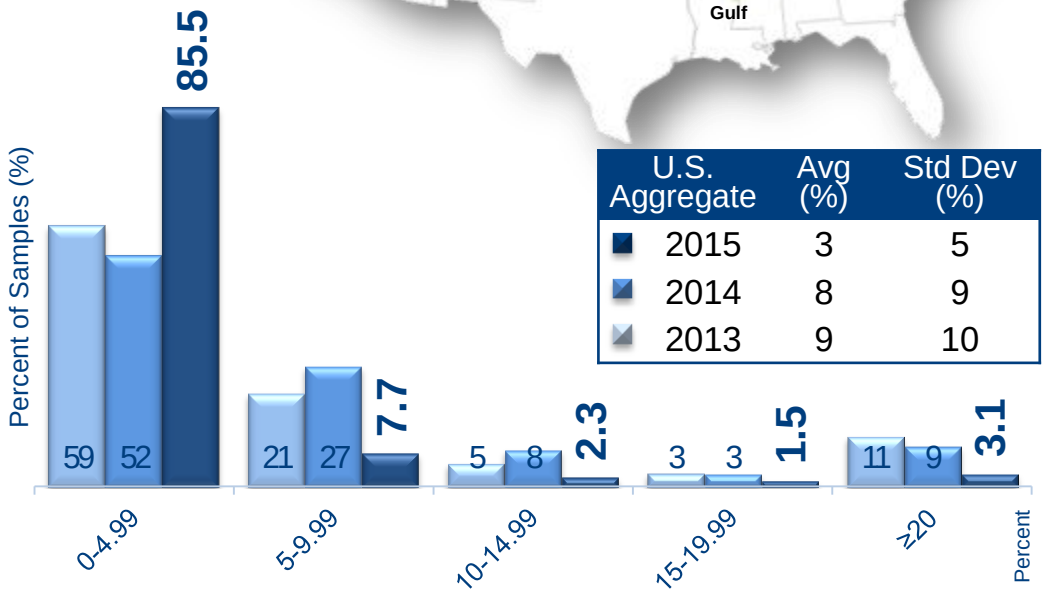
2015/2016 Corn
Harvest Quality Report

## U.S. Aggregate: 3%

- Significantly lower than 2014 and 4YA
- Favorable growing and maturation conditions, along with good field drying and early harvest, led to less artificial drying




| U.S. Aggregate | Avg (%) | Std Dev (%) |
|---|---|---|
| 2015 | 3 | 5 |
| 2014 | 8 | 9 |
| 2013 | 9 | 10 |



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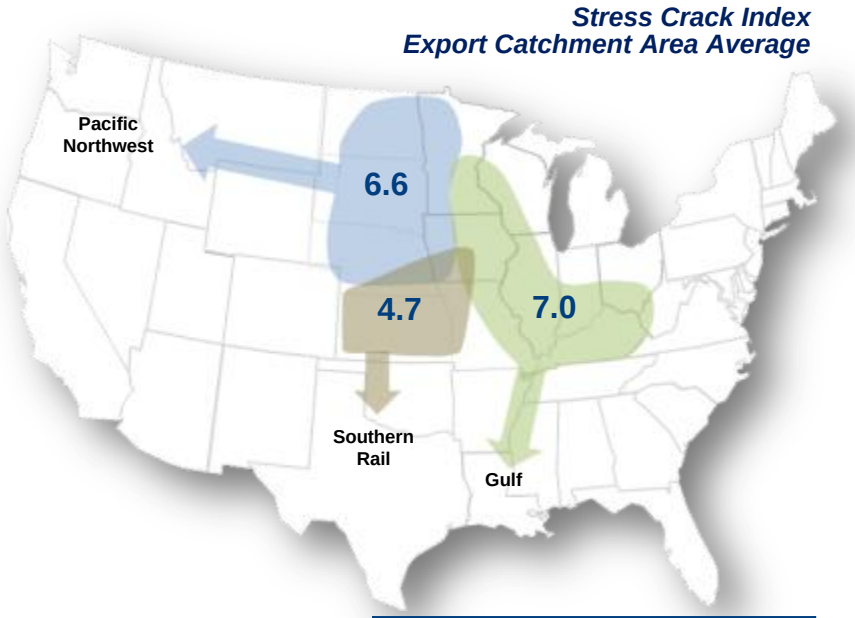
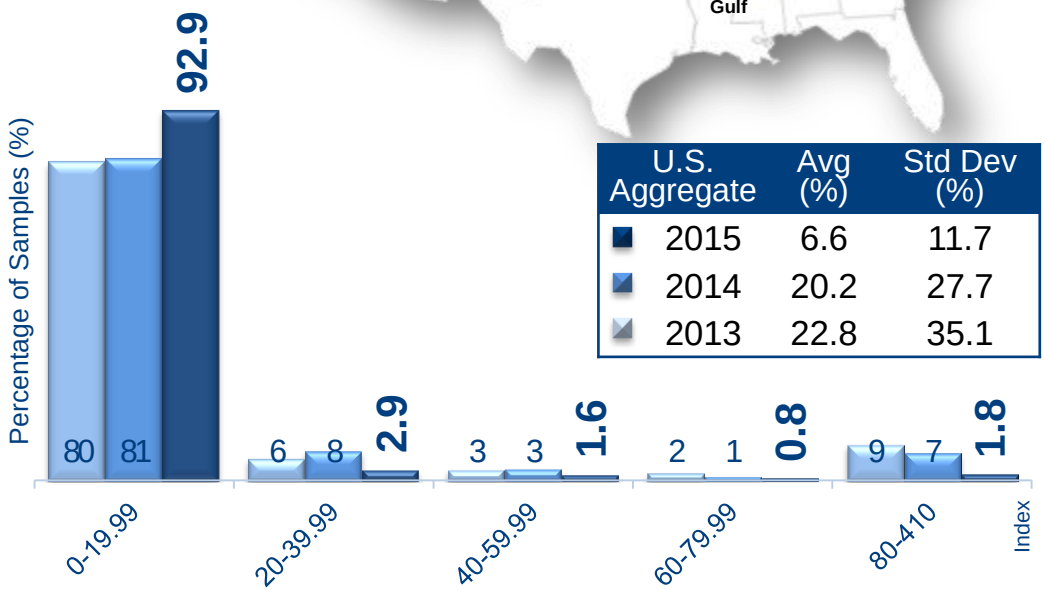
# Stress Crack Index (SCI)

2015/2016 Corn
Harvest Quality Report

## U.S. Aggregate: 6.6

- Fewer kernels with multiple stress cracks in 2015 than in 2014, 2013 and 4YA
- Southern Rail ECA has had the lowest average SCI and stress cracks of the 3 ECAs




| U.S. Aggregate | Avg (%) | Std Dev (%) |
|---|---|---|
| 2015 | 6.6 | 11.7 |
| 2014 | 20.2 | 27.7 |
| 2013 | 22.8 | 35.1 |



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# Kernel Weight, Volume, Density

2015/2016 Corn
Harvest Quality Report

- Measure the size and composition of corn kernels
- Kernel volume is indicative of growing conditions and genetics

$$\frac{\text{100-Kernel Weight (mass) (g)}}{\text{Kernel Volume (cm}^3\text{)}} = \text{True Density (g/cm}^3\text{)}$$

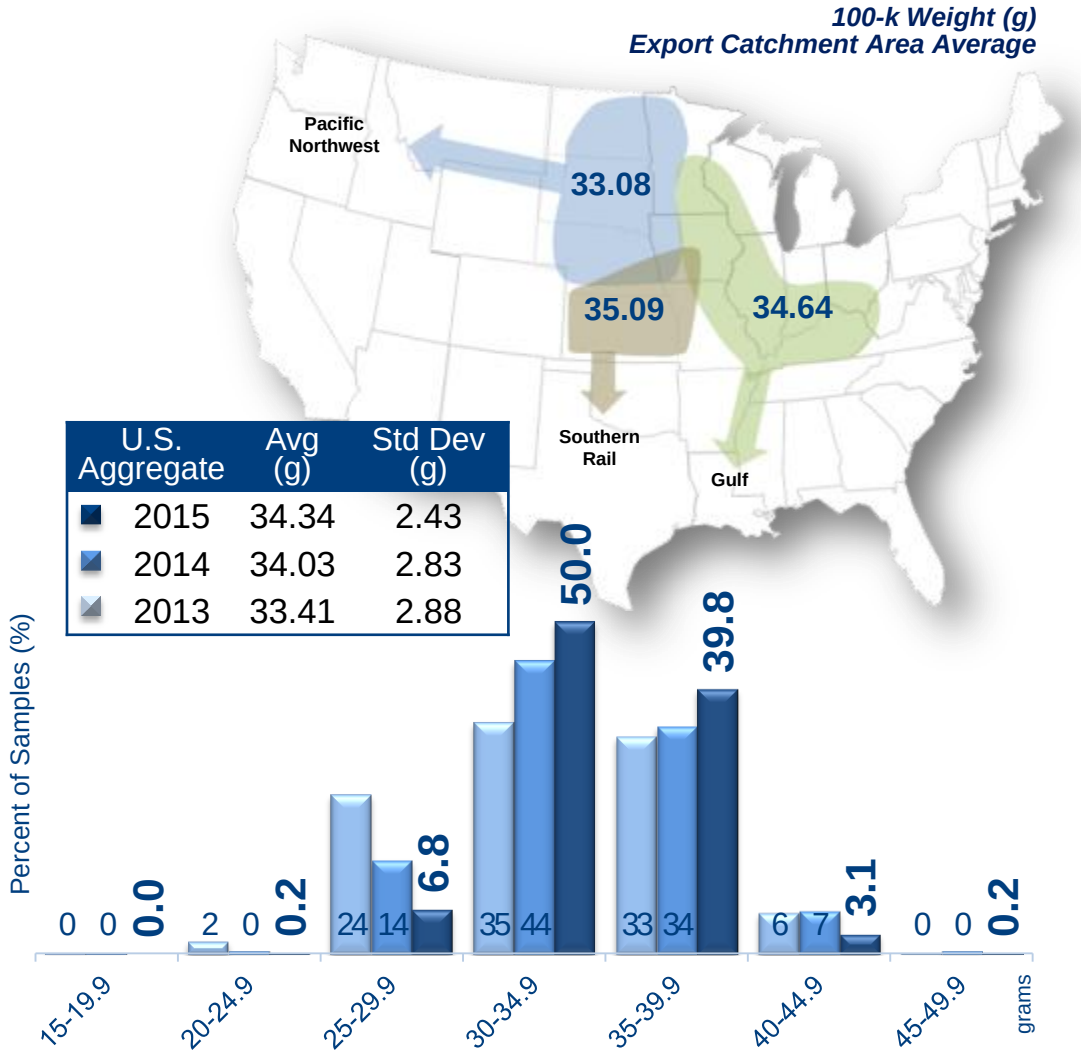
- True density reflects kernel hardness
- Higher density – harder kernels; less susceptible to breakage; more desirable for dry milling and alkaline processing
- Lower density – softer kernels; less at risk for development of stress cracks if high temperature drying is employed; good for wet milling and feed use

# 100-kernel (100-k) Weight (g)

2015/2016 Corn
Harvest Quality Report

## U.S. Aggregate: 34.34 g

- Higher than 2014, 2013 and 4YA averages
- Pacific Northwest ECA has tended to have the lowest 100-k weight of the 3 ECAs



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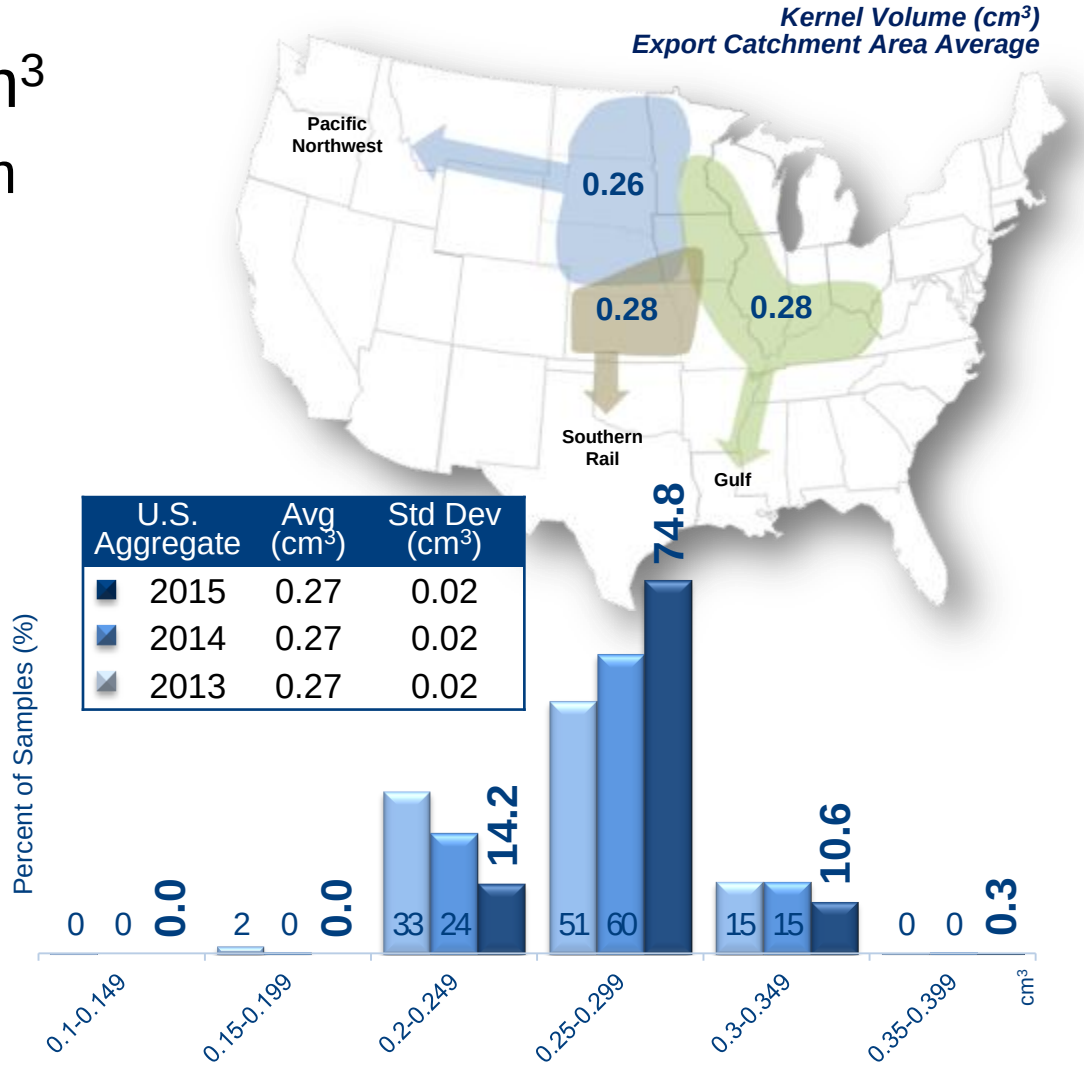
# Kernel Volume ($cm^3$)



## U.S. Aggregate: 0.27 $cm^3$

- Average unchanged from 2014, 2013 and 4YA
- Higher percent of larger kernels in 2015 than in 2014 and 2013
- Pacific Northwest ECA has tended to have lower kernel volumes than Southern Rail and Gulf ECAs



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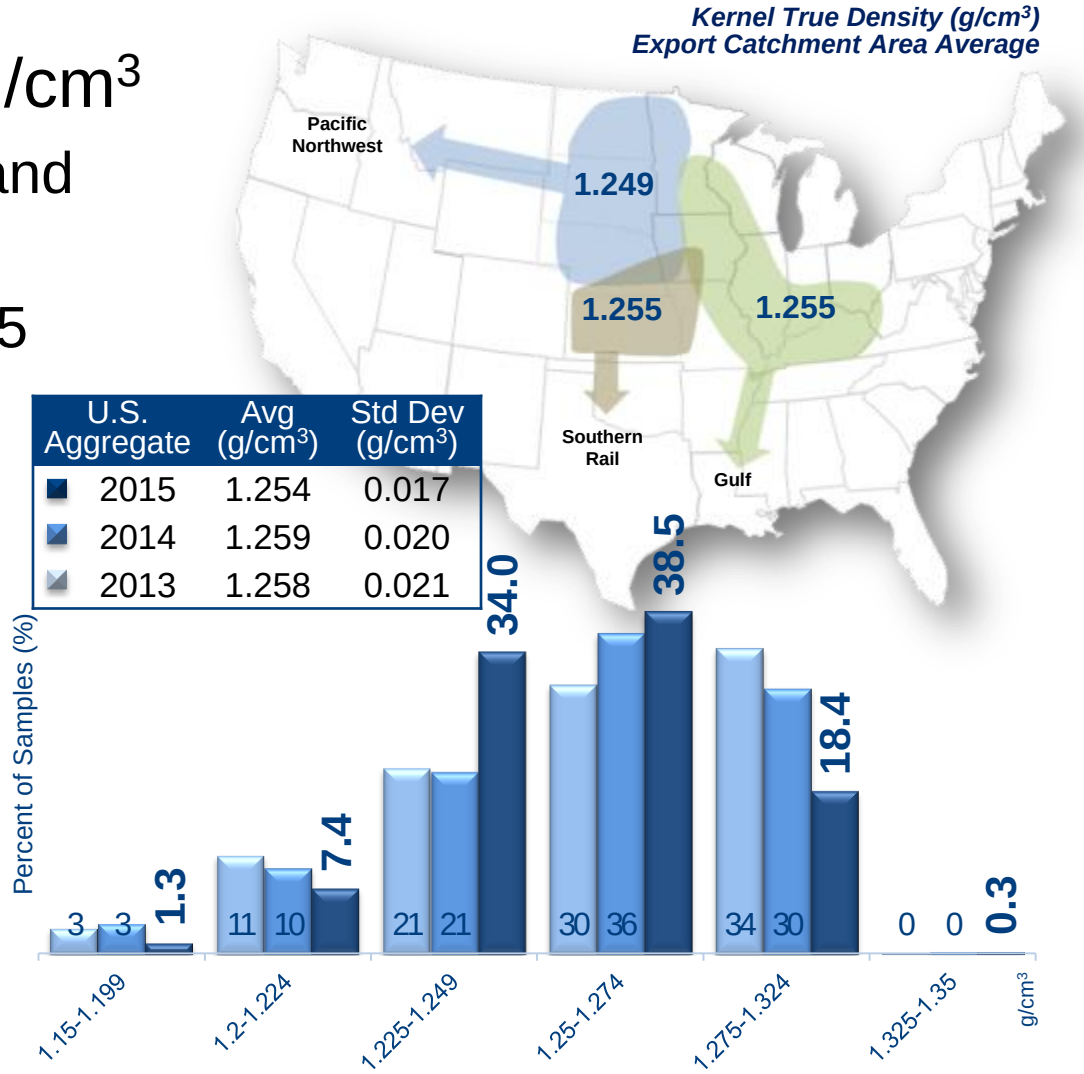
# Kernel True Density (g/cm$^3$)

2015/2016 Corn
Harvest Quality Report

## U.S. Aggregate: 1.254 g/cm$^3$

- Lower than 2014, 2013 and 4YA
- More samples below 1.25 g/cm$^3$ than in 2014 and 2013, indicating softer corn
- Pacific Northwest ECA was lowest among ECAs in 2015, 2014 and for 4YA



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# Other Physical Properties



## Whole kernels (%)

- Percentage of whole kernels of a 50 g sample
- 'Broken Corn' in BCFM measures only kernel size, not whether it is broken or whole
- Impacts alkaline cooking operations and susceptibility to mold invasion and breakage

## Horneous (hard) endosperm (%)

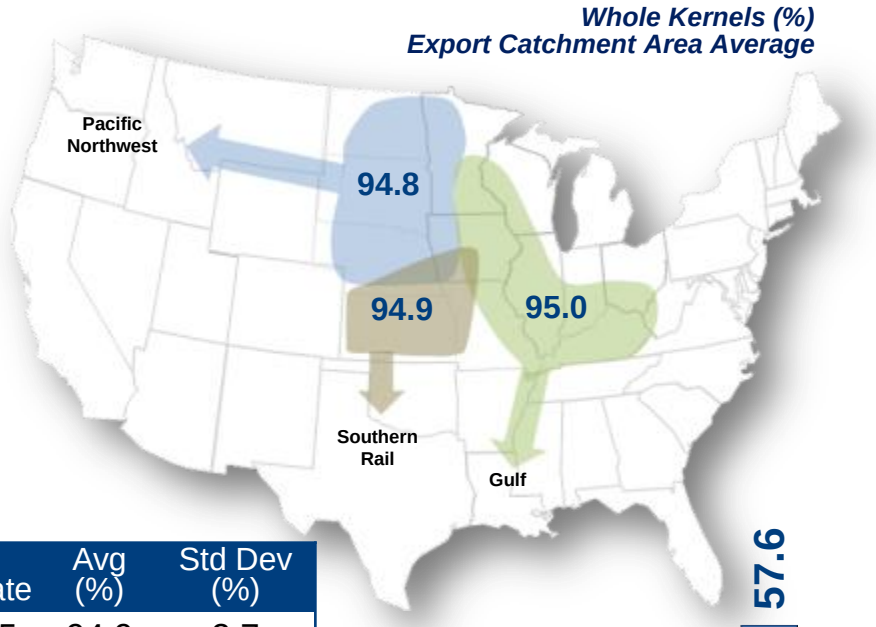
- Measures the percent of the endosperm that is horneous or hard within a range from 70 – 100%
- The higher the value, the harder the corn kernel

# Whole Kernels (%)

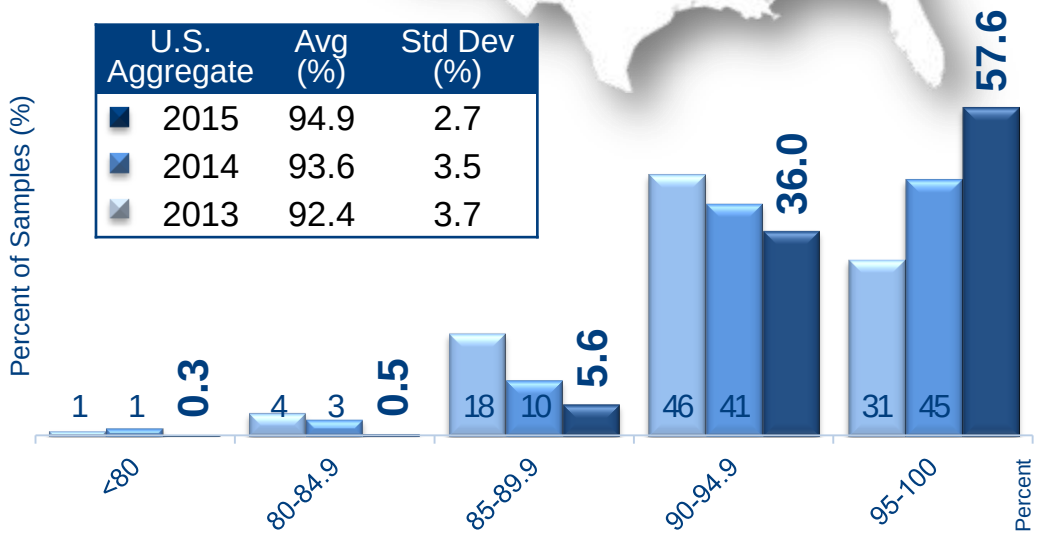
2015/2016 Corn
Harvest Quality Report

## U.S. Aggregate: 94.9%

- Significantly higher whole kernels than in 2014, 2013 and 4YA
- Gulf ECA had the highest average in 2015 and 4YA




| U.S. Aggregate | Avg (%) | Std Dev (%) |
|---|---|---|
| 2015 | 94.9 | 2.7 |
| 2014 | 93.6 | 3.5 |
| 2013 | 92.4 | 3.7 |



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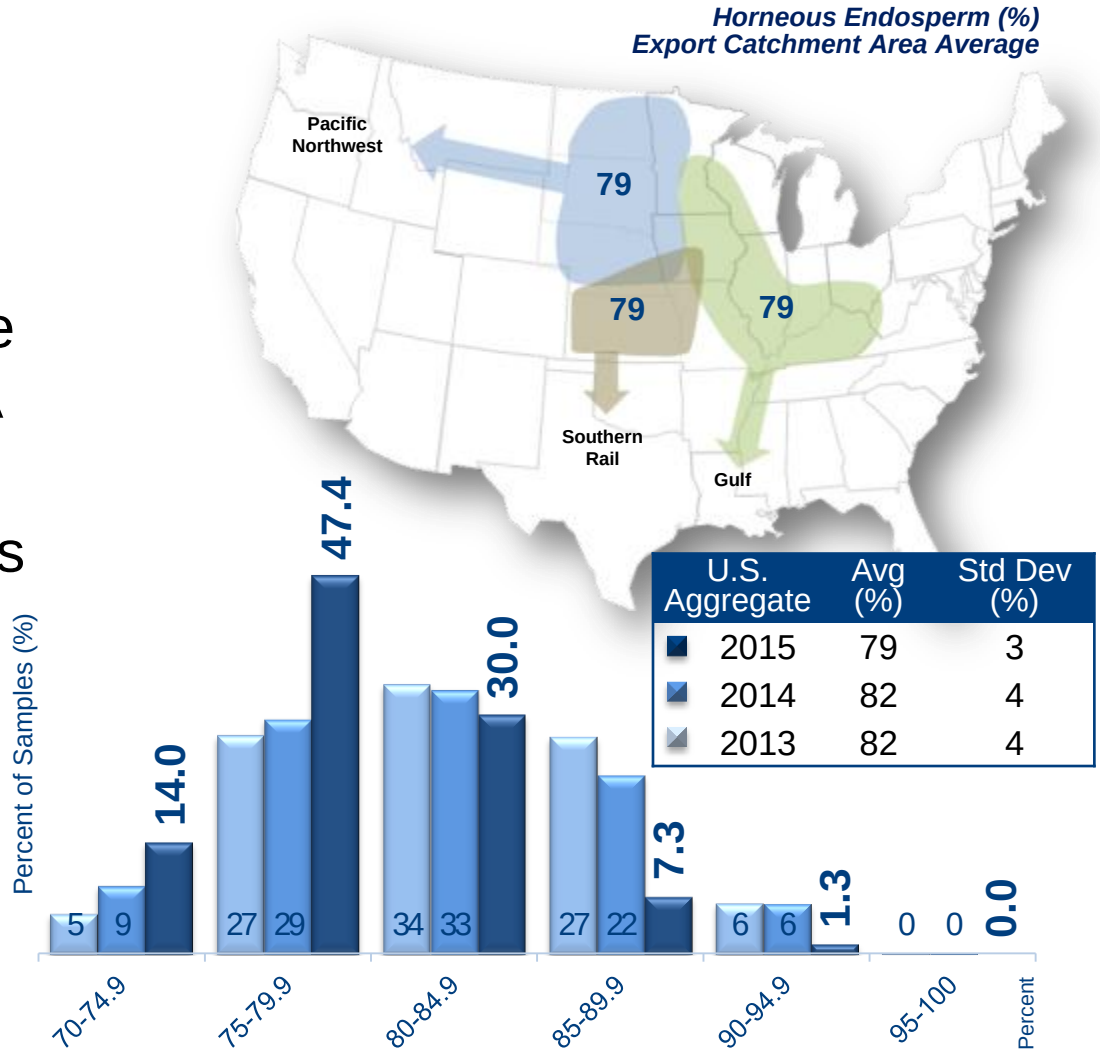
# Horneous (Hard) Endosperm (%)

2015/2016 Corn
Harvest Quality Report

## U.S. Aggregate: 79%

- Lower than 2014, 2013 and 4YA
- Little variation among the 3 ECAs in 2015 and 4YA
- Over 5 years, Aggregate horneous endosperm has tended to be higher in years when Aggregate true density is higher



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# Mycotoxins: Aflatoxins and DON

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# Mycotoxin Testing

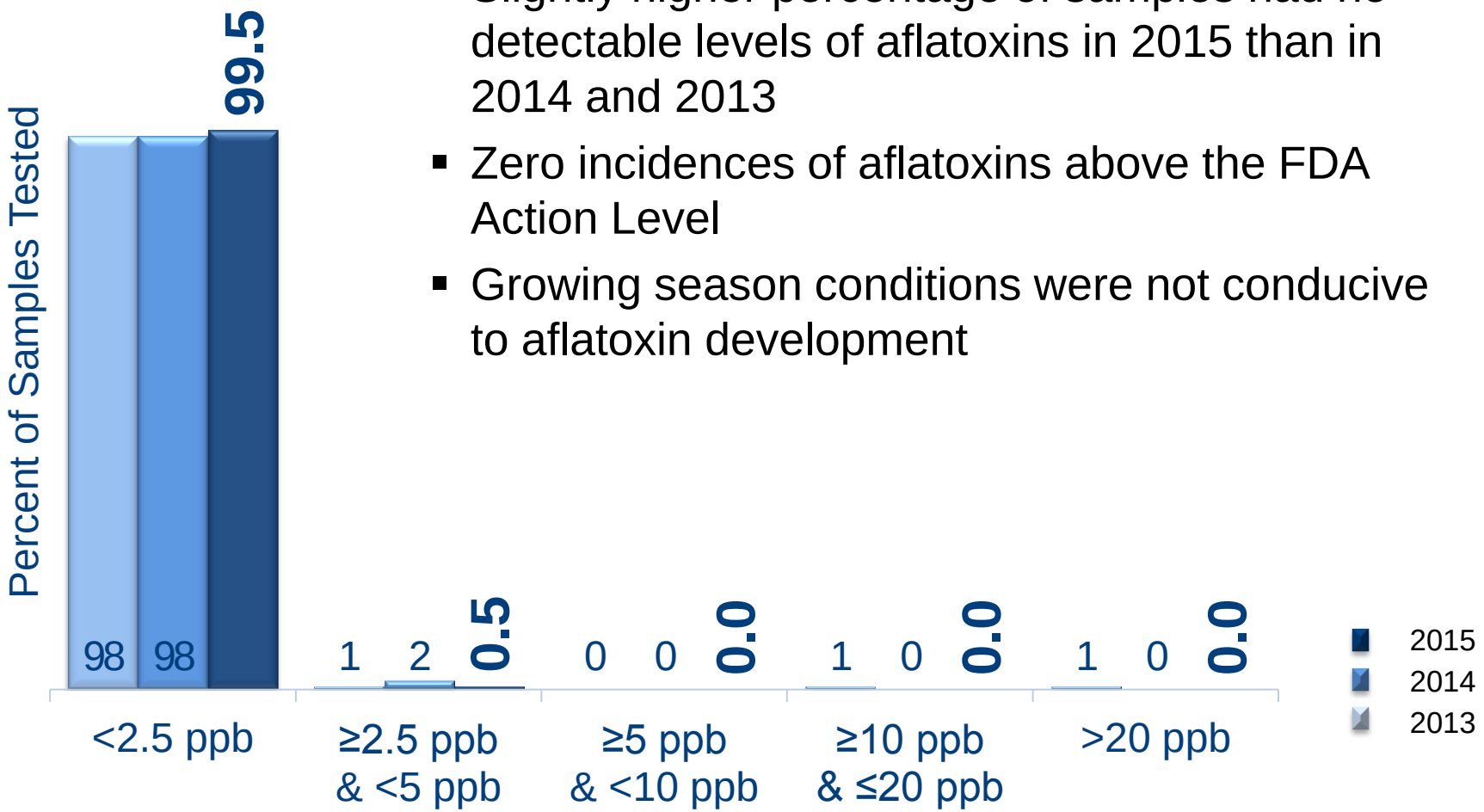


- *Corn Harvest Quality Report* shows ONLY the frequency of detection in harvest samples
- *Corn Harvest Quality Report* does NOT predict the presence or levels of mycotoxins in U.S. corn exports
- Tested a minimum of 25% of collected samples, same as in 2014 and 2013
- Positive results if above Limit of Detection (LOD)
  - Aflatoxins: 2.5 ppb
  - DON: 0.3 ppm

# Aflatoxins Testing Results

2015/2016 Corn
Harvest Quality Report

- Slightly higher percentage of samples had no detectable levels of aflatoxins in 2015 than in 2014 and 2013
- Zero incidences of aflatoxins above the FDA Action Level
- Growing season conditions were not conducive to aflatoxin development



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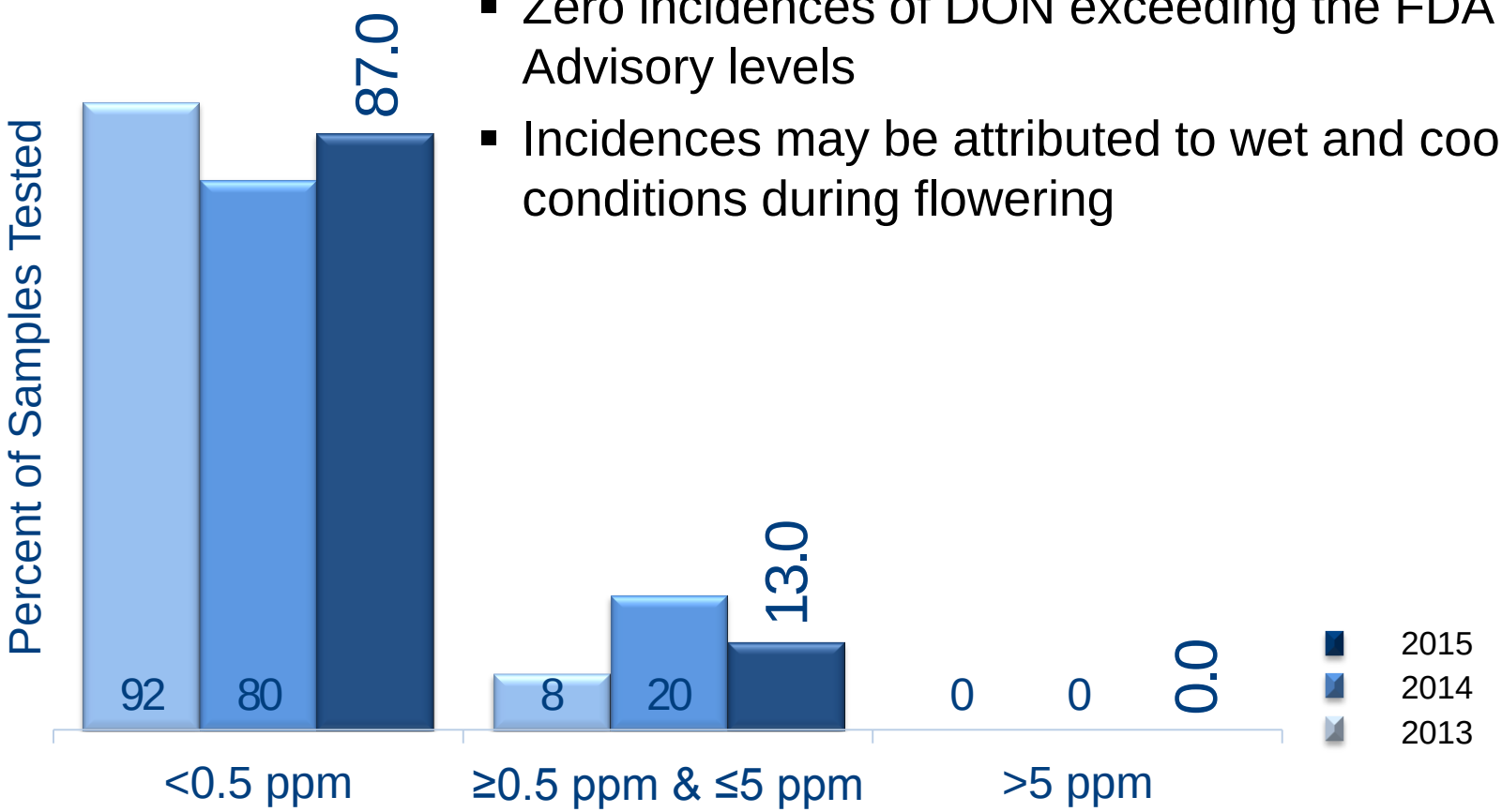
# DON Testing Results

2015/2016 Corn
Harvest Quality Report

- Larger percentage below 0.5 ppm in 2015 than in 2014
- Zero incidences of DON exceeding the FDA Advisory levels
- Incidences may be attributed to wet and cool conditions during flowering



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# Other Components of the Corn Harvest Quality Report

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# Other Features of the Report



- U.S. Corn Production, Usage and Outlook
- Survey and Statistical Analysis Methods
- Testing Analysis Methods

# Harvest Report: Conclusions

2015/2016 Corn
Harvest Quality Report

- 2015 harvest samples were, on average, very good with 94% grading No. 2 or better
- High yields accompanied by lower protein; this was complemented by high starch, and similar oil concentration to 2014 levels
- Early and dry harvest conditions contributed to lower average moisture contents and lower total damage than in 2014, and much lower stress cracks than in previous years
- While test weight is positively influenced by true density, 2015 average test weight remained high due to low moisture content, high percent of whole kernels, and low breakage

# Harvest Report: Conclusions (cont)



- True density and horneous endosperm were lower than 4YA, indicating a softer corn; still, a good supply of corn suitable for dry milling available
- Low levels of BCFM and high percent of whole kernels will help decrease susceptibility to storage problems and enhance processability
- Growing season was not conducive to aflatoxin development
- Lower incidences of DON than in 2014

# Building a Tradition: Thank You!

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Developing markets. >> Enabling trade. >> Improving lives.

# SUPPLEMENTAL SLIDES:
# U.S. Grains Council
# 2015/2016
# Corn Harvest Quality Report

[Insert Date]

[Insert Location]

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Developing markets. >> Enabling trade. >> Improving lives.



# U.S. Corn Production
# Supply & Demand Outlook

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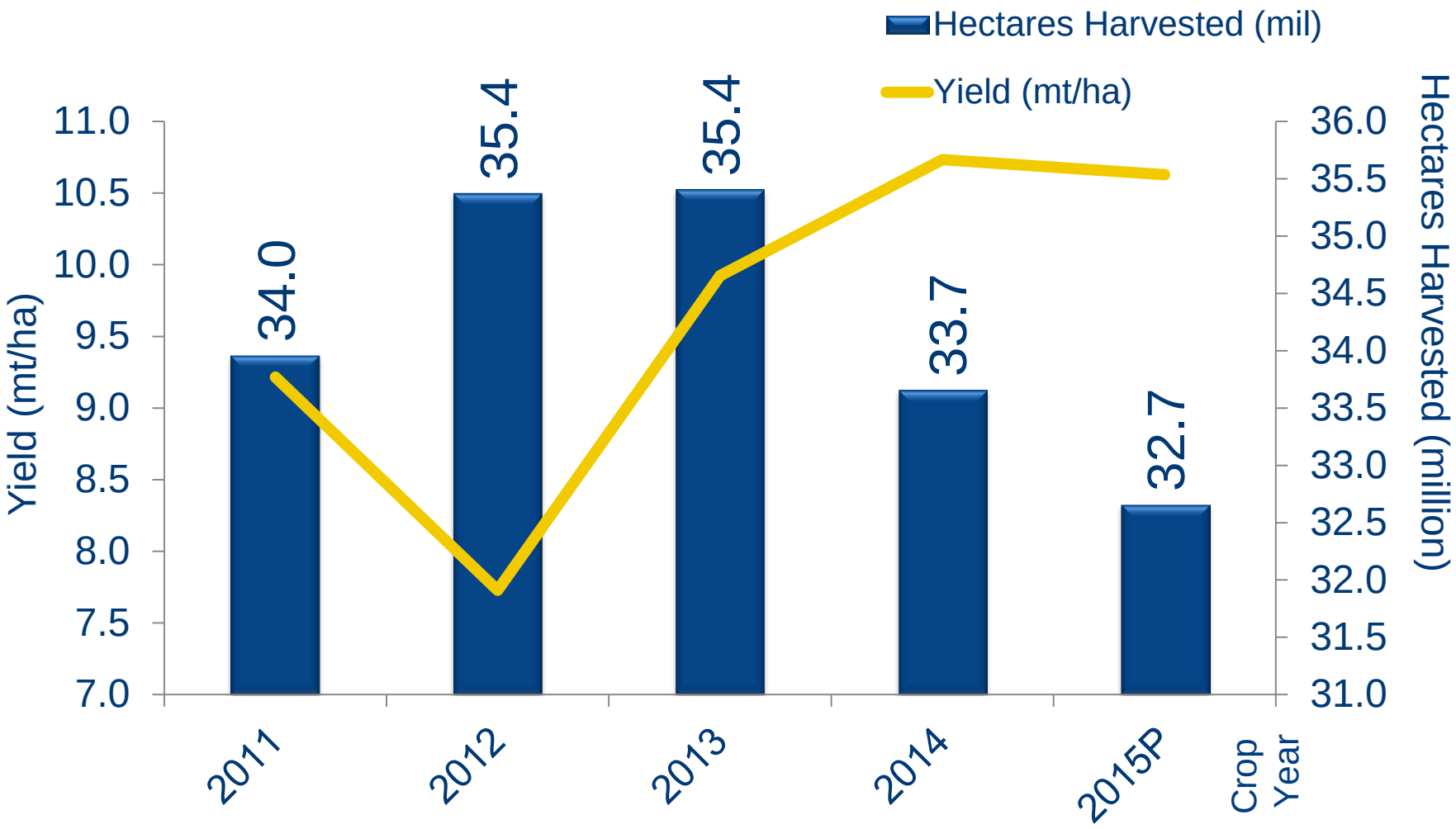
# U.S. Production and Yield

2015/2016 Corn
Harvest Quality Report




Source: USDA NASS P=Projected



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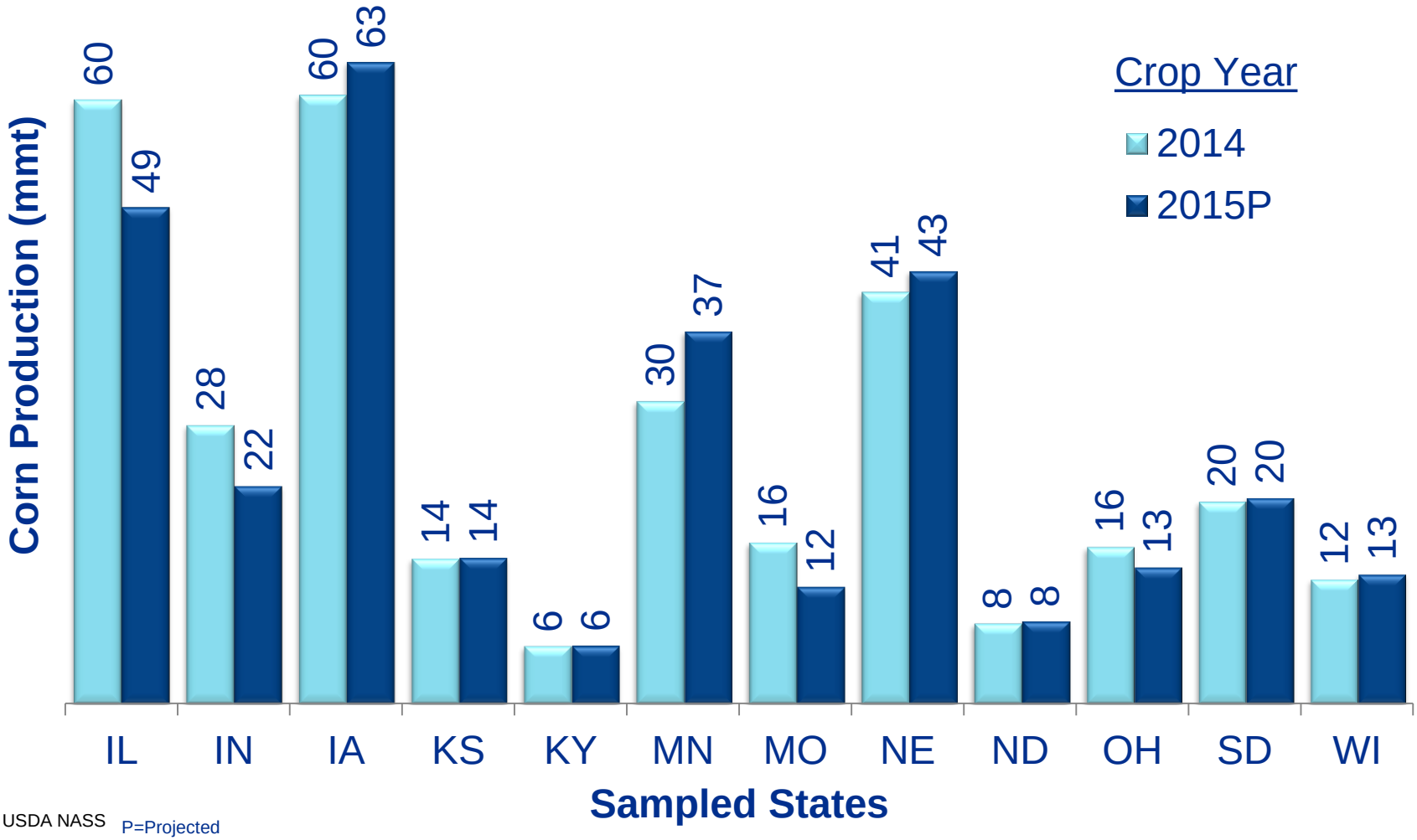
# U.S. Production by State

2015/2016 Corn
Harvest Quality Report




Source: USDA NASS P=Projected



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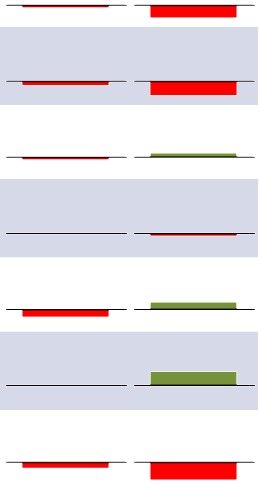
# Surveyed State Production (MMT)

2015/2016 Corn
Harvest Quality Report

| State | 2014 | 2015P | Difference MMT | Difference Percent | Relative %Change* Acres | Relative %Change* Yield |
|---|---|---|---|---|---|---|
| Illinois | 60 | 49 | (11) | -18% | | |
| Indiana | 28 | 22 | (6) | -22% | | |
| Iowa | 60 | 63 | 3 | 5% | | |
| Kansas | 14 | 14 | 0 | 1% | | |
| Kentucky | 6 | 6 | 0 | 1% | | |
| Minnesota | 30 | 37 | 7 | 23% | | |
| Missouri | 16 | 12 | (4) | -27% | | |
| Nebraska | 41 | 43 | 2 | 5% | | |
| North Dakota | 8 | 8 | 0 | 3% | | |
| Ohio | 16 | 13 | (2) | -13% | | |
| South Dakota | 20 | 20 | 0 | 2% | | |
| Wisconsin | 12 | 13 | 1 | 4% | | |
| Total | 361 | 347 | (14) | -4% | | |





*Green indicates 2015 is higher than 2014 and red indicates 2015 is lower than 2014; bar height indicates the relative amount.

Source: USDA NASS



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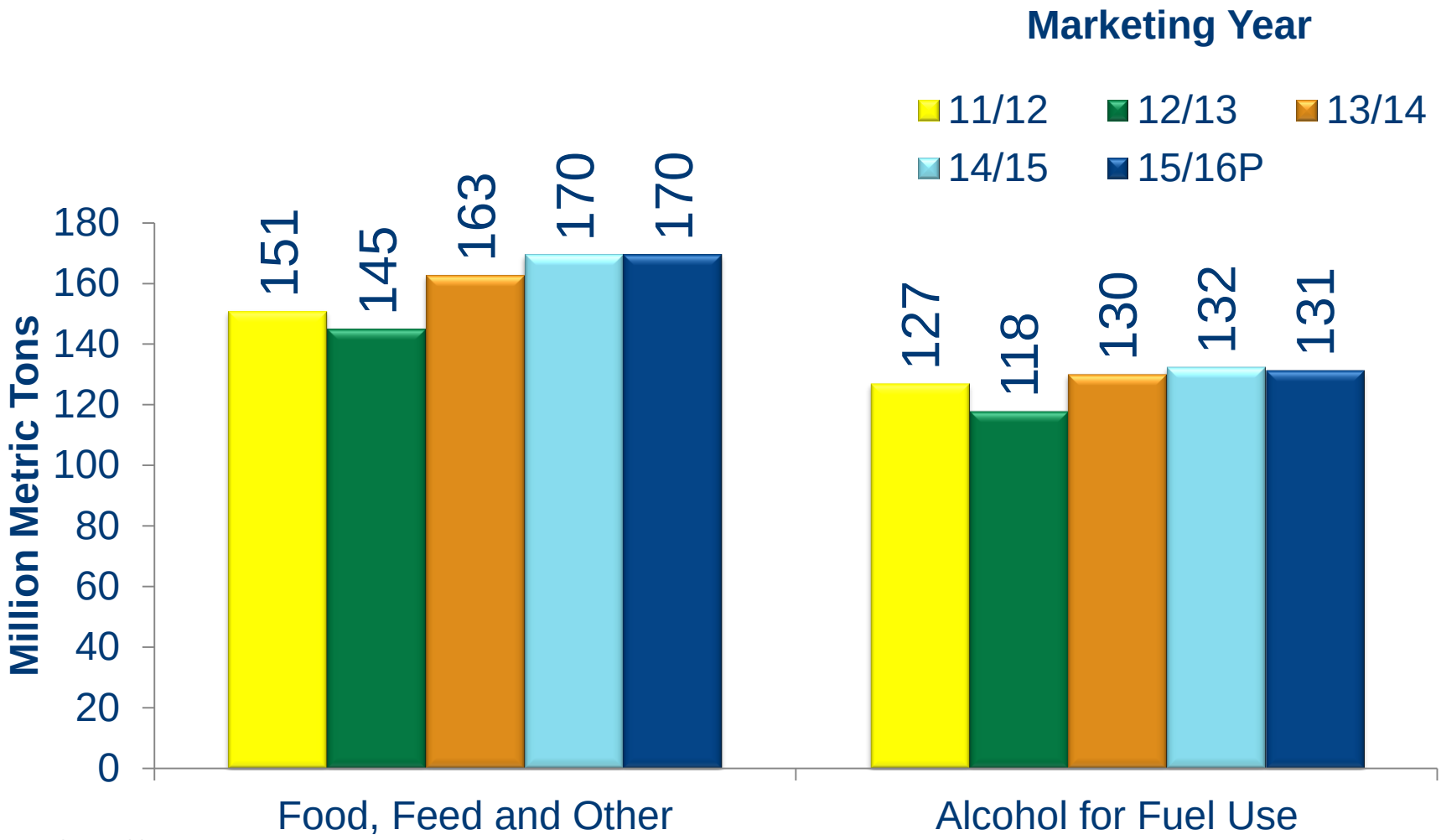
# U.S. Production and Use

2015/2016 Corn
Harvest Quality Report




Source: USDA NASS P=Projected



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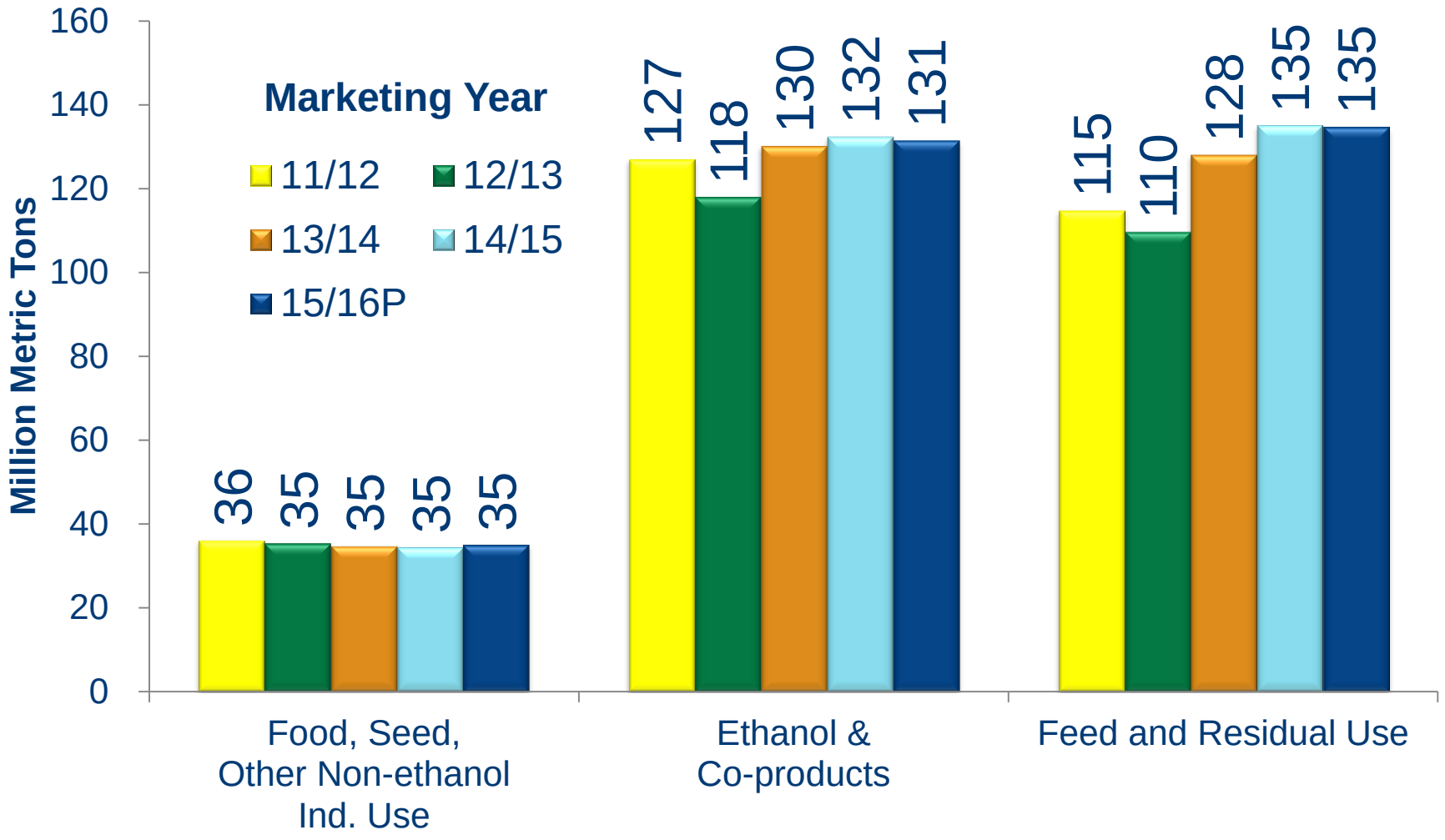
# U.S. Domestic Corn Use

2015/2016 Corn
Harvest Quality Report




Source: USDA NASS P=Projected



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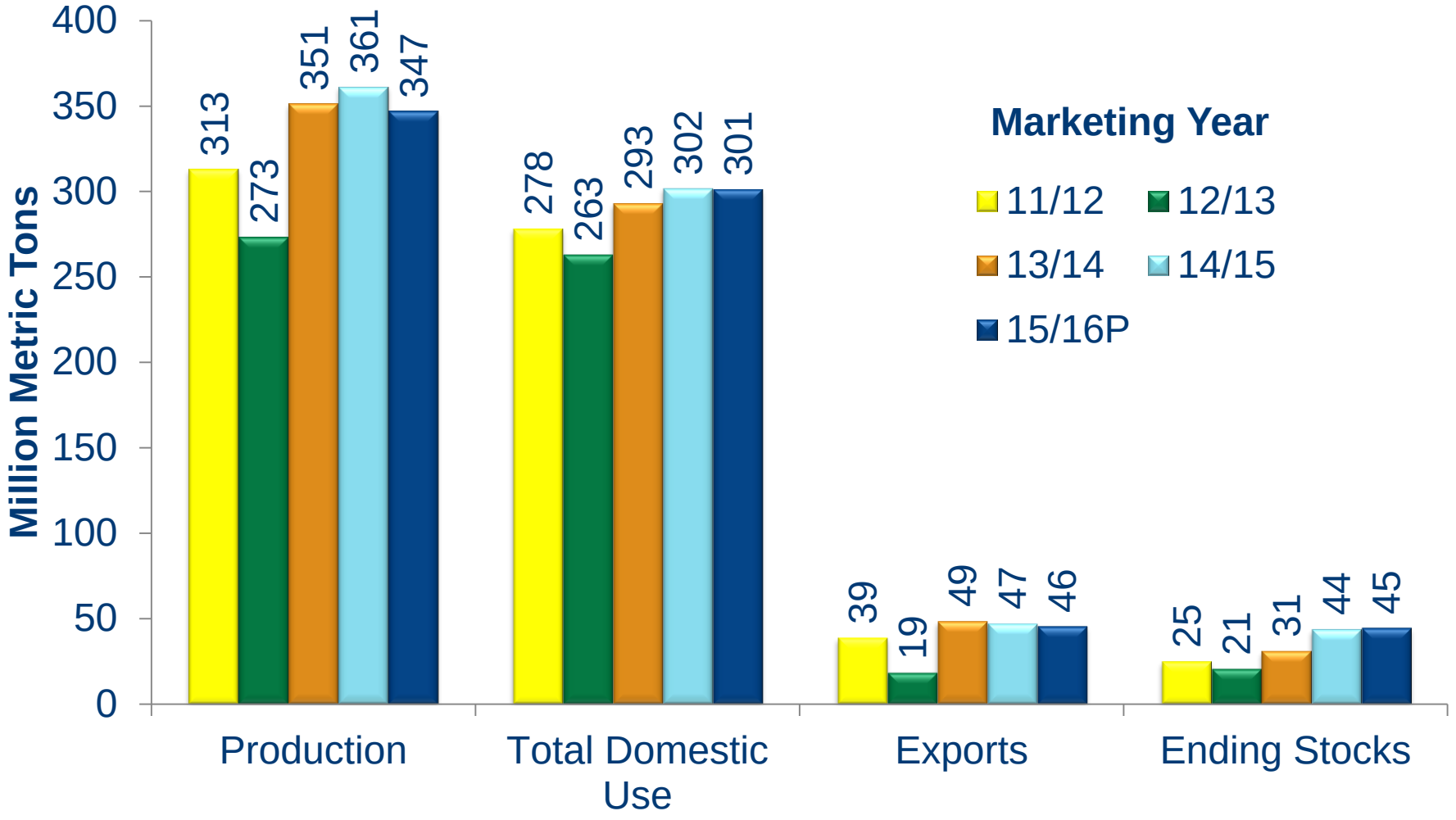
# U.S. Production and Disappearance

2015/2016 Corn
Harvest Quality Report




Source: USDA NASS P=Projected



U.S. GRAINS COUNCIL

# U.S. Corn Supply and Usage Summary

2015/2016 Corn
Harvest Quality Report

| | 08/09 | 09/10 | 10/11 | 11/12 | 12/13 | 13/14 | 14/15 | 15/16P |
|---|---|---|---|---|---|---|---|---|
| **Acreage (million hectares)** | | | | | | | | |
| Planted | 34.8 | 35.0 | 35.7 | 37.2 | 39.4 | 38.6 | 36.7 | 35.8 |
| Harvested | 31.8 | 32.2 | 33.0 | 34.0 | 35.4 | 35.4 | 33.7 | 32.7 |
| Yield (metric ton/hectare) | 9.6 | 10.3 | 9.6 | 9.2 | 7.7 | 9.9 | 10.7 | 10.6 |
| | | | *In Millions of Metric Tons* | | | | | |
| **Supply (million metric tons)** | | | | | | | | |
| Beginning Stocks | 41.3 | 42.5 | 43.4 | 28.6 | 25.1 | 20.9 | 31.3 | 44.0 |
| Production | 307.1 | 331.9 | 315.6 | 312.8 | 273.2 | 351.3 | 361.1 | 346.8 |
| Imports | 0.3 | 0.2 | 0.7 | 0.7 | 4.1 | 0.9 | 0.8 | 0.8 |
| **Total Supply** | 348.7 | 374.6 | 359.7 | 342.2 | 302.4 | 373.0 | 393.2 | 391.6 |
| **Usage (million metric tons)** | | | | | | | | |
| Food, seed, other non-ethanol ind. use | 33.4 | 34.8 | 35.7 | 36.2 | 35.5 | 34.8 | 34.5 | 35.1 |
| Ethanol and co-products | 94.2 | 116.6 | 127.5 | 127.0 | 117.9 | 130.1 | 132.3 | 131.5 |
| Feed and residual | 130.4 | 129.6 | 121.3 | 114.8 | 109.6 | 128.0 | 135.0 | 134.6 |
| Exports | 47.0 | 50.3 | 46.5 | 39.1 | 18.5 | 48.8 | 47.4 | 45.7 |
| **Total Use** | 305.0 | 331.3 | 331.1 | 317.1 | 281.5 | 341.8 | 349.2 | 346.9 |
| **Ending Stocks** | 42.5 | 43.4 | 28.6 | 25.1 | 20.9 | 31.3 | 44.0 | 44.7 |
| **Avg farm price ($/mt*)** | 159.83 | 139.76 | 203.93 | 244.87 | 271.25 | 175.58 | 145.66 | 131.88-155.50 |

P-Projected
* Farm prices are weighted averages based on volume of farm shipment
Average farm price for 15/16P based on WASDE November projected price

Source: USDA WASDE November 2015



U.S. GRAINS COUNCIL

# U.S. Corn Supply and Usage Summary

2015/2016 Corn
Harvest Quality Report

| | 08/09 | 09/10 | 10/11 | 11/12 | 12/13 | 13/14 | 14/15 | 15/16P |
|---|---|---|---|---|---|---|---|---|
| **Acreage (million acres)** | | | | | | | | |
| Planted | 86.0 | 86.4 | 88.2 | 91.9 | 97.3 | 95.4 | 90.6 | 88.4 |
| Harvested | 78.6 | 79.5 | 81.4 | 83.9 | 87.4 | 87.5 | 83.1 | 80.7 |
| Yield (bushels/acre) | 153.3 | 164.4 | 152.6 | 146.8 | 123.1 | 158.1 | 171.0 | 169.3 |
| | | | *In Millions of Bushels* | | | | | |
| **Supply (million bushels)** | | | | | | | | |
| Beginning Stocks | 1,624 | 1,673 | 1,708 | 1,128 | 989 | 821 | 1,232 | 1,731 |
| Production | 12,092 | 13,067 | 12,425 | 12,314 | 10,755 | 13,829 | 14,216 | 13,654 |
| Imports | 14 | 8 | 28 | 29 | 160 | 36 | 32 | 30 |
| **Total Supply** | 13,729 | 14,749 | 14,161 | 13,471 | 11,904 | 14,686 | 15,479 | 15,415 |
| **Usage (million bushels)** | | | | | | | | |
| Food, seed, other non-ethanol ind. use | 1,316 | 1,370 | 1,407 | 1,424 | 1,397 | 1,370 | 1,359 | 1,380 |
| Ethanol and co-products | 3,709 | 4,591 | 5,019 | 5,000 | 4,641 | 5,124 | 5,209 | 5,175 |
| Feed and residual | 5,133 | 5,101 | 4,777 | 4,519 | 4,315 | 5,040 | 5,315 | 5,300 |
| Exports | 1,849 | 1,979 | 1,831 | 1,539 | 730 | 1,920 | 1,864 | 1,800 |
| **Total Use** | 12,008 | 13,041 | 13,033 | 12,482 | 11,083 | 13,454 | 13,748 | 13,655 |
| **Ending Stocks** | 1,673 | 1,708 | 1,128 | 989 | 821 | 1,232 | 1,731 | 1,760 |
| **Avg farm price ($/bushel**)** | 4.06 | 3.55 | 5.18 | 6.22 | 6.89 | 4.46 | 3.70 | 3.35-3.95 |

P-Projected
* Farm prices are weighted averages based on volume of farm shipment
Average farm price for 15/16P based on WASDE November projected price

Source: USDA WASDE November 2015