2024/2025 Corn Harvest Quality Report

November 27, 2024

U.S. GRAINS COUNCIL

Quality, Reliability, Transparency

U.S. GRAINS COUNCIL

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Bridge to world's largest, most reliable grain supply

2024/2025 Corn Harvest Quality Report

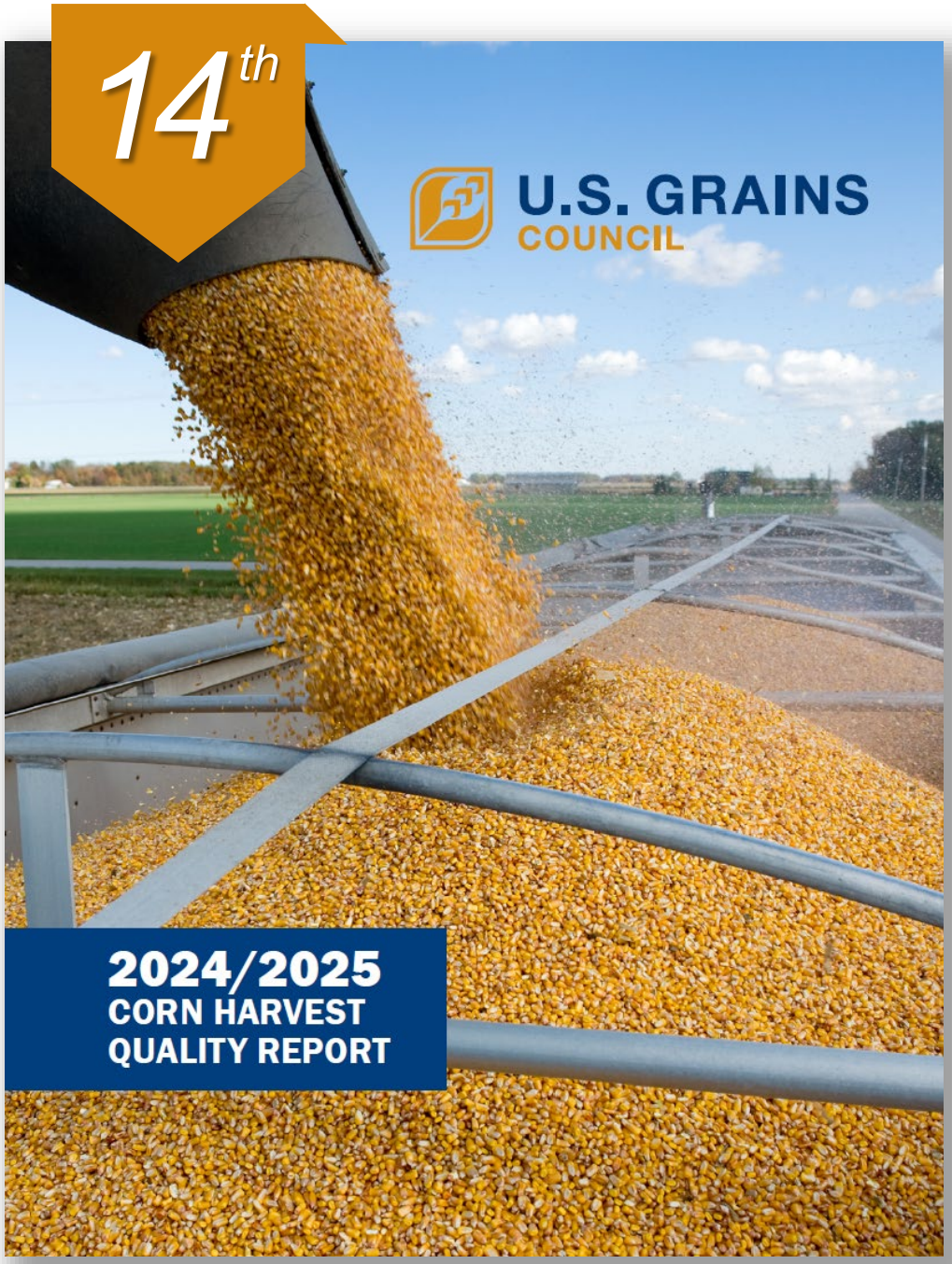
Reliable and Comparable Data

Transparent and Consistent Methodology

Early Look at General Harvest Quality

Tools for Better Decision Making

- Evaluating 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 2025 will report U.S. corn quality from samples at export points



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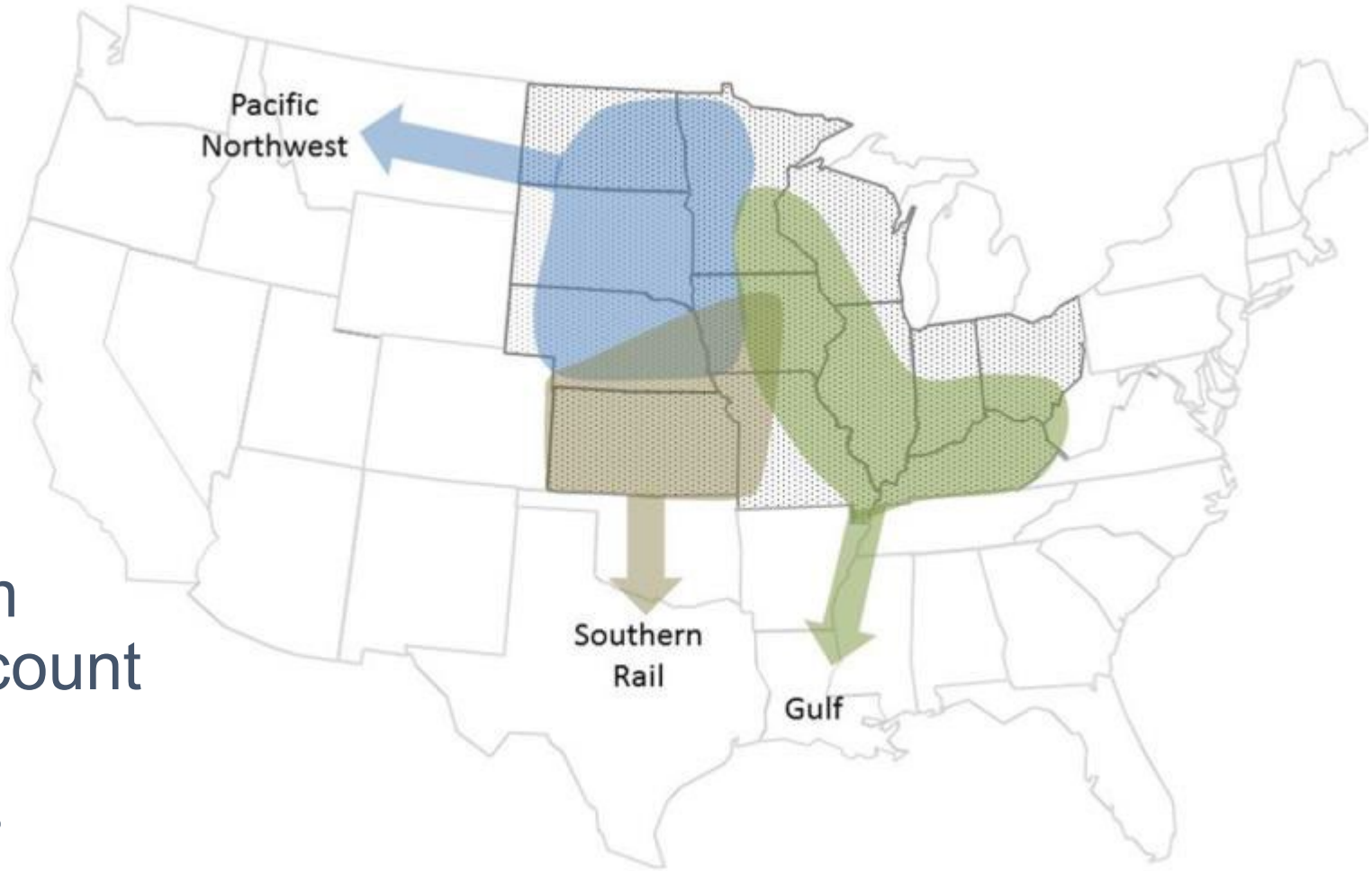
Export Catchment Areas (ECAs)



620 samples from
12 states that account
for over 90% of
U.S. corn exports

Quality Factors Tested

Grading Factors
- Test weight
- Broken corn
- Foreign material
- Total damage
- Heat damage

Moisture

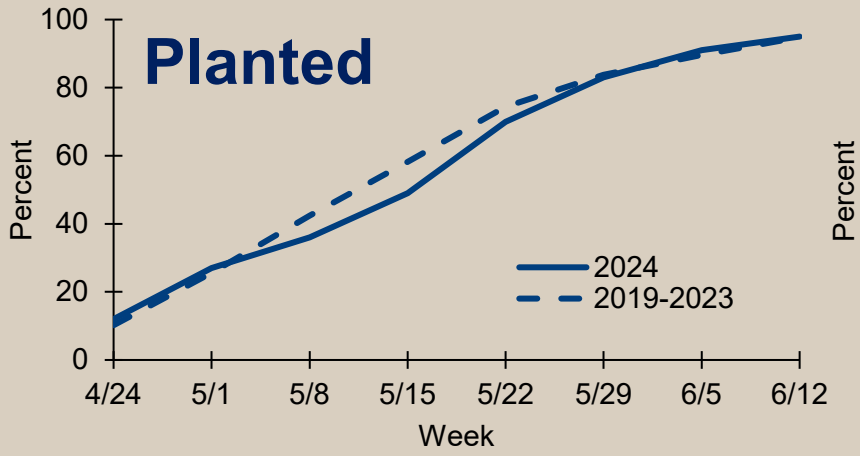
Chemical Composition
- Protein
- Starch
- Oil

Physical Factors
- Stress cracks
- 100-kernel weight
- Kernel volume
- True density
- Whole kernels
- Horneous (hard) endosperm

Mycotoxins
- Aflatoxin
- DON (Vomitoxin)
- Fumonisin
- Ochratoxin A
- T-2
- Zearalenone

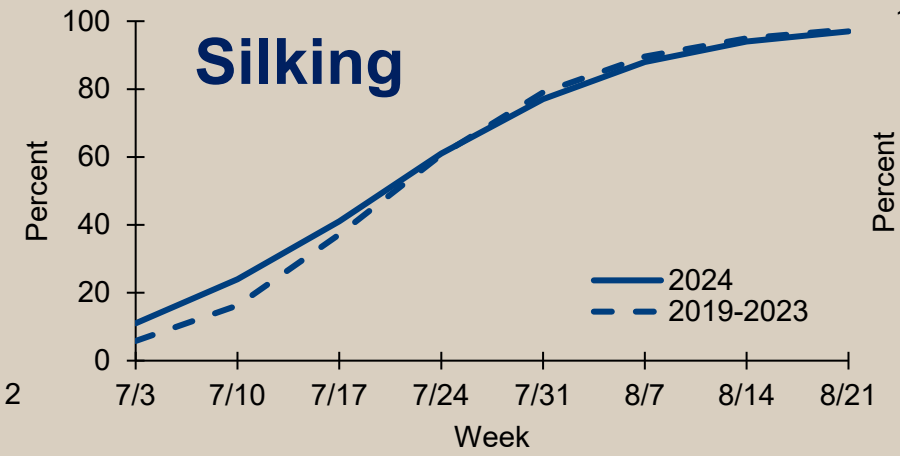
2024 Growing Conditions and Impact on Crop Development

Planting progress similar to 5YA despite some planting interruptions from rain



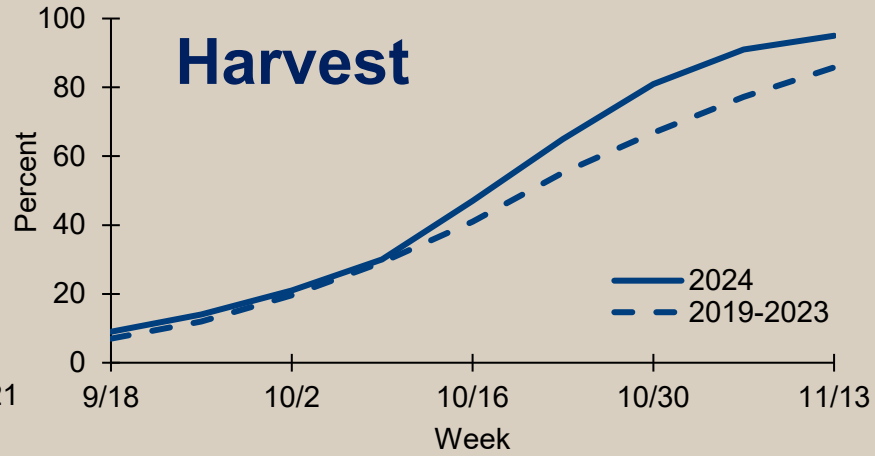
Ample moisture and warm conditions fostered quick emergence and strong growth

Pollination initiated slightly earlier than the 5YA



Low crop stress and mild conditions were ideal conditions for grain development

Warm and dry conditions led to quick field drying and timely harvest



Lower BCFM, higher percentage of whole kernels and historically low moisture

2024/2025 Corn Harvest Quality Highlights

Overall Crop

67% of crop rated good or excellent condition & **highest yields** on record projected

Harvest about **81%** complete as of October 27, higher than 2023 (68%) and the 5YA† (64%)

Grade Factors/Moisture vs. 5YA

Test Weight
Higher

BCFM
Lower

Total Damage
Lower

Moisture
Lower

Chemical Composition vs. 5YA

Protein
Same

Starch
Higher

Oil
Lower

Physical Factors vs. 5YA

Stress Cracks
Similar

100-Kernel Weight
Higher

True Density
Higher

Whole Kernels
Higher

Mycotoxins

98.9% of samples ≤ FDA action level for Aflatoxin‡

98.9% of samples below FDA advisory level for DON of 5.0 ppm‡

97.2% of samples ≤ FDA Fumonisin guidance level of 5 ppm‡

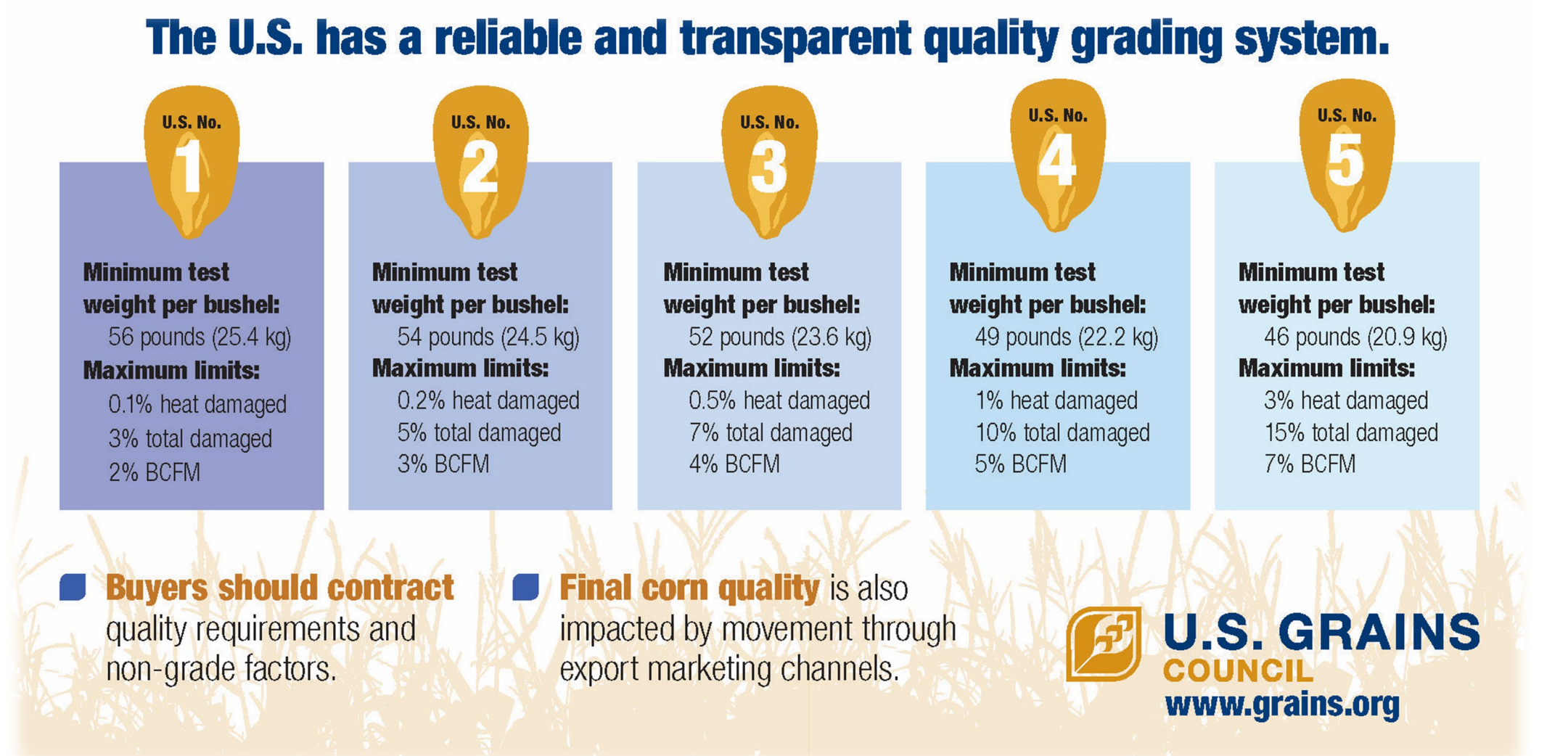
†5YA = 2019-2023 crop years ‡Action, advisory and guidance levels for corn intended for feed use

Grade Factors and Moisture

Grades and Grade Requirements

Grade	Minimum Test Weight		Maximum Limits of Damaged Kernels		
	Pounds per Bushel	Kilogram per Hectoliter	Heat Damage (%)	Total (%)	BCFM (%)
U.S. No. 1	56.0	72.1	0.1	3.0	2.0
U.S. No. 2	54.0	69.5	0.2	5.0	3.0
U.S. No. 3	52.0	66.9	0.5	7.0	4.0
U.S. No. 4	49.0	63.1	1.0	10.0	5.0
U.S. No. 5	46.0	59.2	3.0	15.0	7.0

USDA Corn Quality Grades



Grade Factors and Moisture

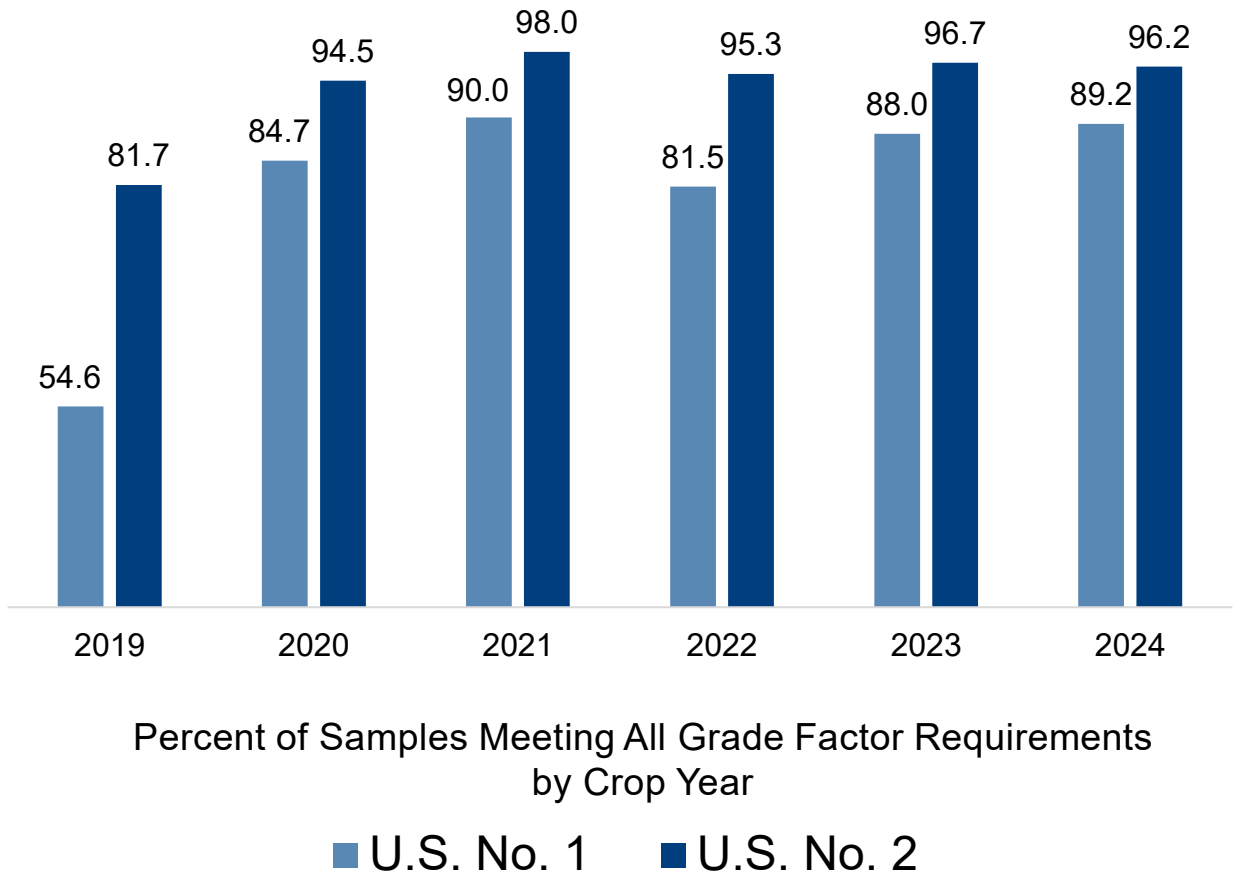
	Number of Samples	Average	Standard Deviation	Minimum	Maximum
Test Weight (lb/bu)	586	58.9	1.27	52.5	63.8
Test Weight (kg/hl)	586	75.8	1.63	67.6	82.1
BCFM (%)	586	0.6	0.38	0.1	7.4
Broken Corn (%)	586	0.4	0.26	0.0	4.6
Foreign Material (%)	586	0.1	0.19	0.0	3.5
Total Damage (%)	586	1.1	1.05	0.0	21.3
Heat Damage (%)	586	0.0	0.00	0.0	0.0
Moisture (%)	618	15.3	1.74	9.6	23.6

Grade Factors Summary

89.2% of samples No. 1 grade (88.0% in 2023)

96.2% of samples No. 2 grade (96.7% in 2023)

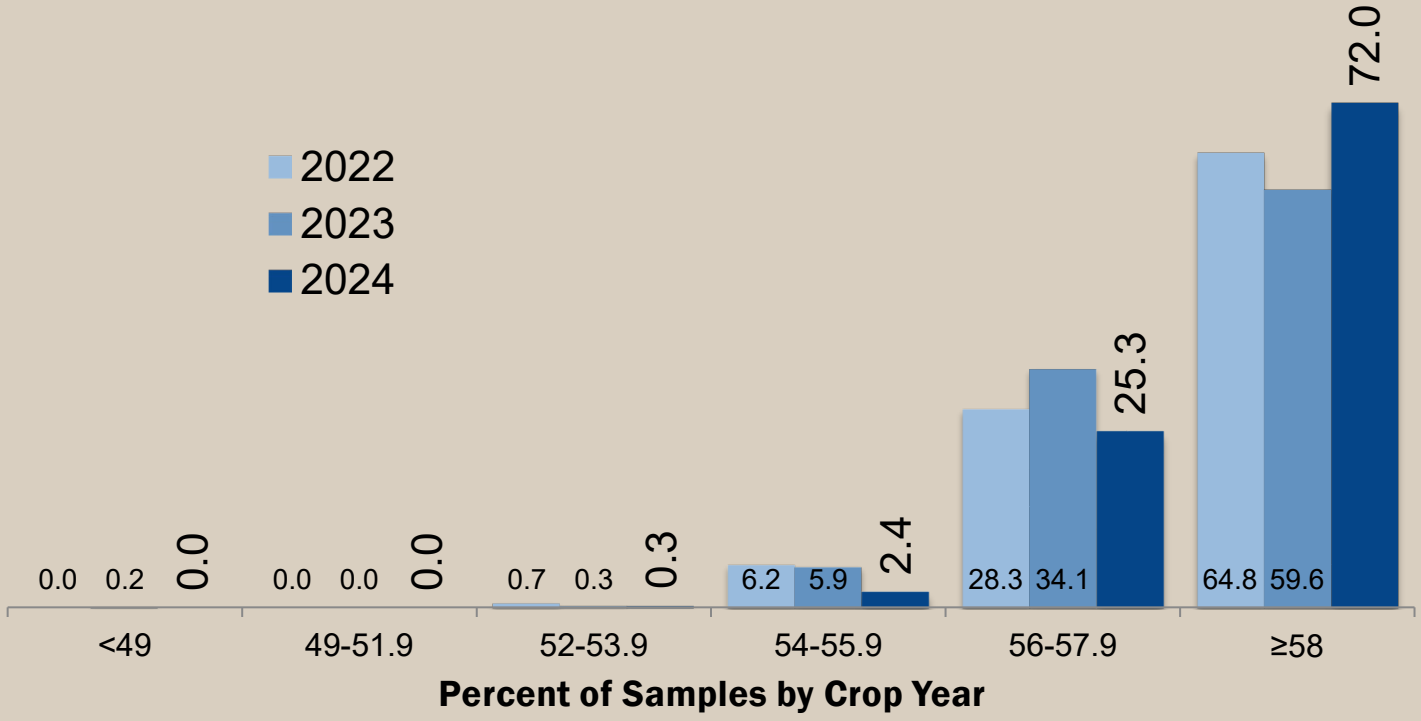
Average aggregate quality of the samples tested was better than all grade factor requirements for U.S. No. 1 grade



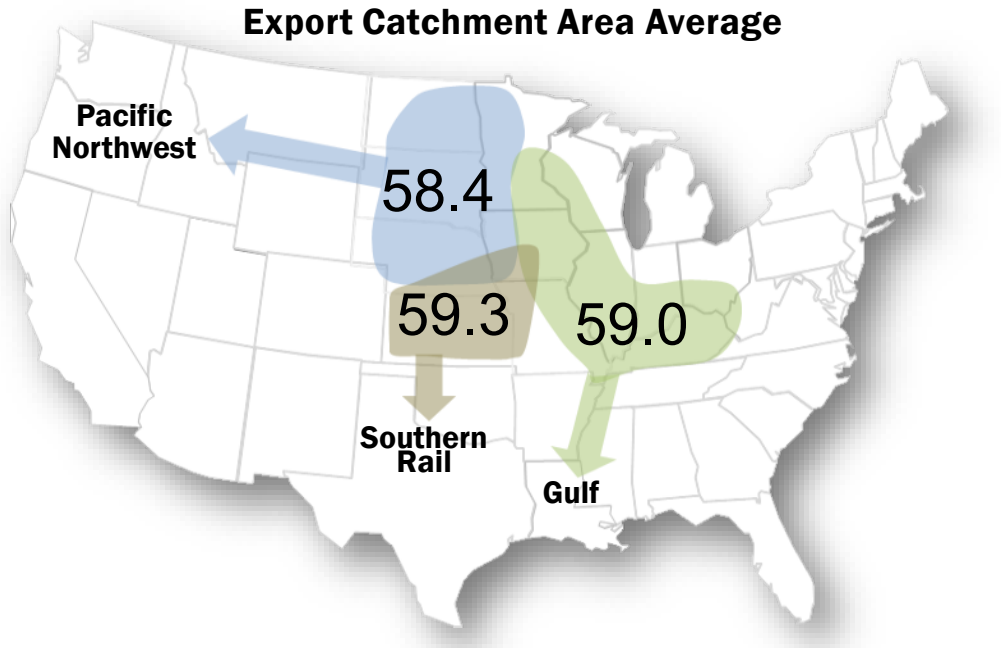
Test Weight — U.S. Units

U.S. Aggregate: 58.9 lb/bu

- **Highest** average in the history of the report
- Average **higher** than the 5YA (58.2 lb/bu)
- **97.3%** No. 1 grade (93.7% in 2023)



Percent of Samples by Crop Year

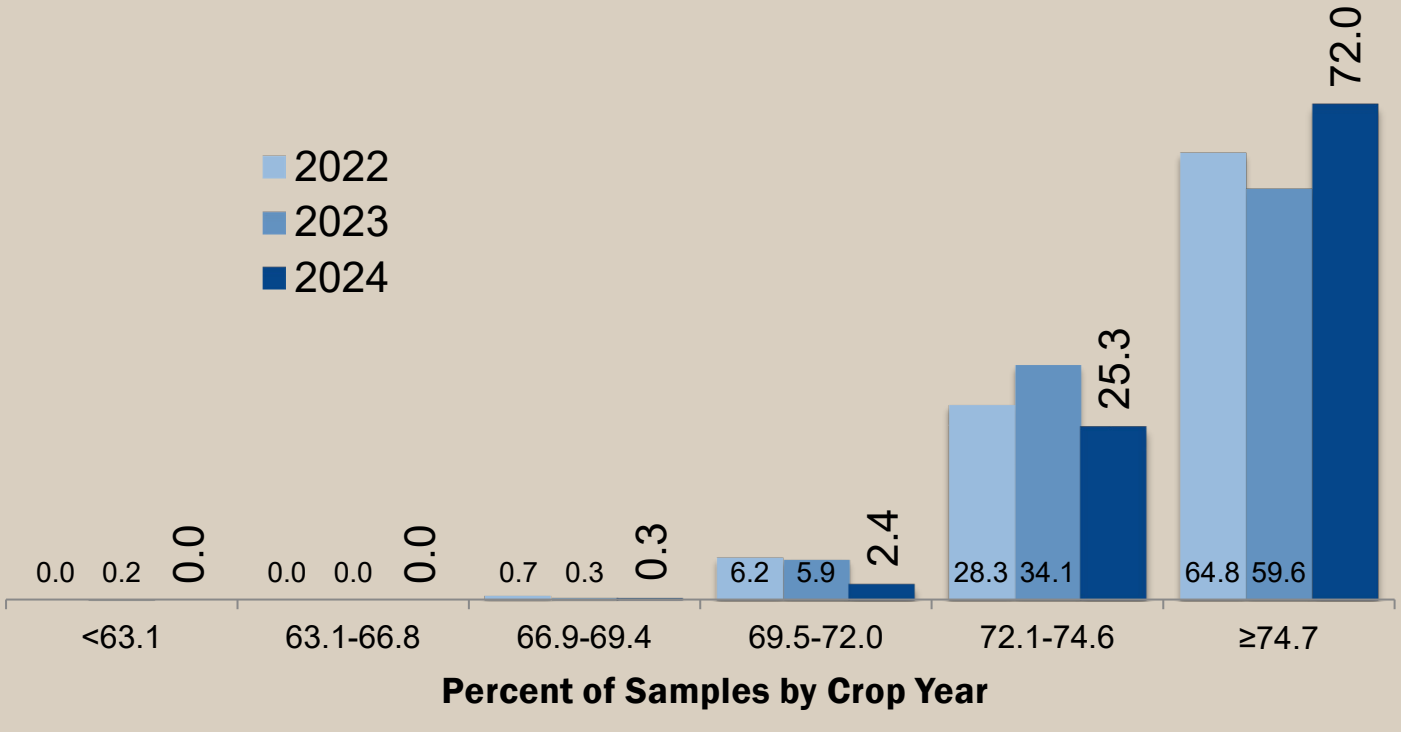


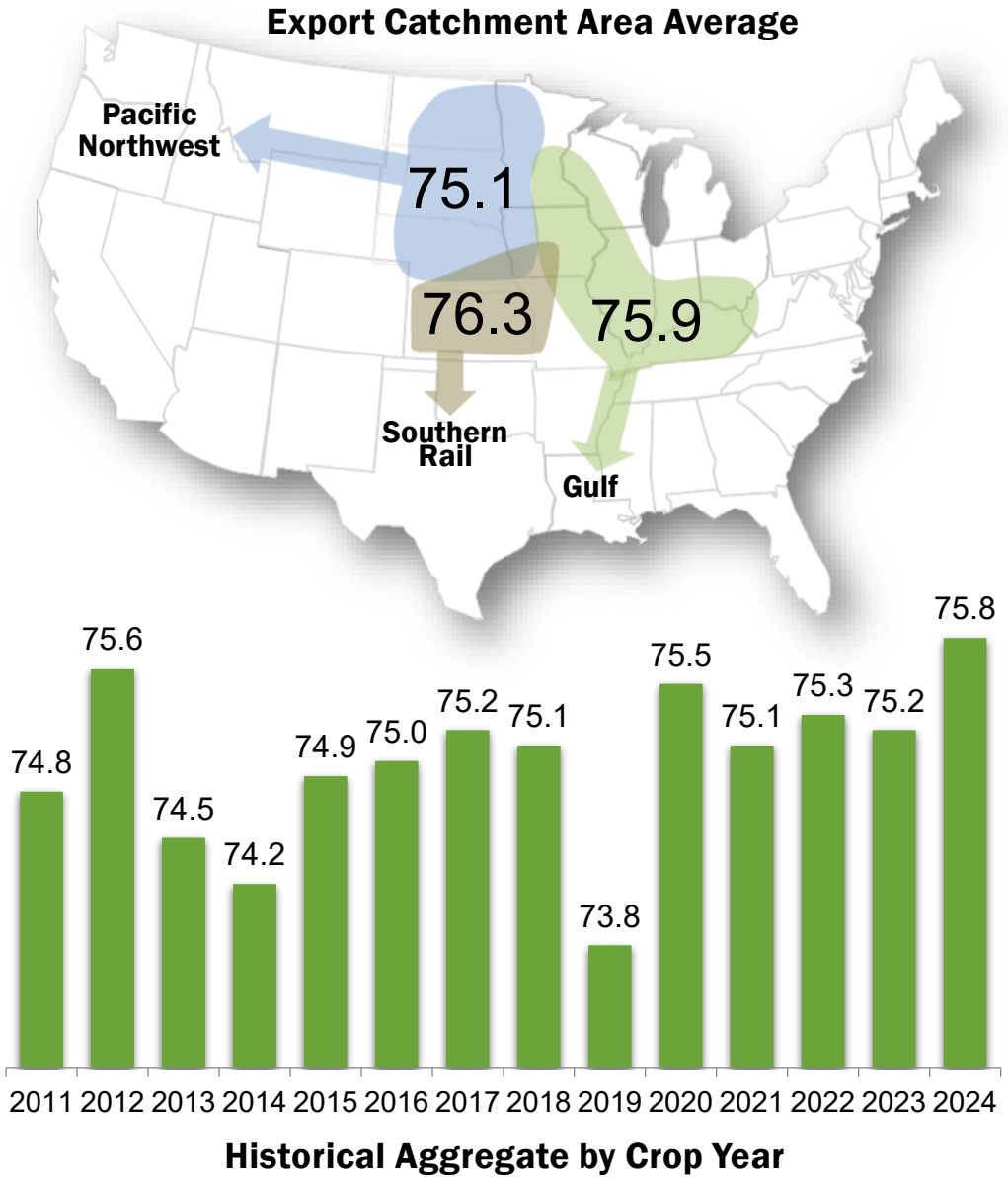
Historical Aggregate by Crop Year

Test Weight — Metric

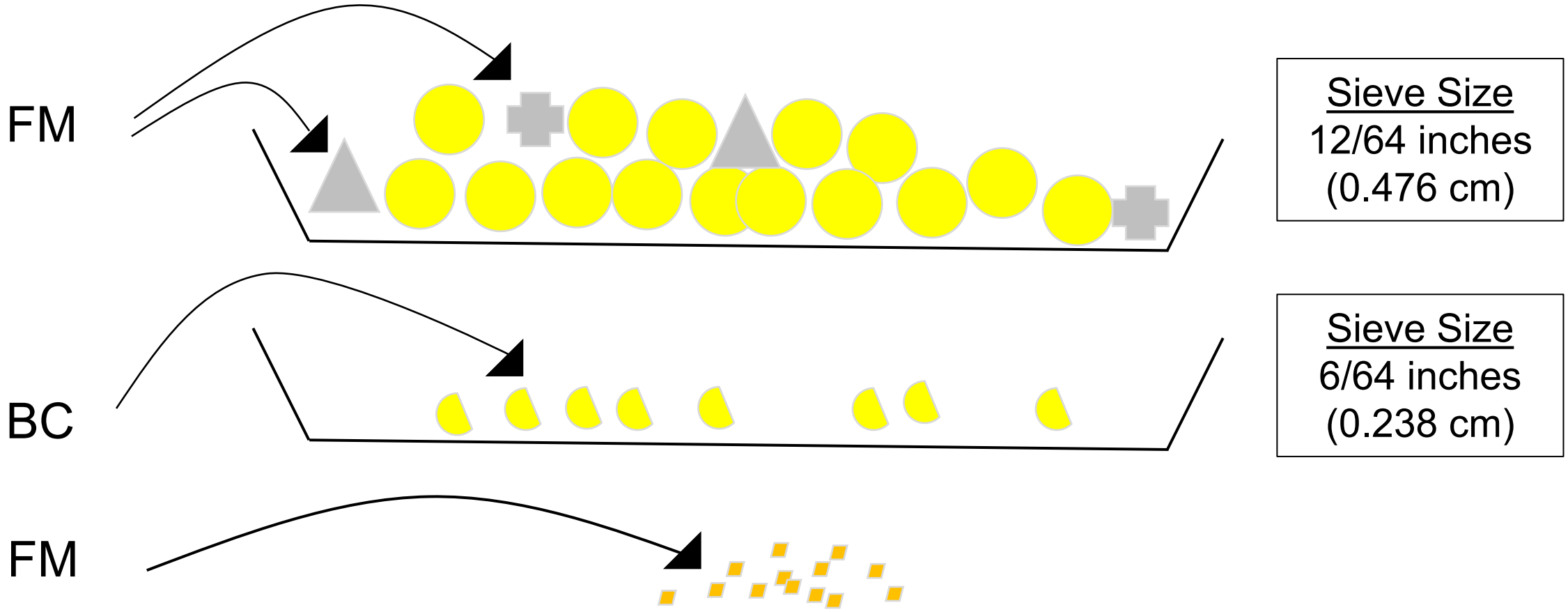
U.S. Aggregate: 75.8 kg/hl

- **Highest** average in the history of the report
- Average **higher** than the 5YA (75.0 kg/hl)
- **97.3%** No. 1 grade (93.7% in 2023)





Broken Corn and Foreign Material*

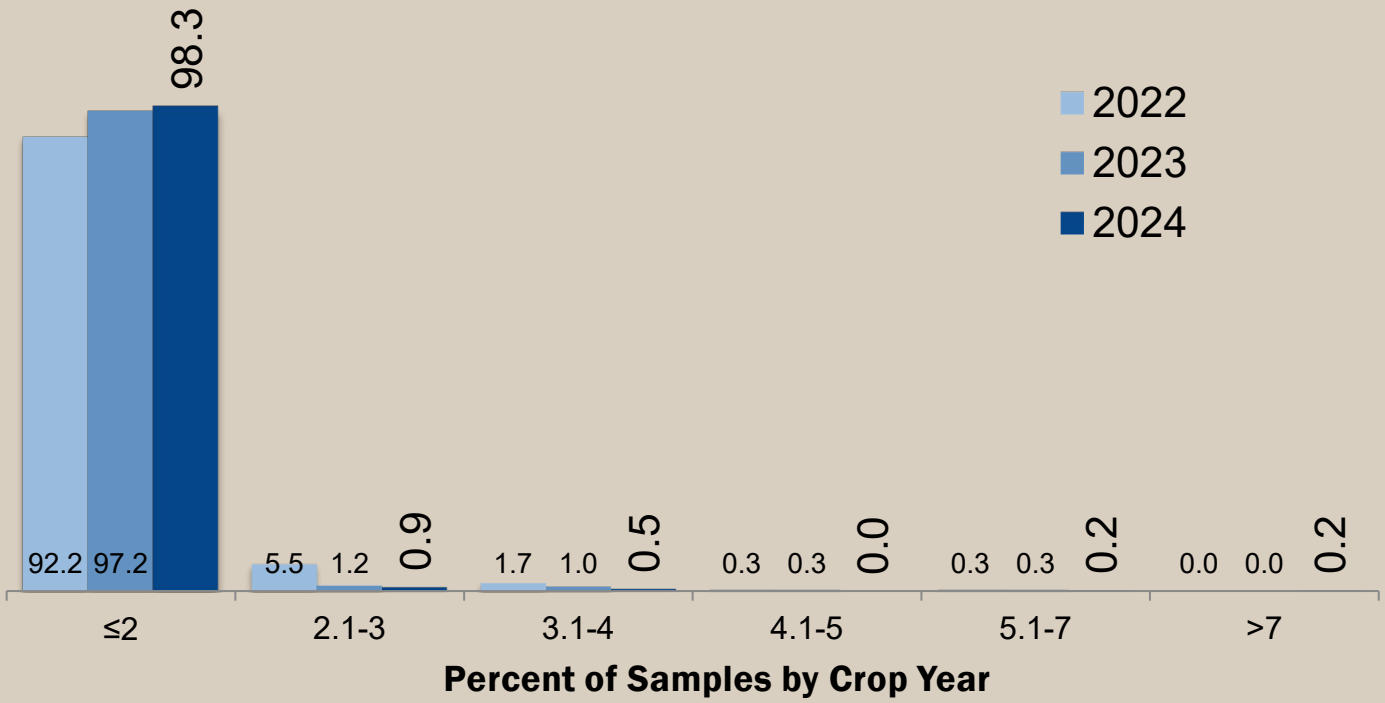


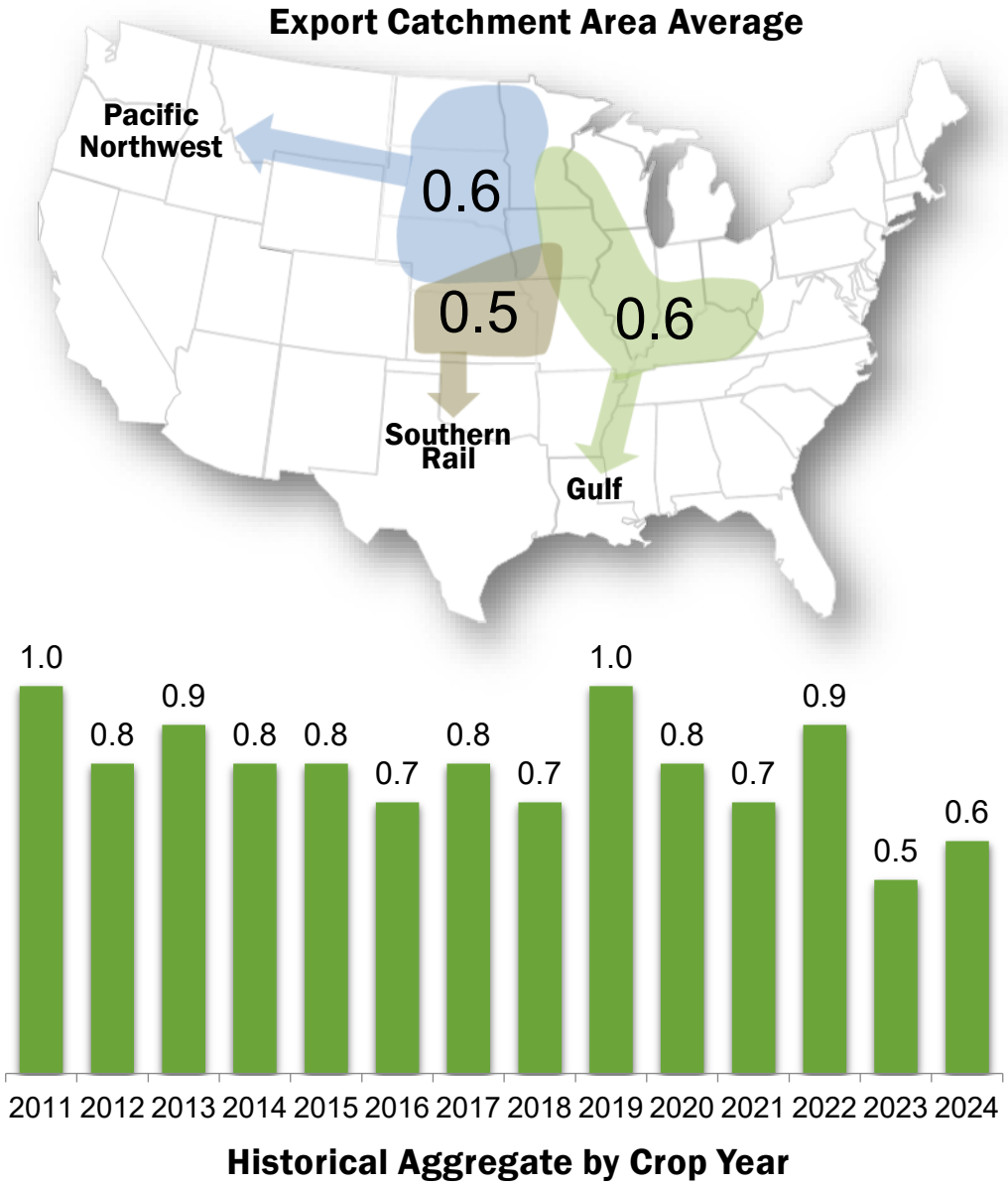
*Measured as percent of weight

Broken Corn and Foreign Material (%)

U.S. Aggregate: 0.6%

- Average **lower** than the 5YA (0.8%)
- **98.3%** No. 1 grade (97.2% in 2023)

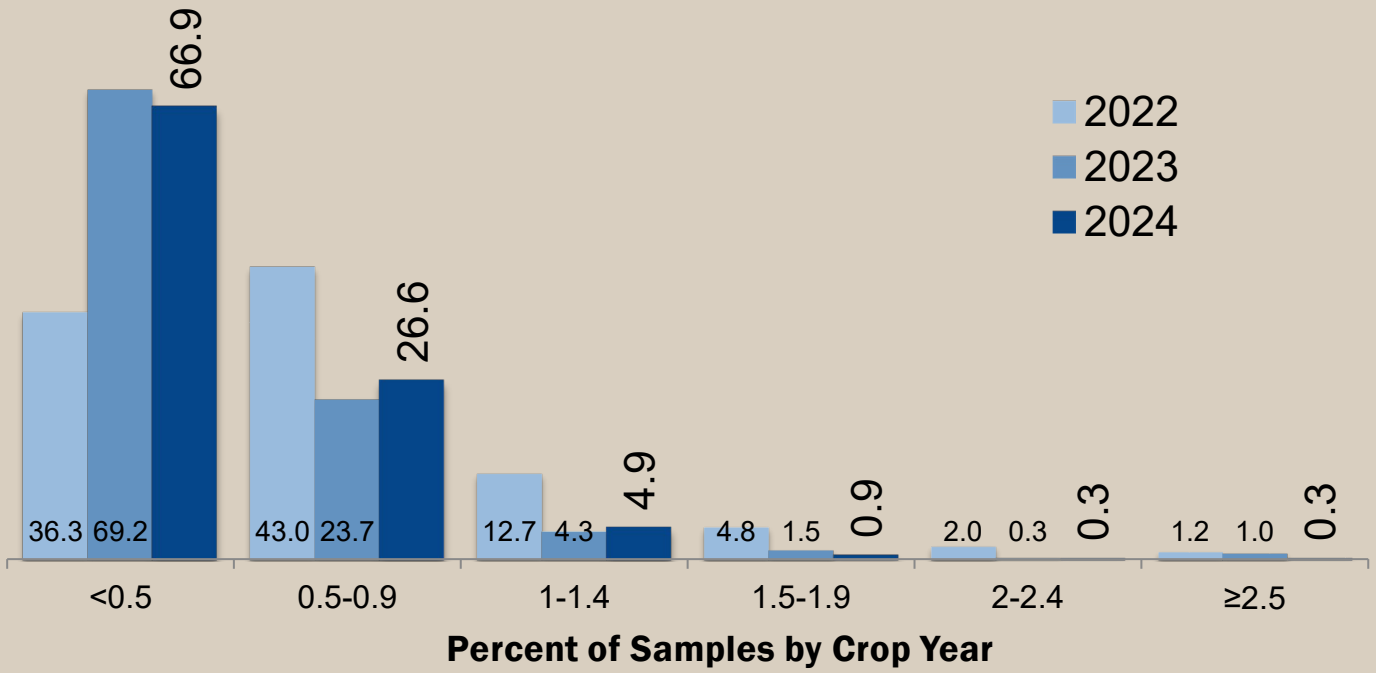


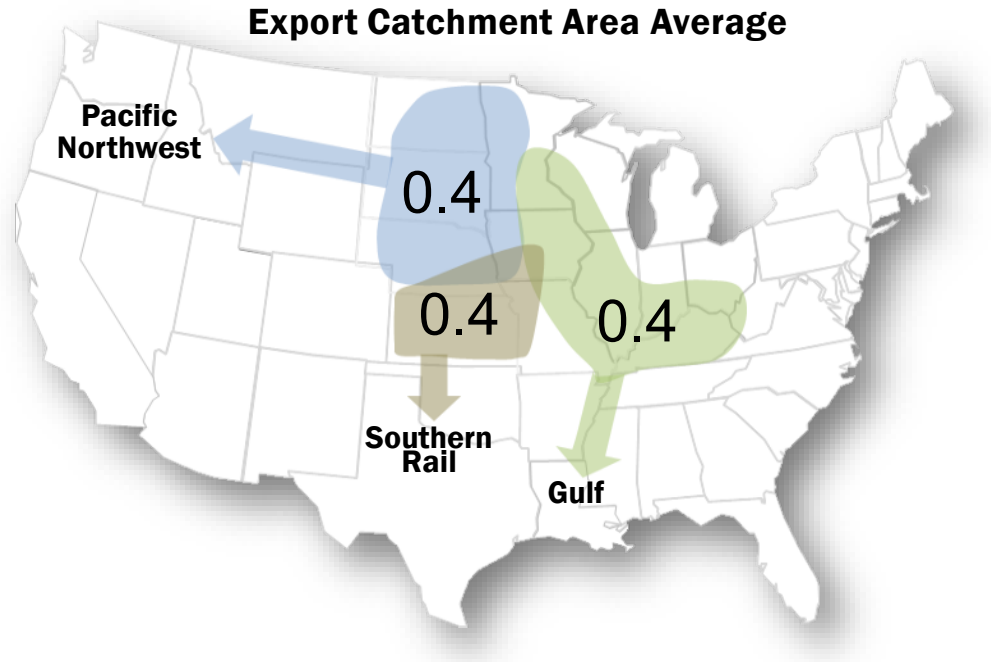


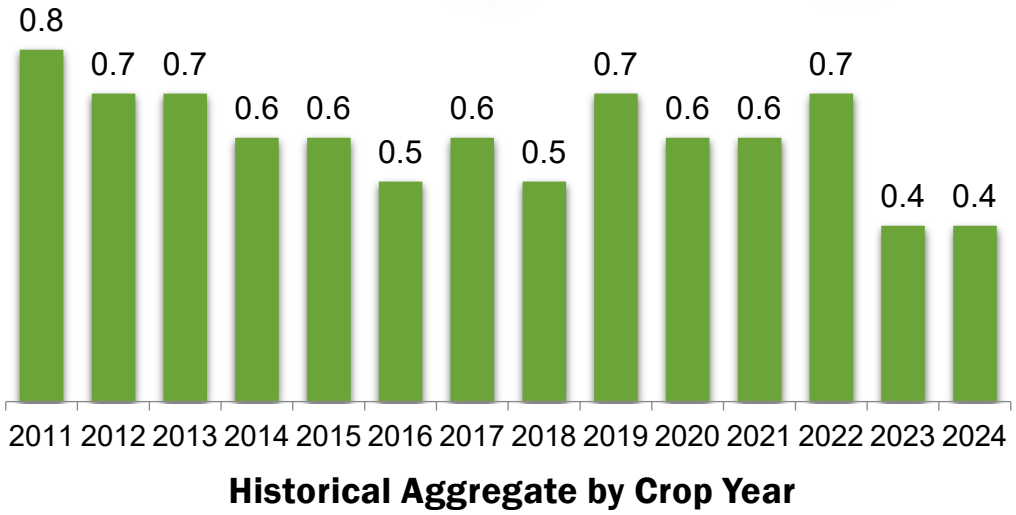
Broken Corn (%)

U.S. Aggregate: 0.4%

- Average **lower** than the 5YA (0.6%)



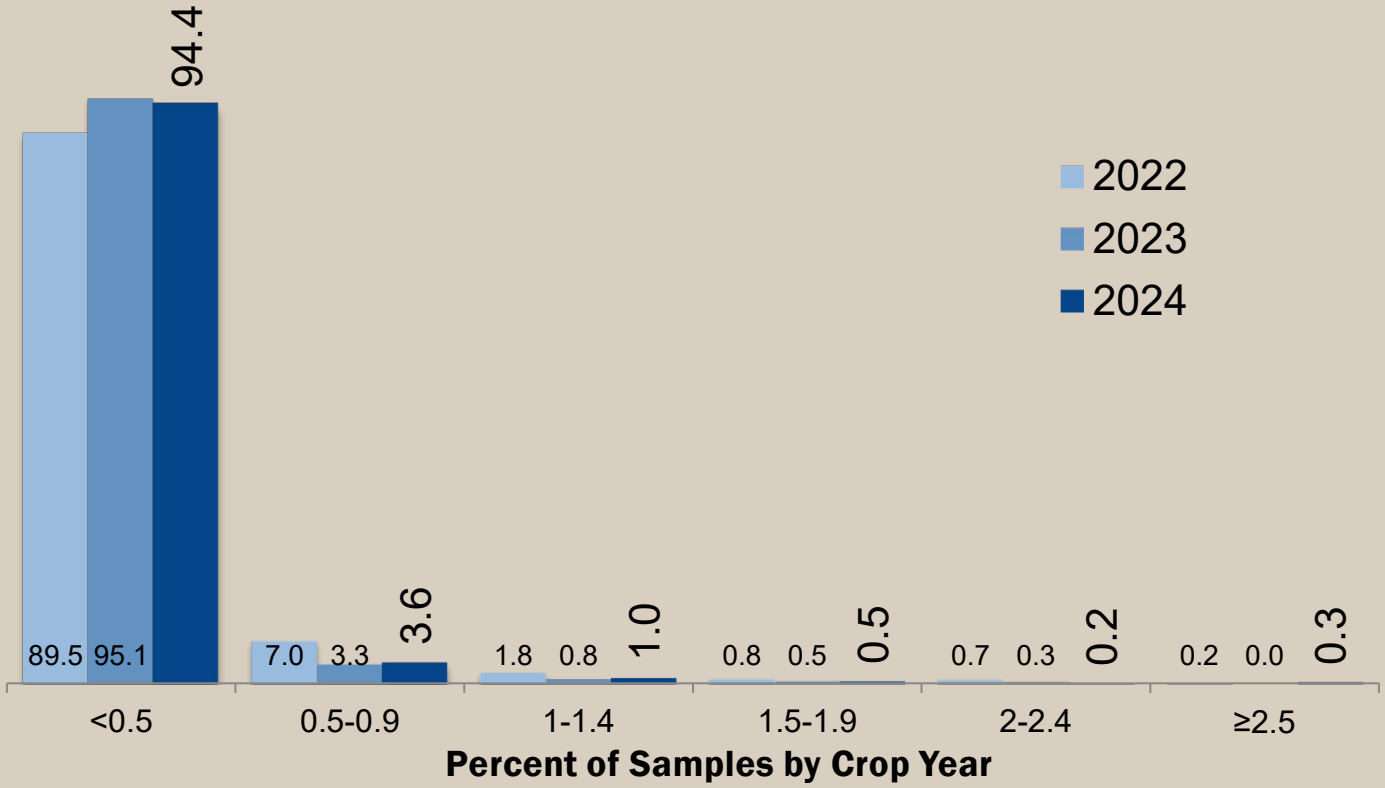


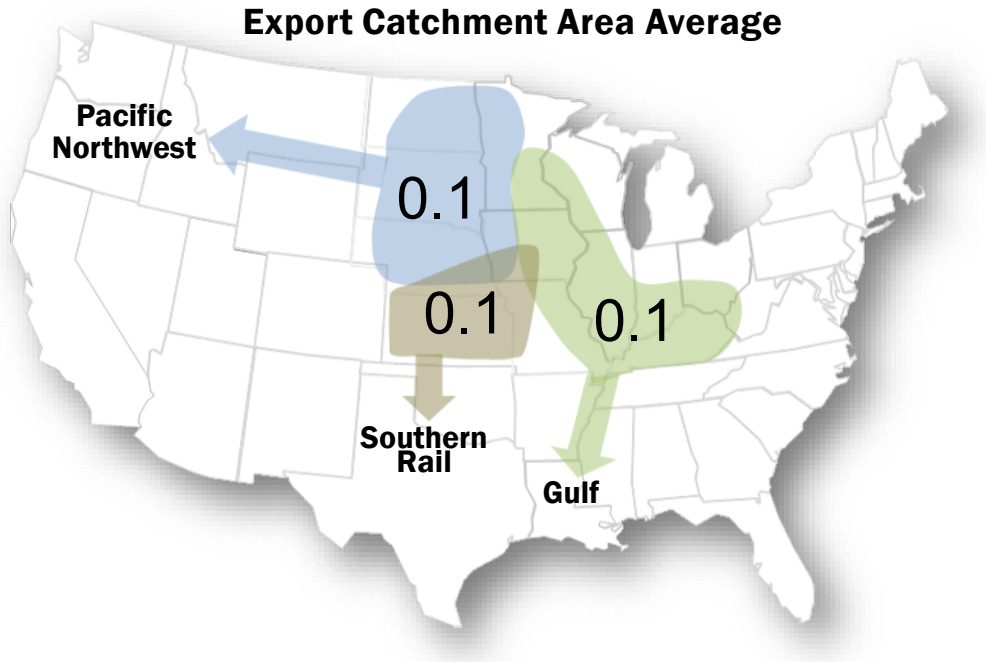


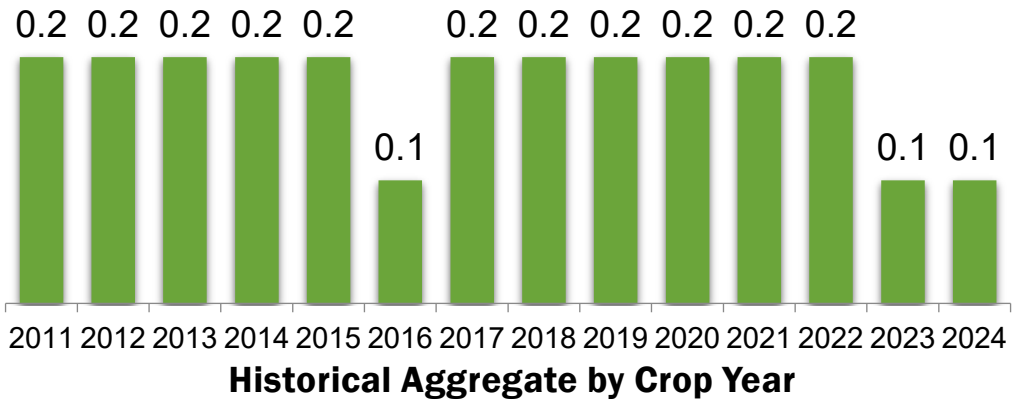
Foreign Material (%)

U.S. Aggregate: 0.1%

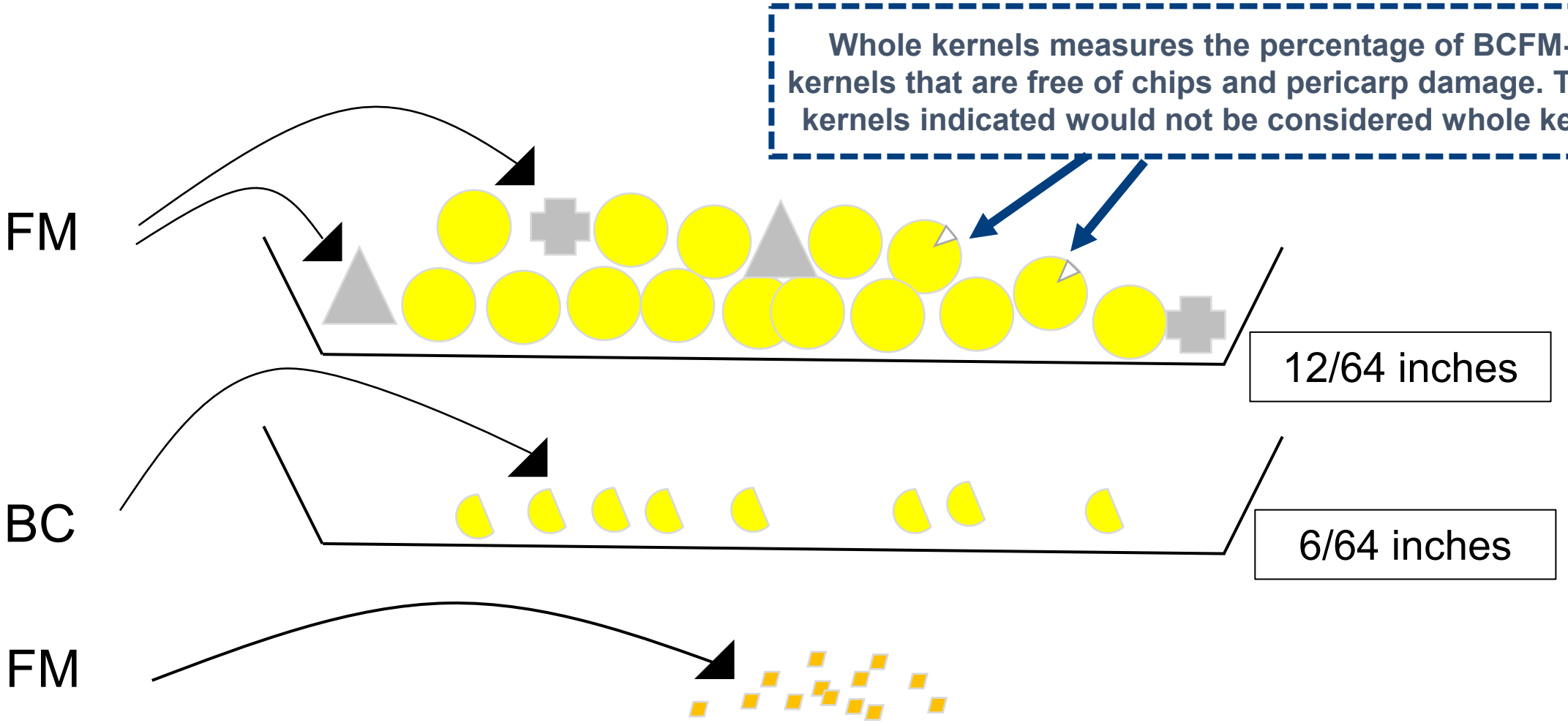
- Average **lower** than the 5YA (0.2%)
- **94.4%** contained less than 0.5% FM







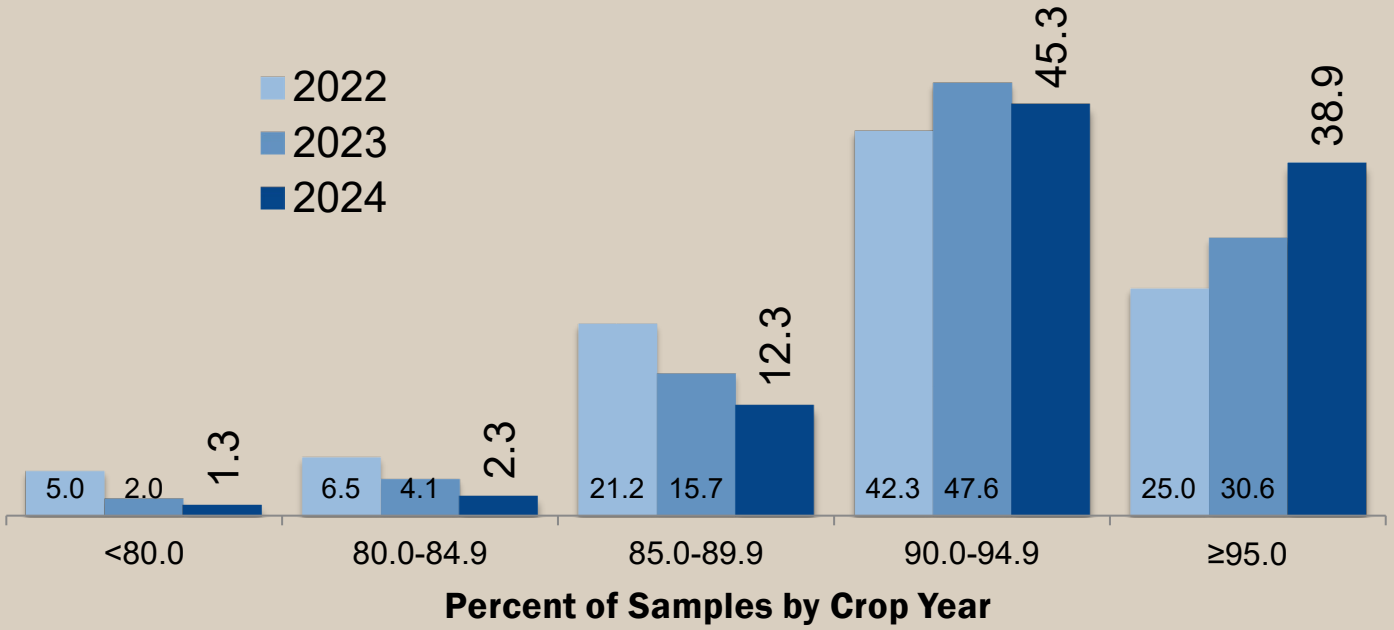
Whole Kernels (%)



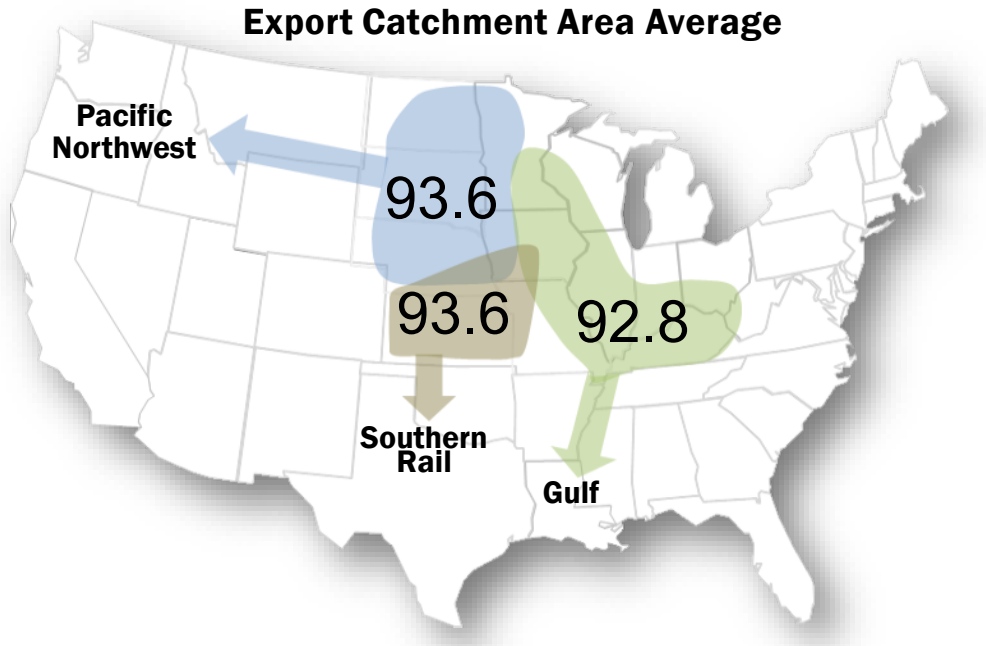
Whole Kernels (%)

U.S. Aggregate: 93.1%

- Not a grade factor
- Average **higher** than the 5YA (91.8%)



Percent of Samples by Crop Year

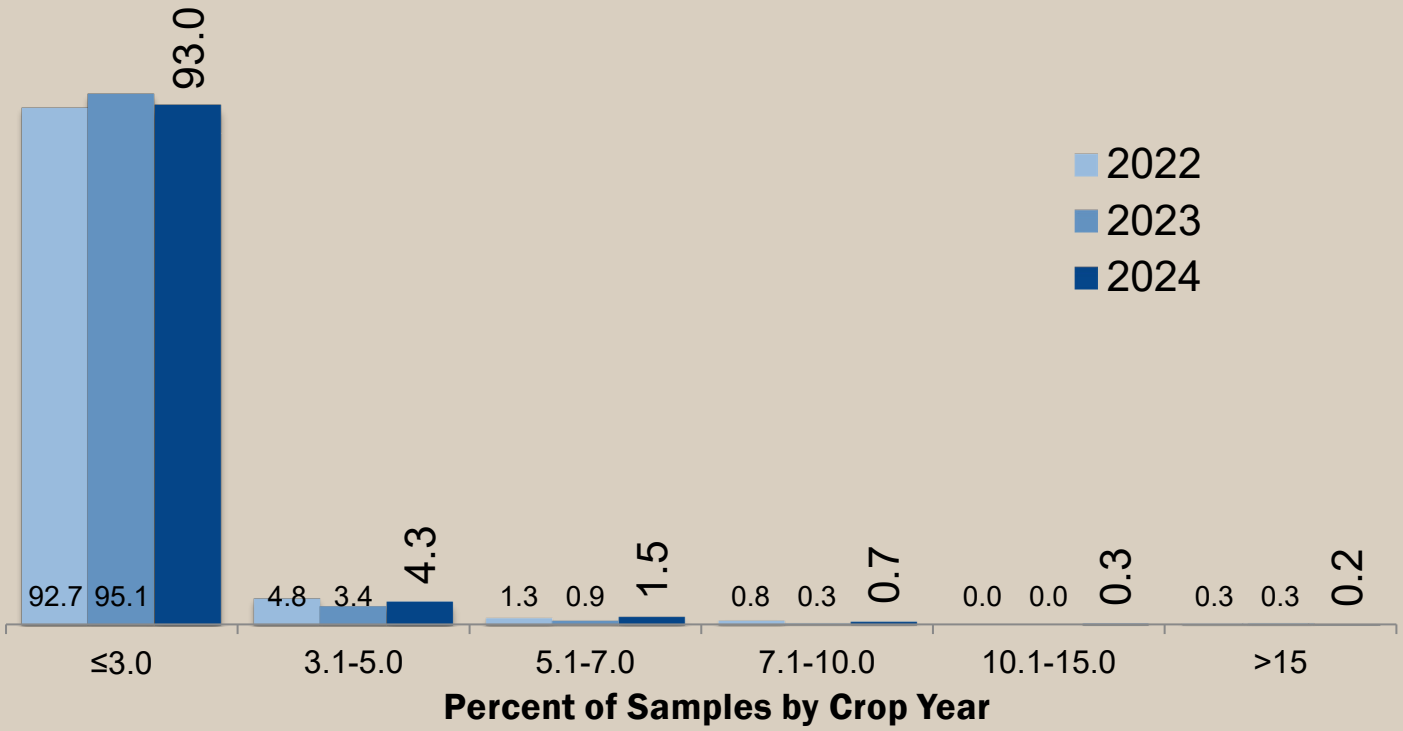


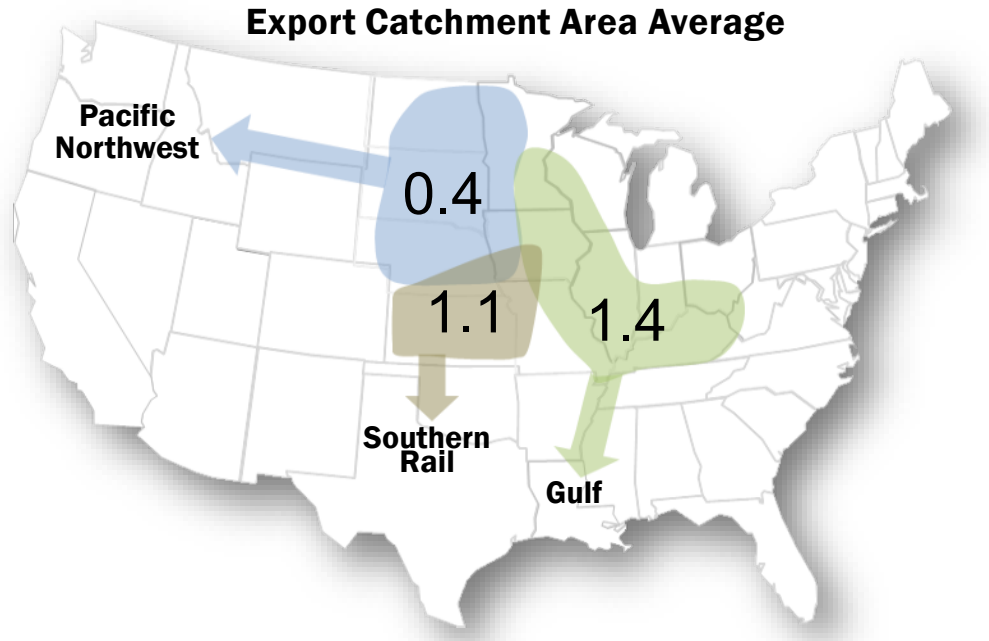
Historical Aggregate by Crop Year

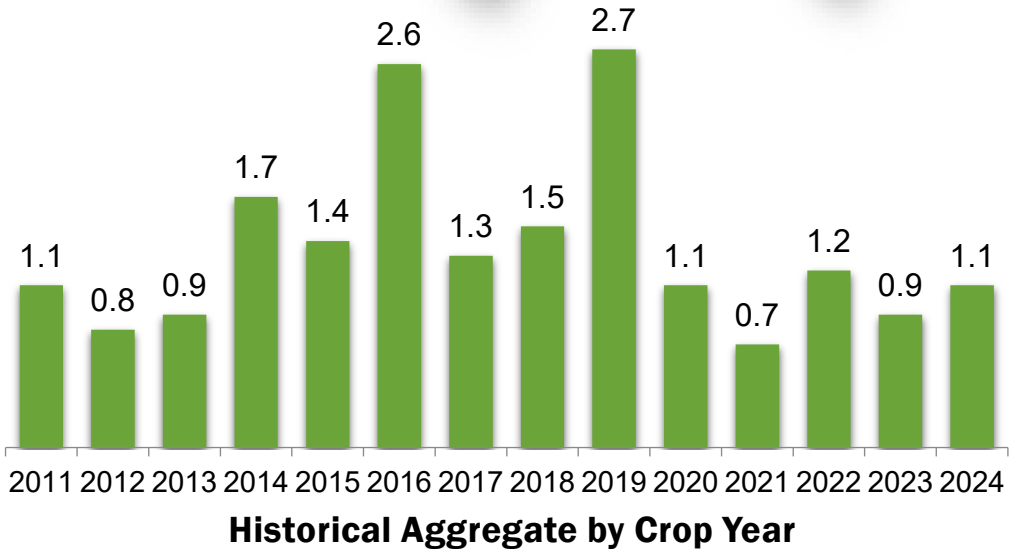
Total Damage and Heat Damage (%)

U.S. Aggregate: 1.1%

- Average **lower** than the 5YA (1.3%)
- **93.0%** No. 1 grade (95.1% in 2023)
- Average heat damage of **0.0%**



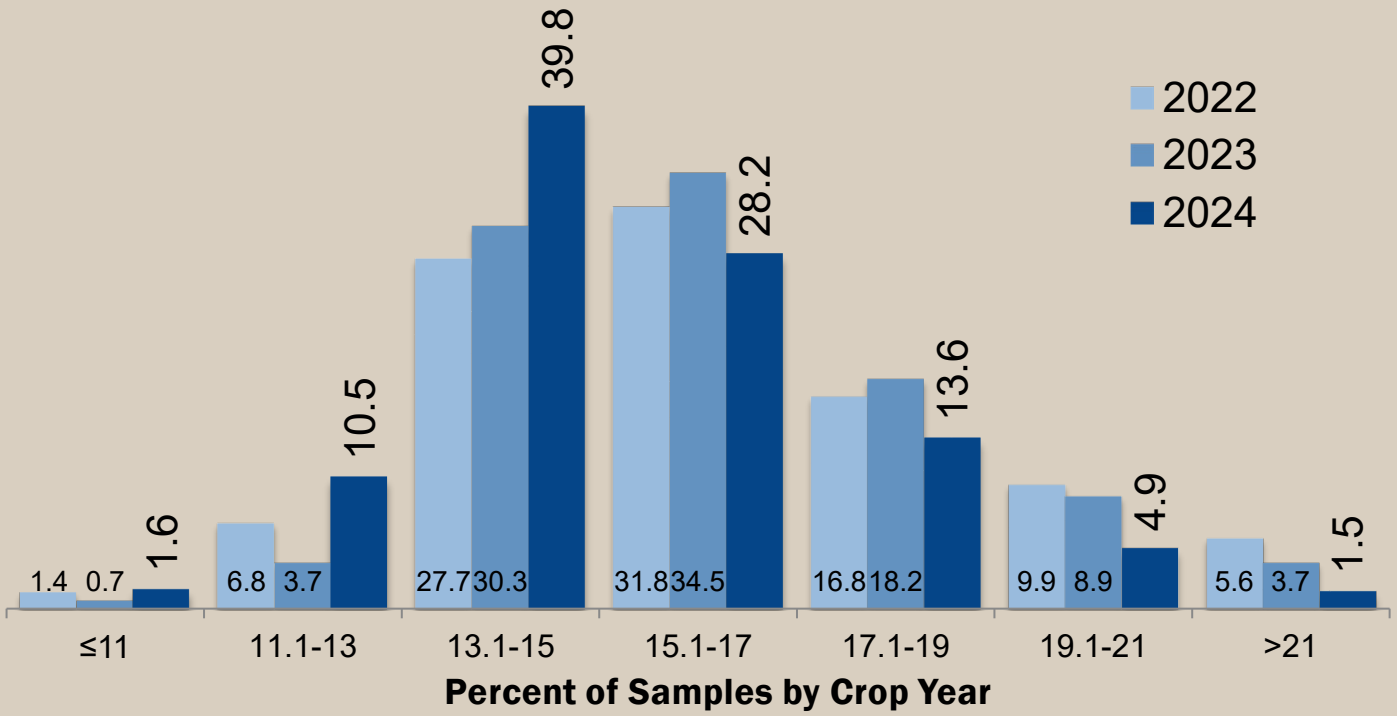


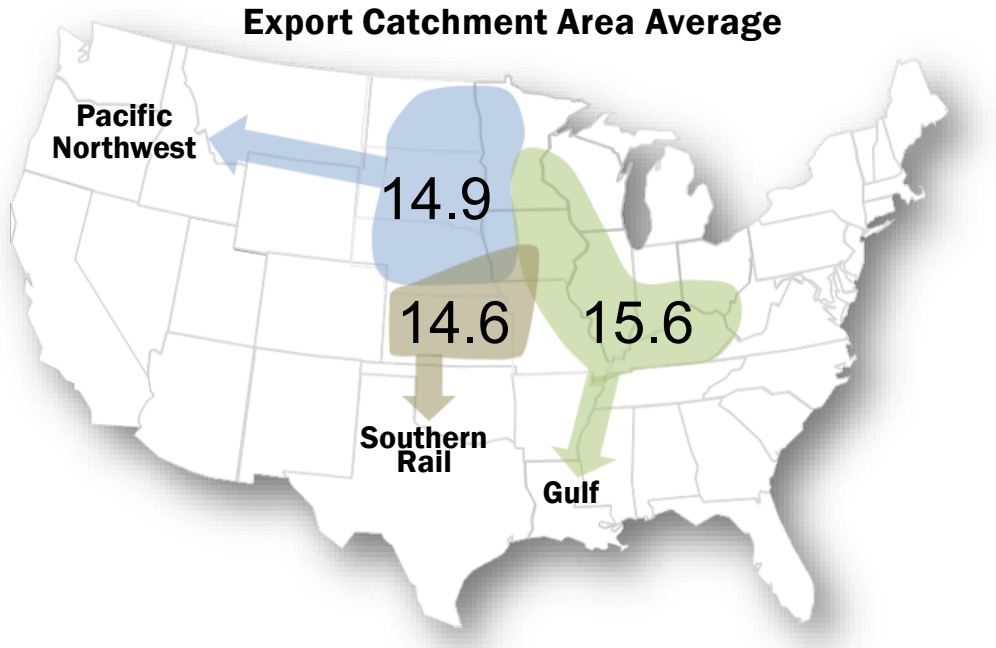


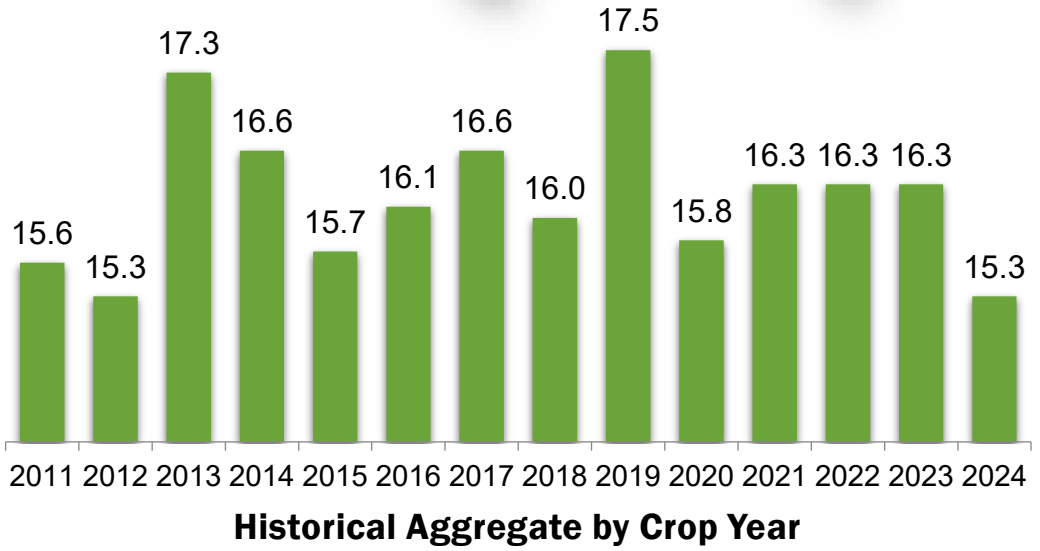
Moisture (%)

U.S. Aggregate: 15.3%

- Ties 2012 for the **lowest** average in the history of the report
- Average **lower** than the 5YA (16.4%)

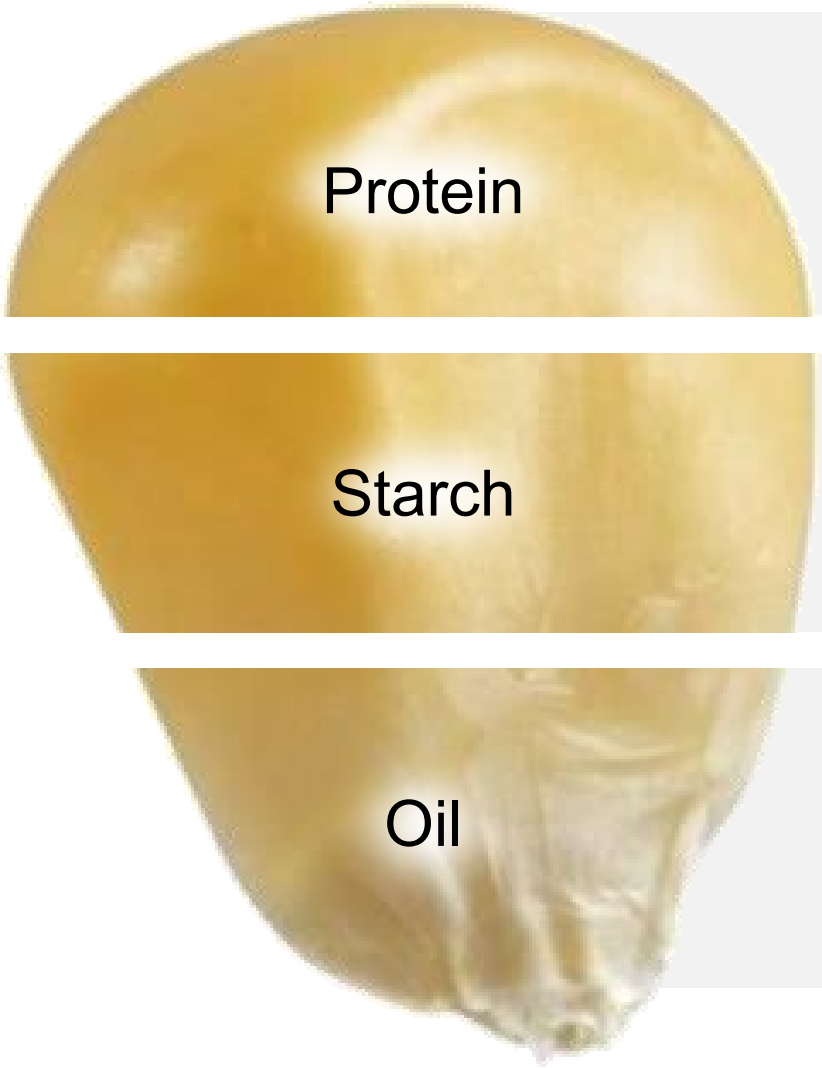






Chemical Composition

Chemical Composition



Protein	Important for poultry and livestock feeding Supplies essential amino acids	Influenced by	Genetics, weather, crop yields and available nitrogen during the growing season
Starch	Important for wet millers and dry-grind ethanol manufacturers	Influenced by	Genetics, weather and crop yields
Oil	Important by-product of wet and dry milling Essential feed component		

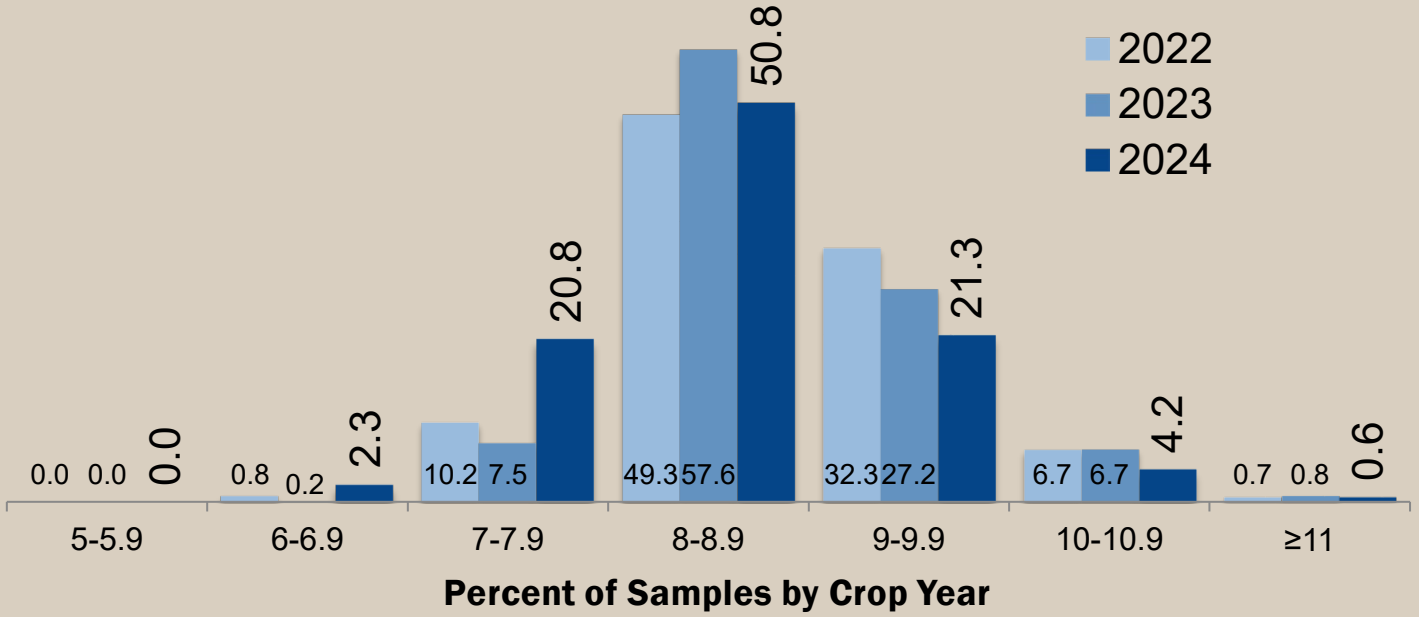
Chemical Composition

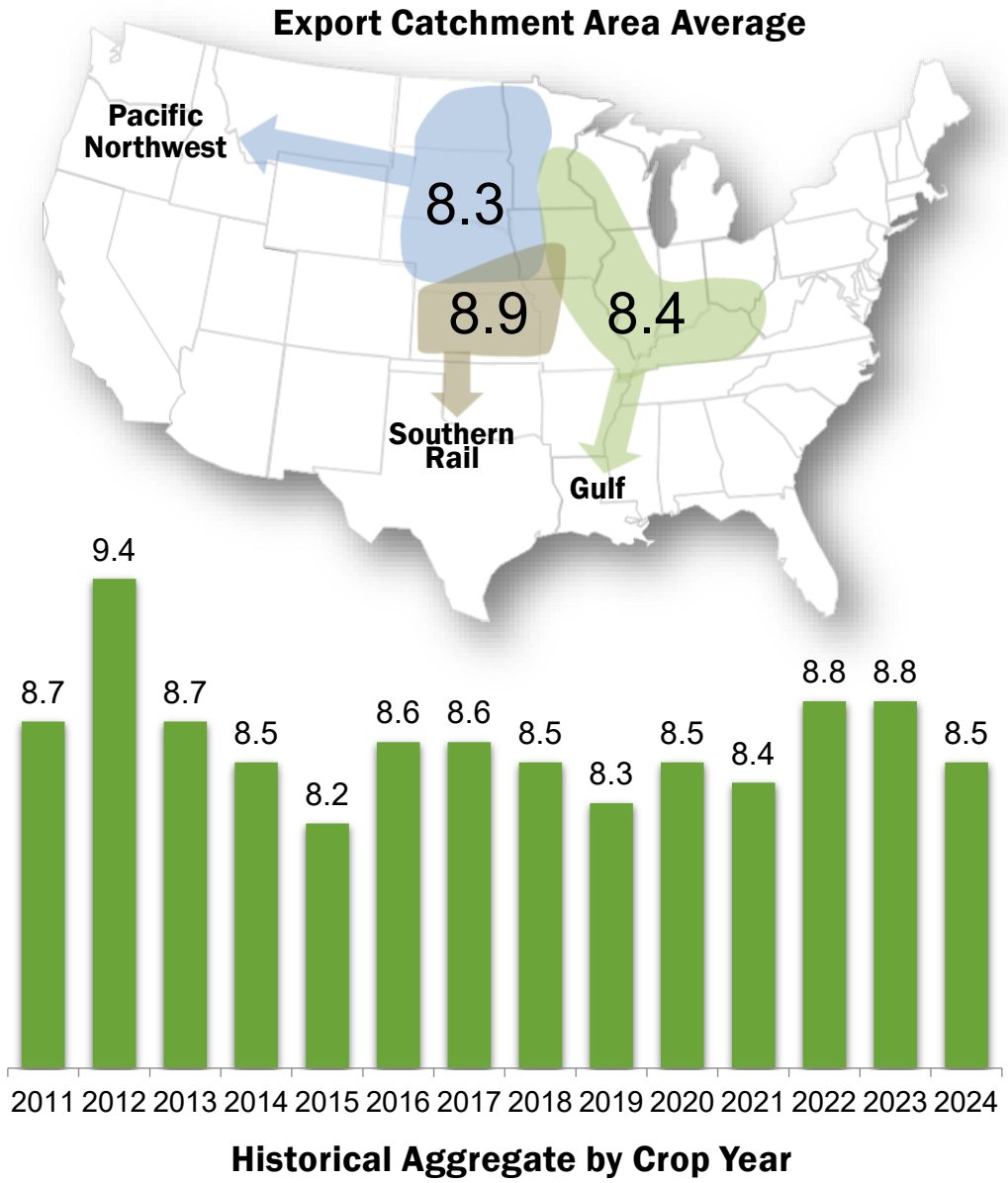
	Number of Samples	Average	Standard Deviation	Minimum	Maximum
Protein (Dry Basis %)	620	8.5	0.60	6.0	11.6
Starch (Dry Basis %)	620	72.2	0.65	69.7	74.3
Oil (Dry Basis %)	620	3.9	0.24	3.0	4.8

Protein (Dry Basis %)

U.S. Aggregate: 8.5%

- Average **same** as the 5YA

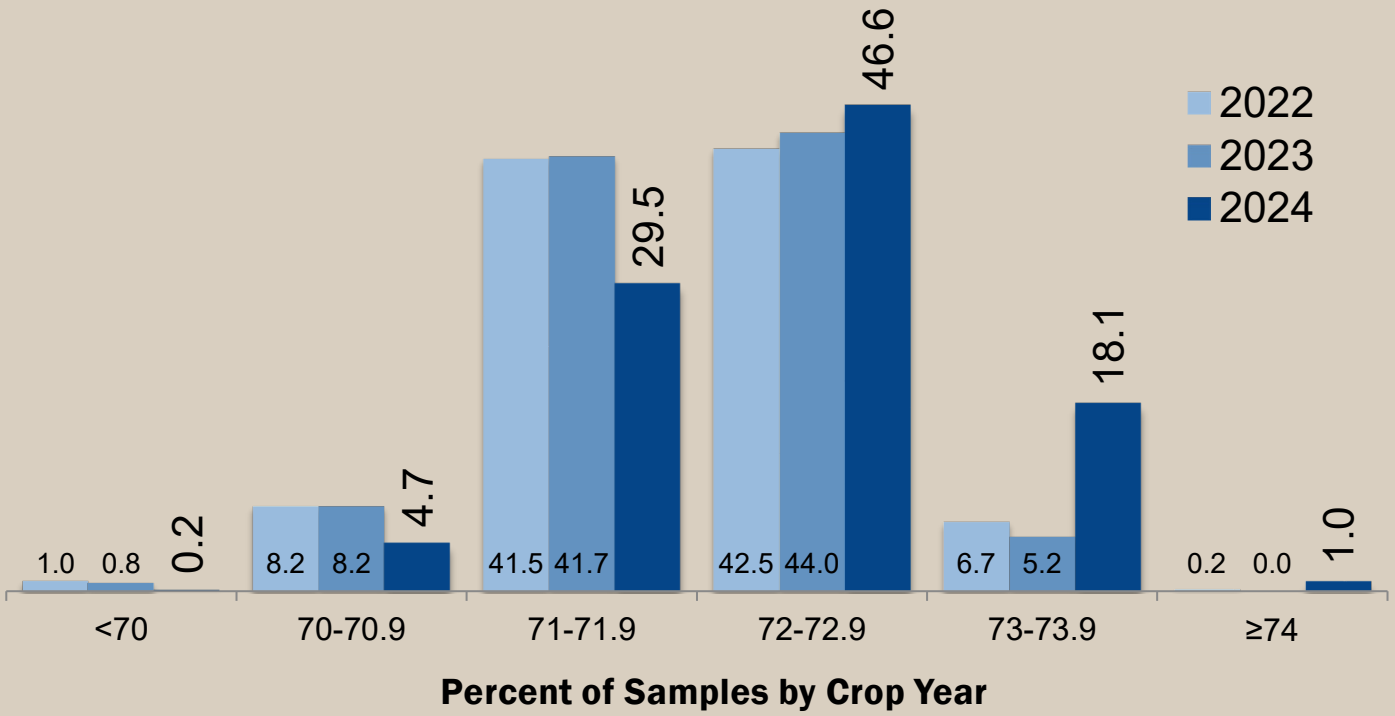




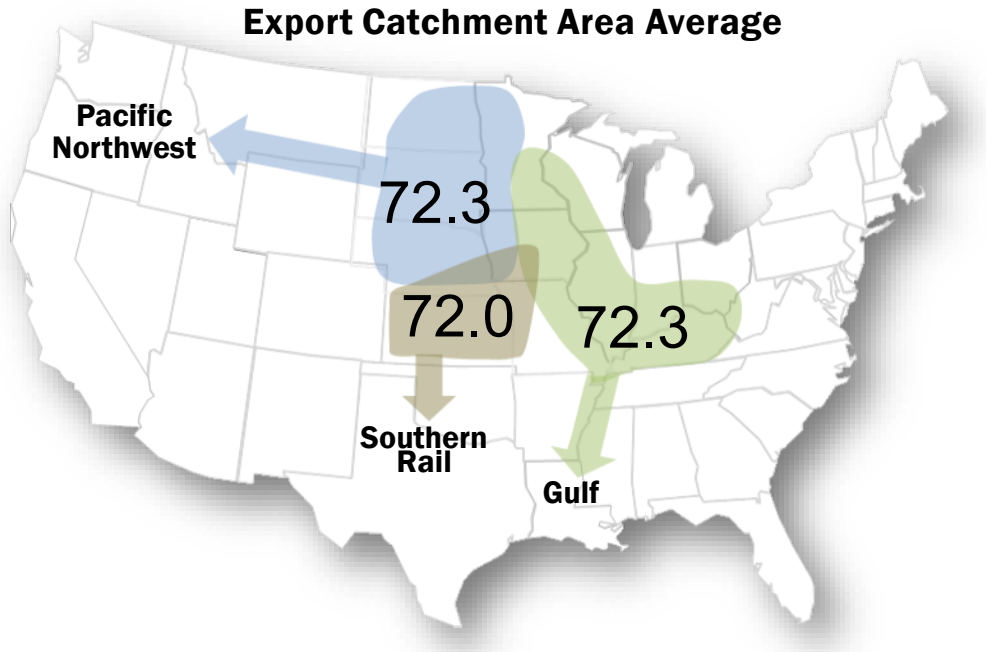
Starch (Dry Basis %)

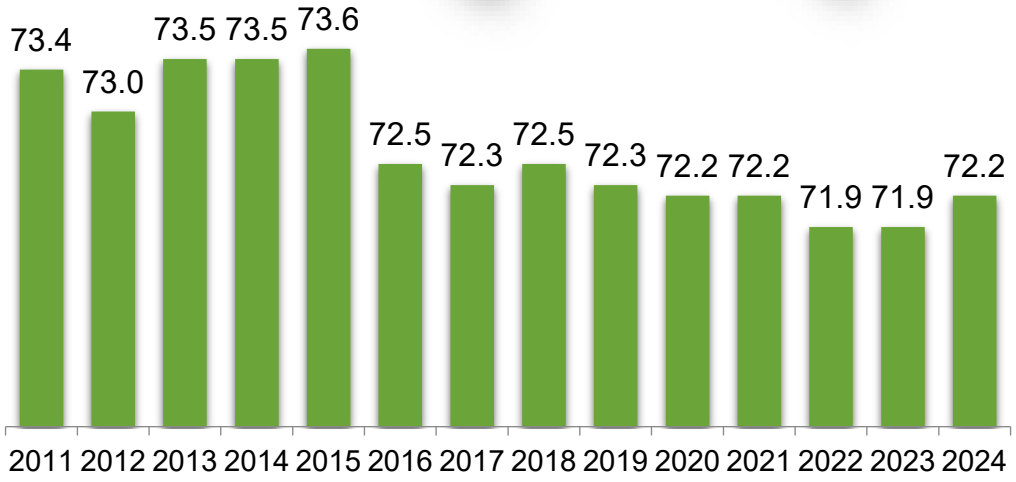
U.S. Aggregate: 72.2%

- Average **higher** than the 5YA (72.1%)
- **Gulf** ECA tends to have the highest average starch



Percent of Samples by Crop Year



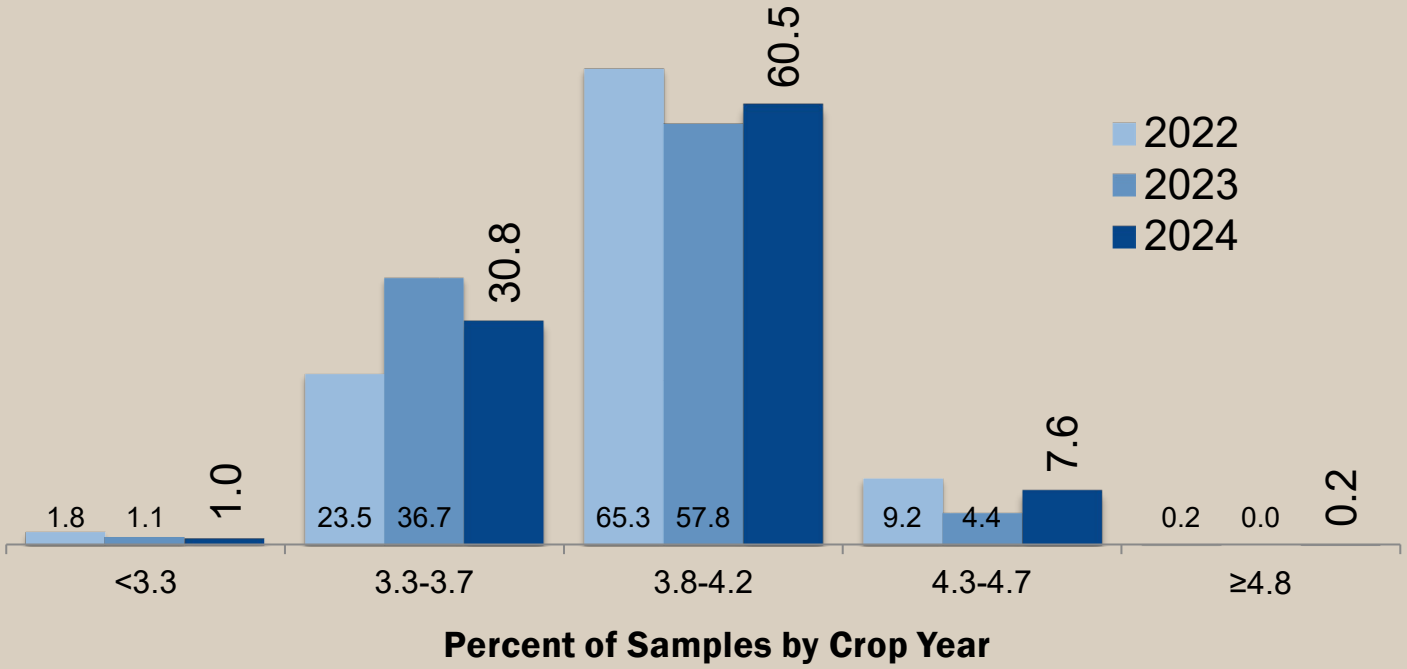


Historical Aggregate by Crop Year

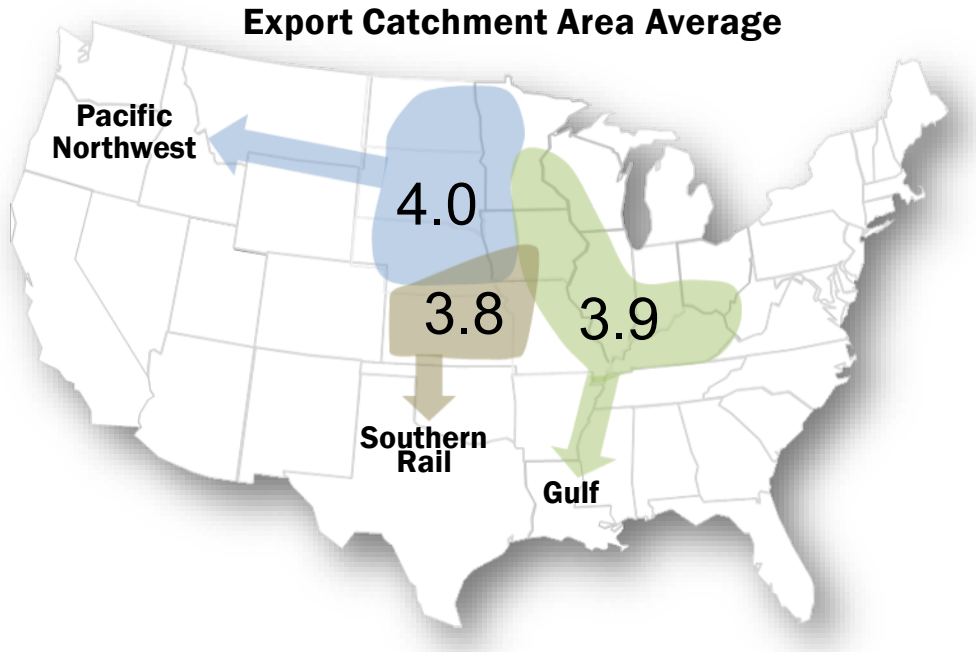
Oil (Dry Basis %)

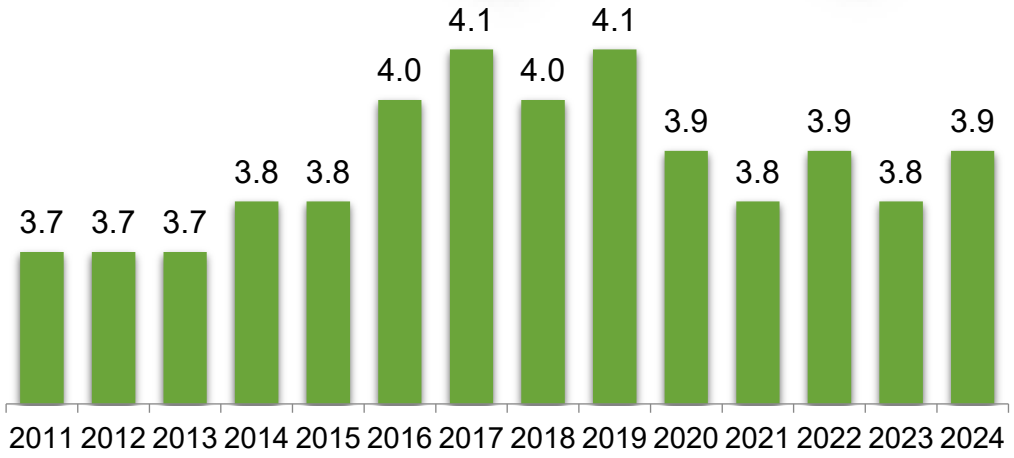
U.S. Aggregate: 3.9%

- Average **lower** than the 5YA (3.9%)*



Percent of Samples by Crop Year

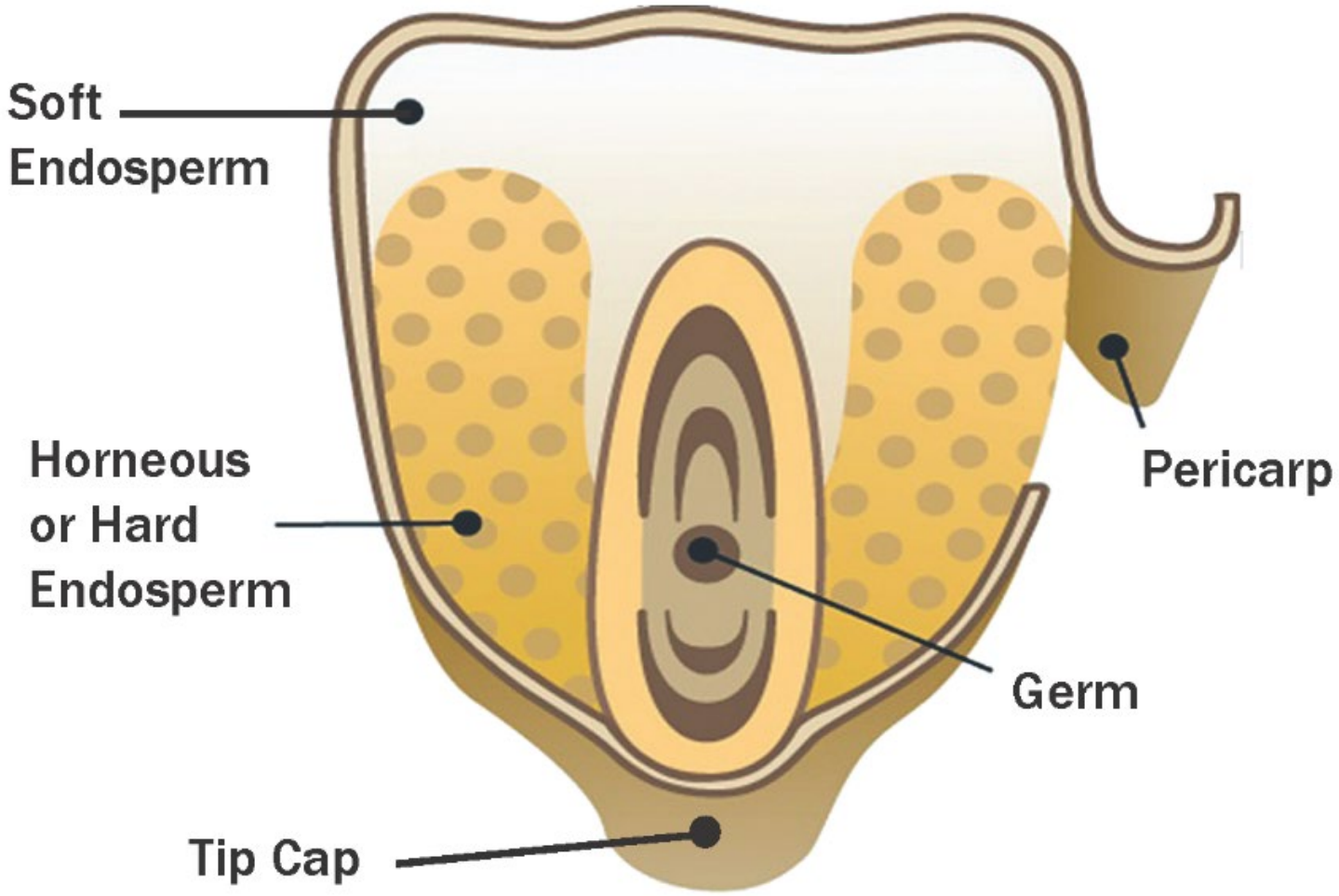




Historical Aggregate by Crop Year

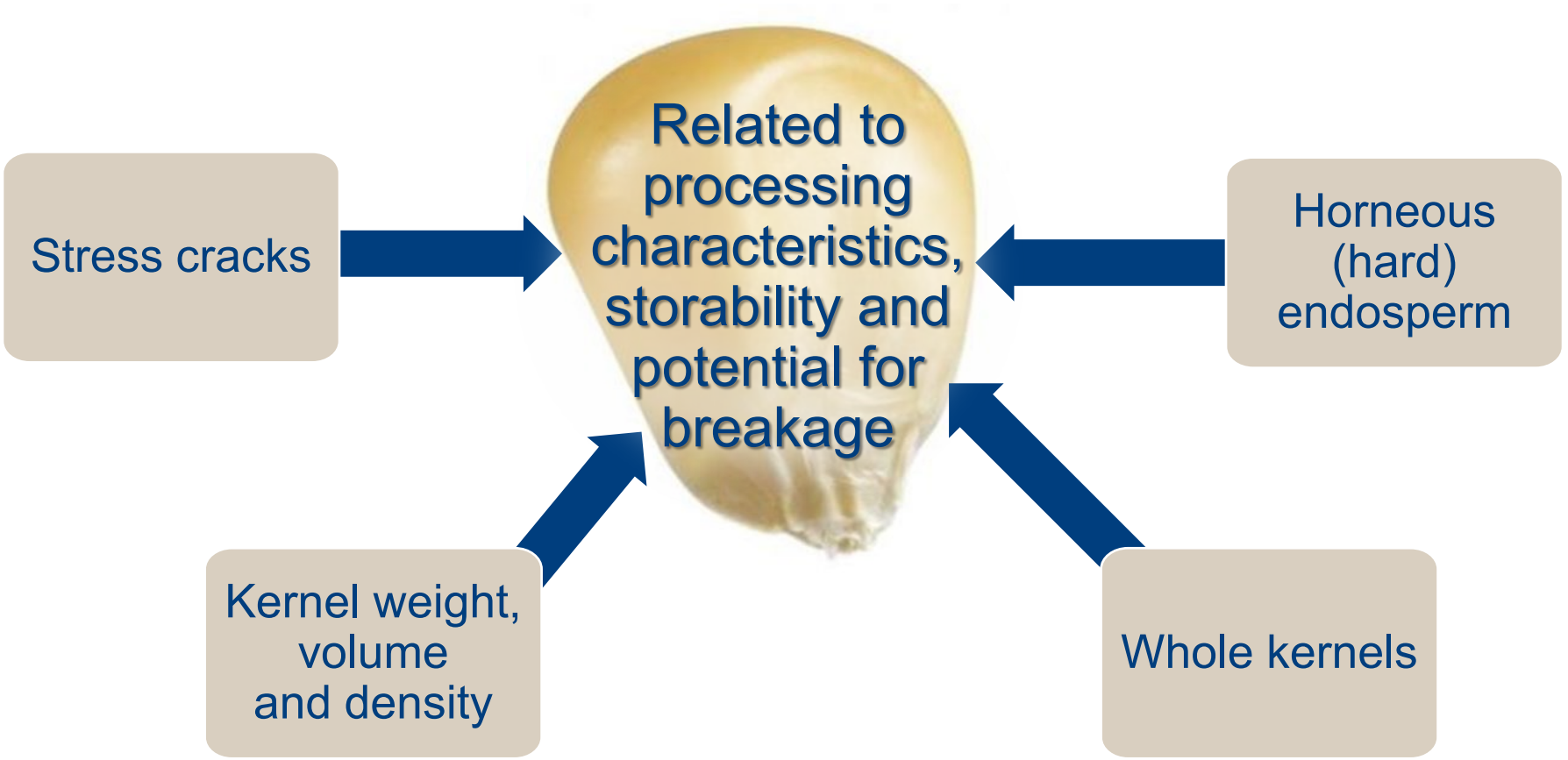
Physical Factors

Corn Morphology



Source: Adapted from Corn Refiners Association, 2011

Physical Factors – Overview



Physical Factors

	Number of Samples	Average	Standard Deviation	Minimum	Maximum
Stress Cracks (%)	620	9.3	9.4	0	82
100-Kernel Weight (g)	182	36.66	4.33	23.60	47.20
Kernel Volume (cm^3)	182	0.29	0.03	0.19	0.37
True Density (g/cm^3)	182	1.265	0.022	1.203	1.325
Whole Kernels (%)	620	93.1	3.6	49.8	99.6
Horneous Endosperm (%)	182	85	3	77	92

Stress Cracks

Internal cracks in the horneous (hard) endosperm

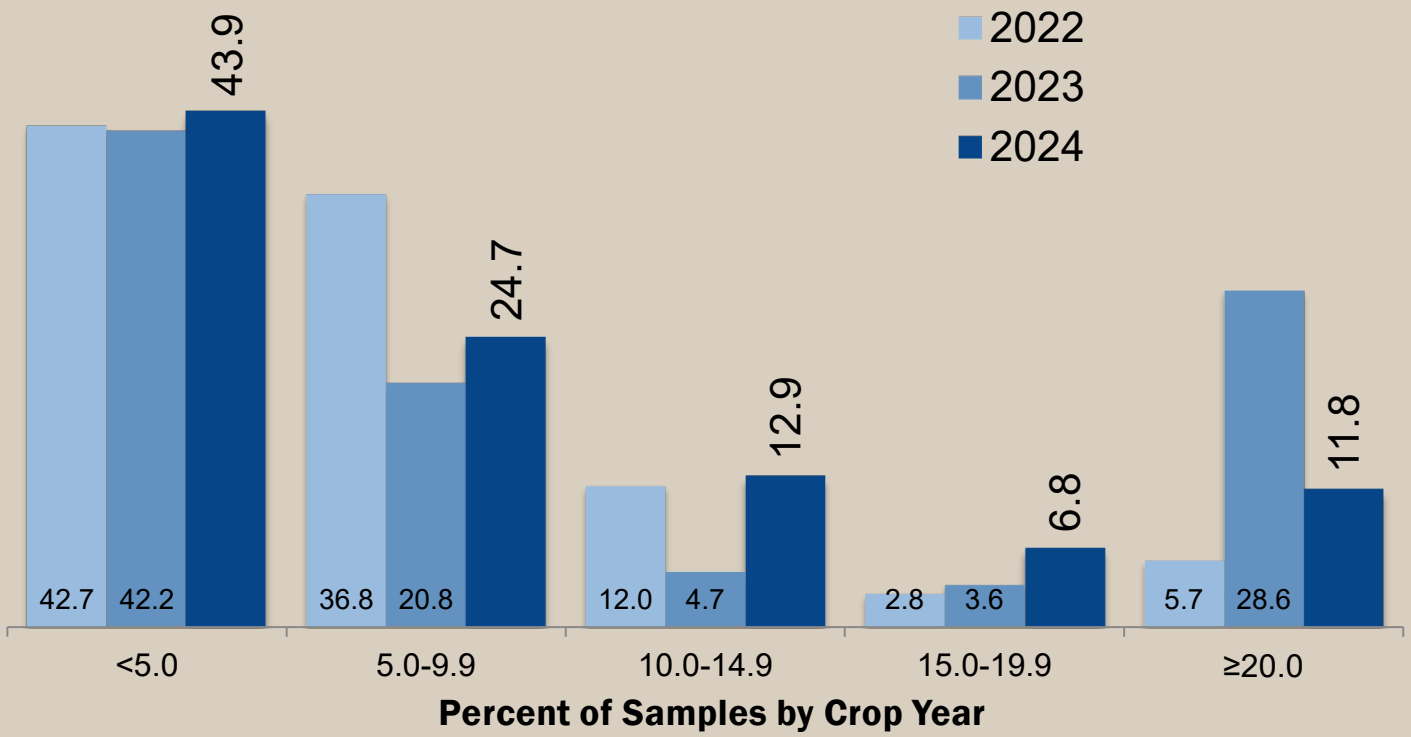
Most common cause is artificial drying

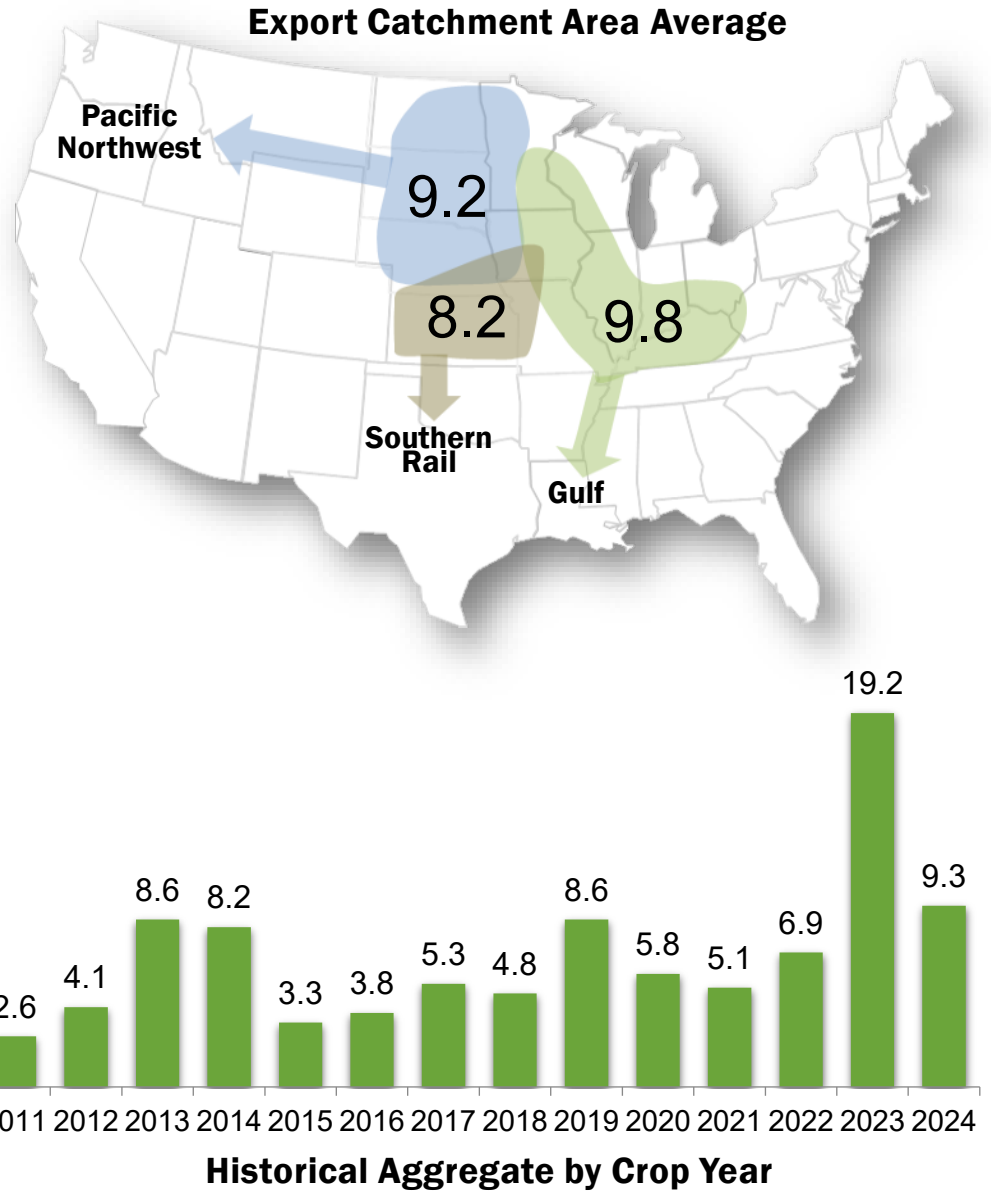
Impacts breakage susceptibility, milling and alkaline cooking

Stress Cracks (%)

U.S. Aggregate: 9.3%

- Average **similar** to the 5YA (9.1%)





Stress Crack Index

% kernels with
1 stress crack

× 1

+

% kernels with
2 stress cracks

× 3

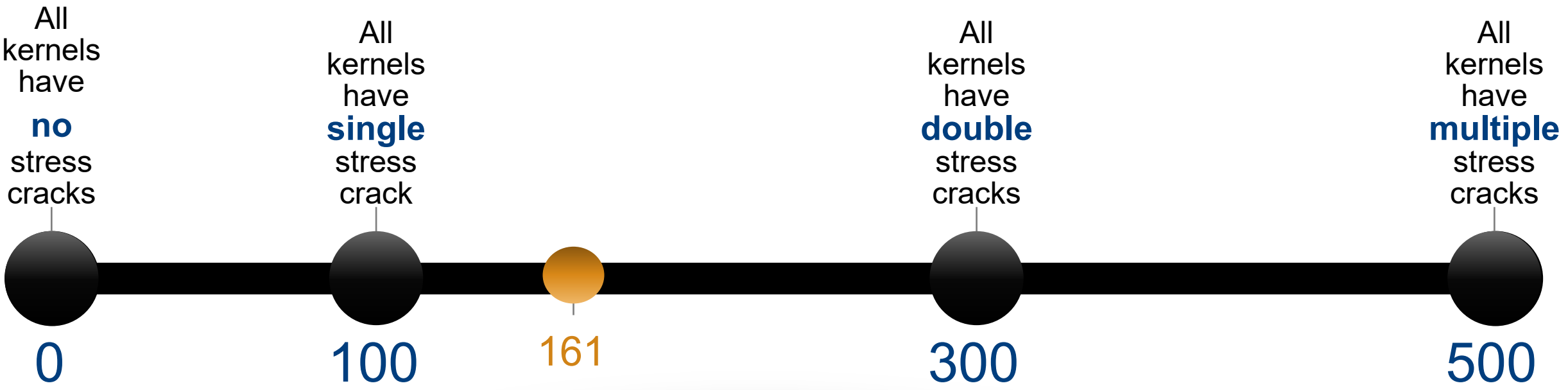
+

% kernels with
> 2 stress cracks

× 5

= SCI

Magnitude of Stress Crack Index



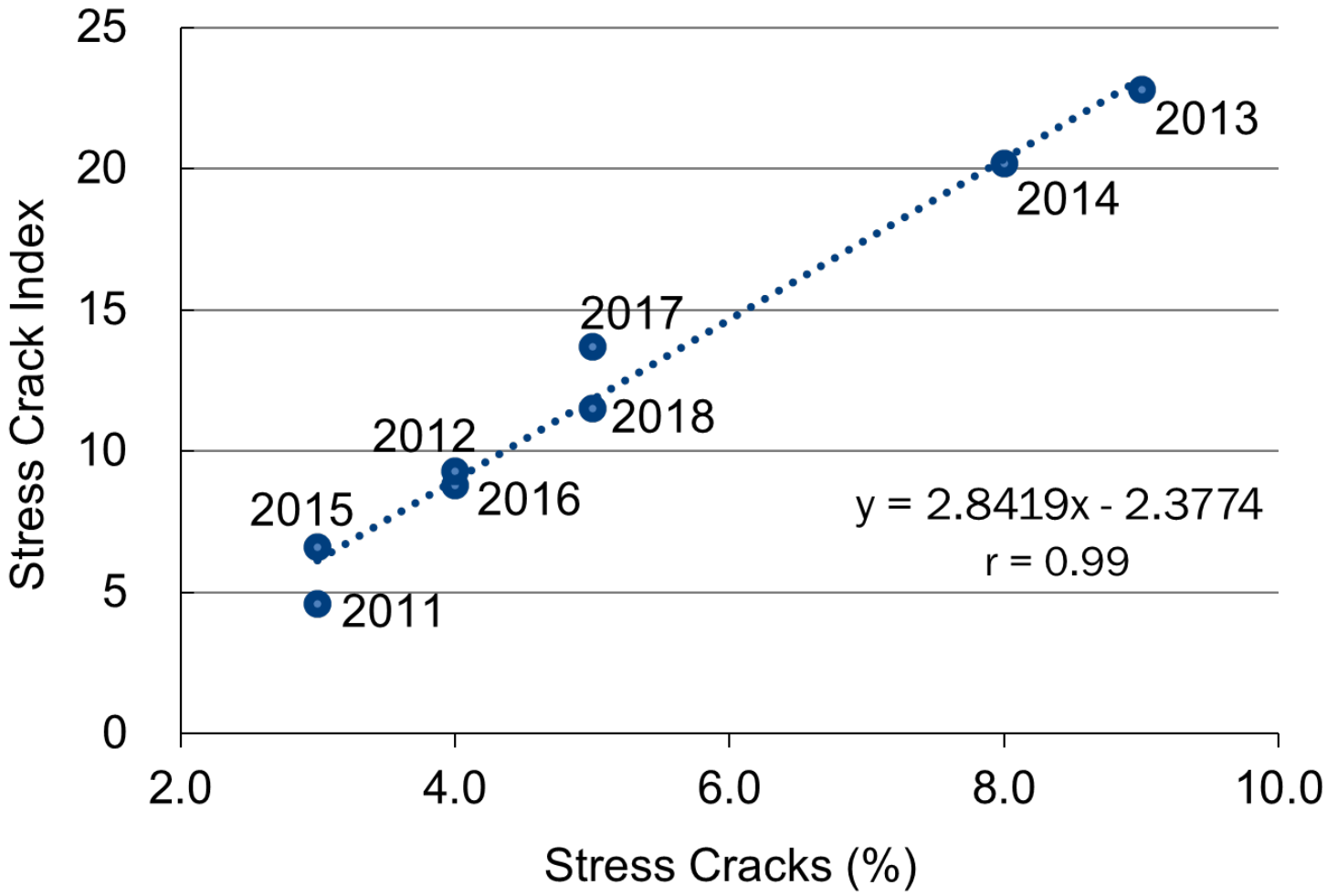
Example: SC% = 43%

SCI Calculation

$(4\%^{a} \times 1) + (19\%^{b} \times 3) + (20\%^{c} \times 5) = 161$

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

Stress Cracks (%) vs. Stress Crack Index



Kernel Weight, Volume and Density

100-Kernel Weight
(grams)

÷

Kernel Volume
(cubic centimeters)

=

True Density
(grams per cubic centimeters)

Indicates kernel size which affects

- Drying rates
- Flaking grit yields in dry milling

Kernel volume is indicative of growing conditions and genetics

True density reflects kernel hardness

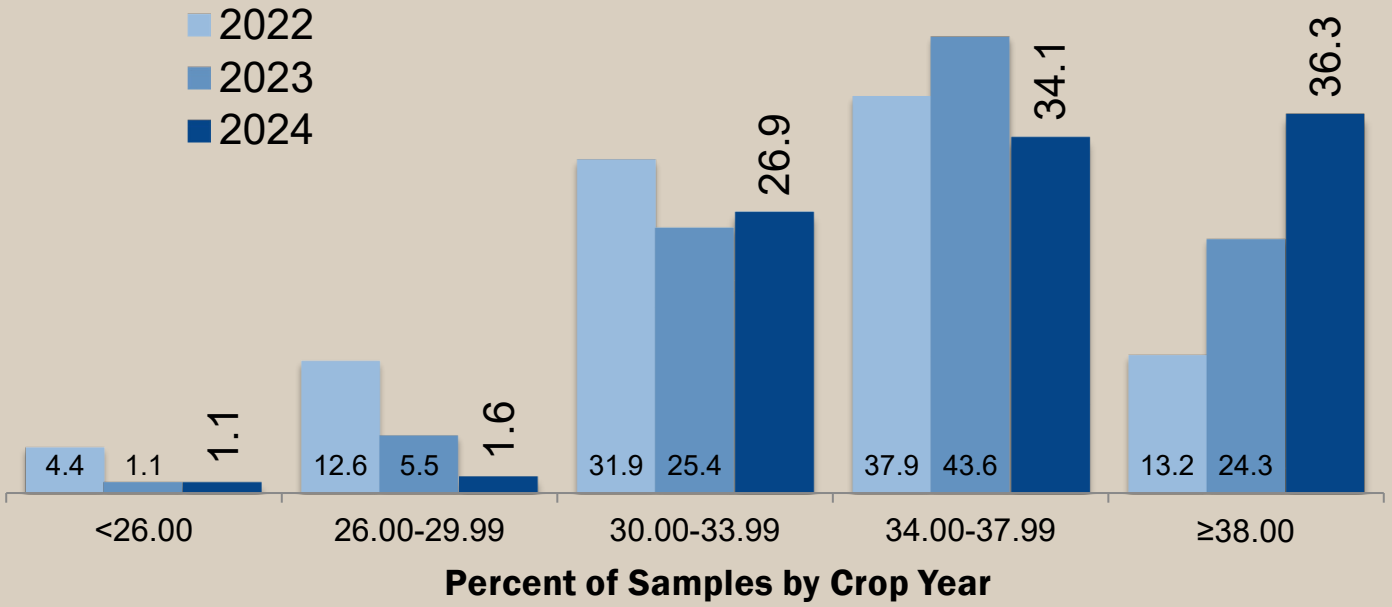
Higher density – harder kernels, less susceptible to breakage, more desirable for dry milling and alkaline processing

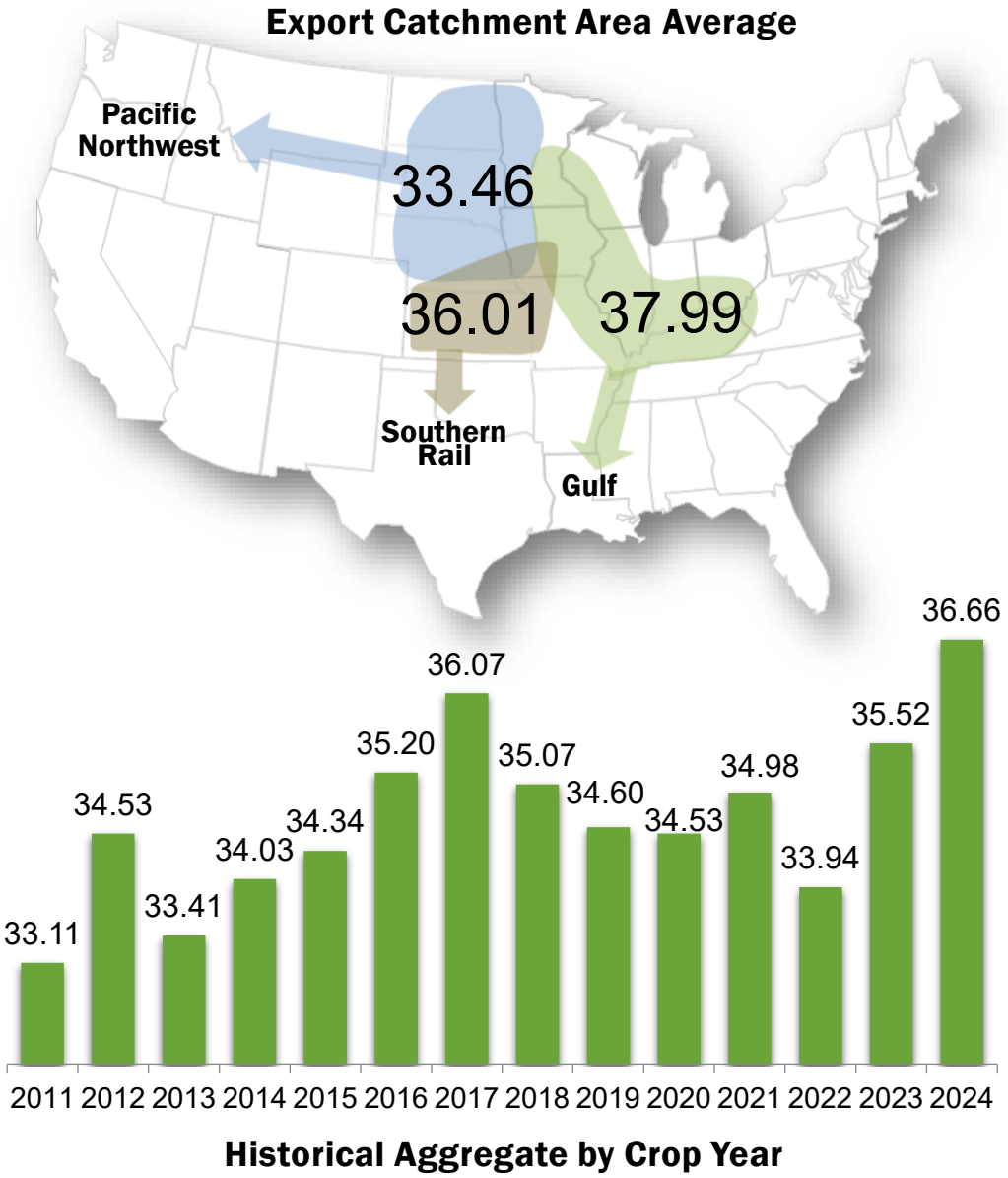
Lower density – softer kernels, less at risk for development of stress cracks if high temperature drying is employed, good for wet milling and feed use

100-Kernel Weight (grams)

U.S. Aggregate: 36.66 grams

- **Highest** average in the report's 14-year history

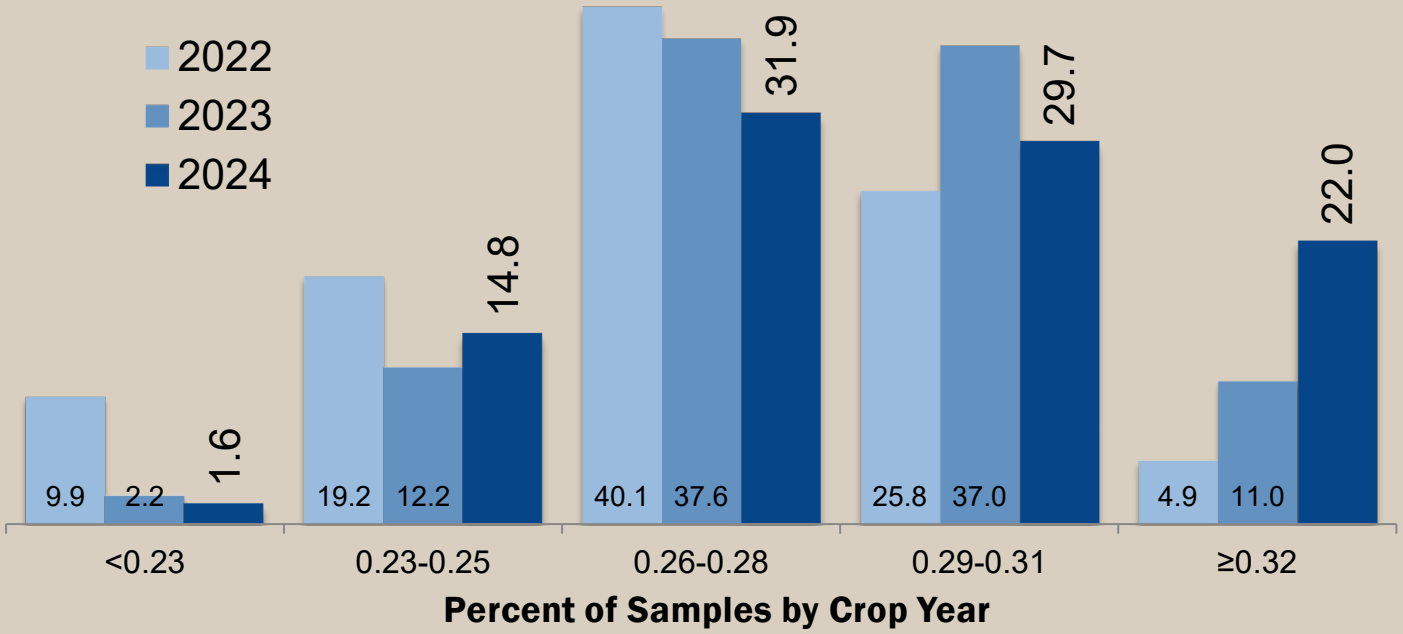


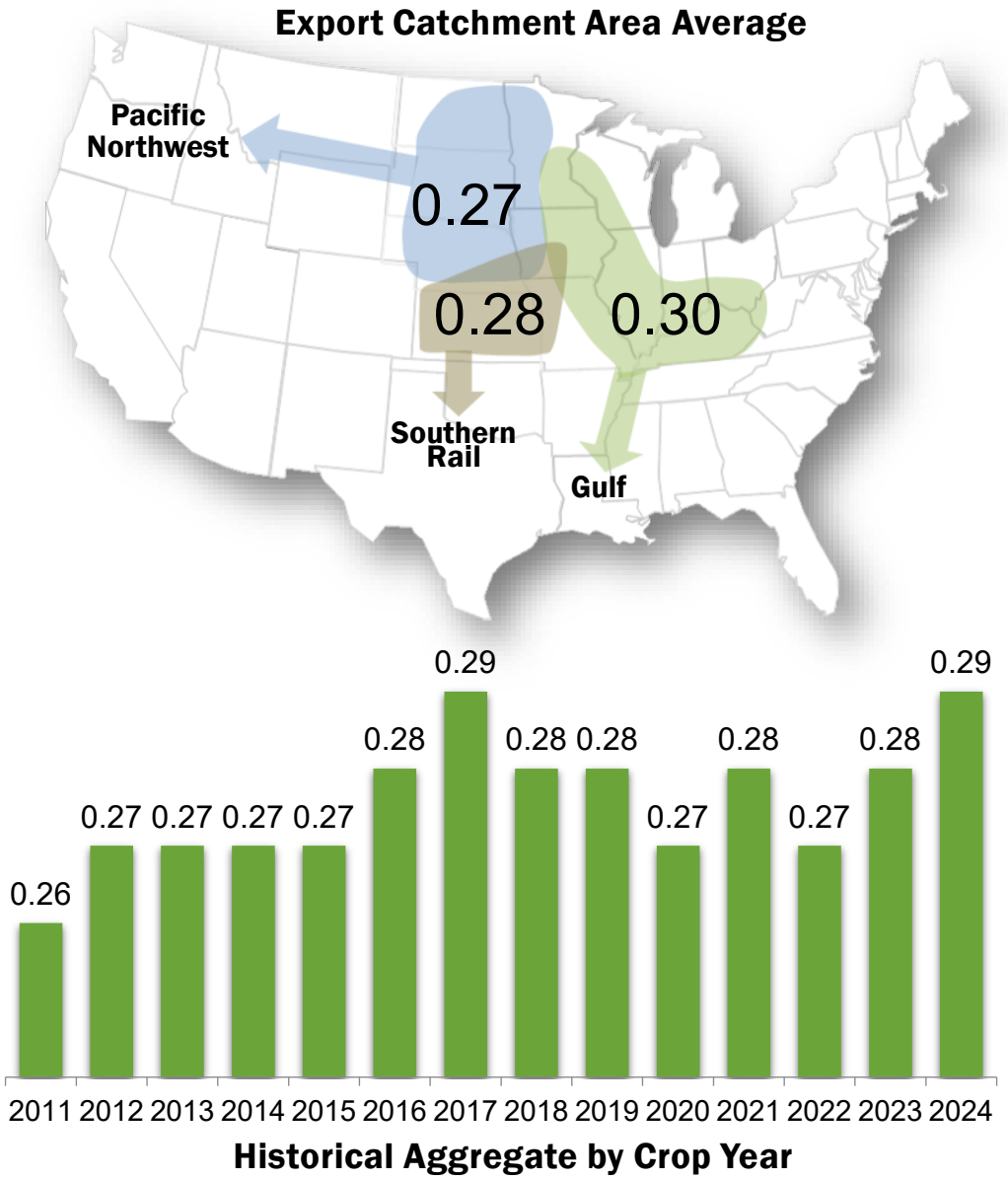


Kernel Volume (cm^3)

U.S. Aggregate: 0.29 cm^3

- Tied for the **highest** average in the report's 14-year history

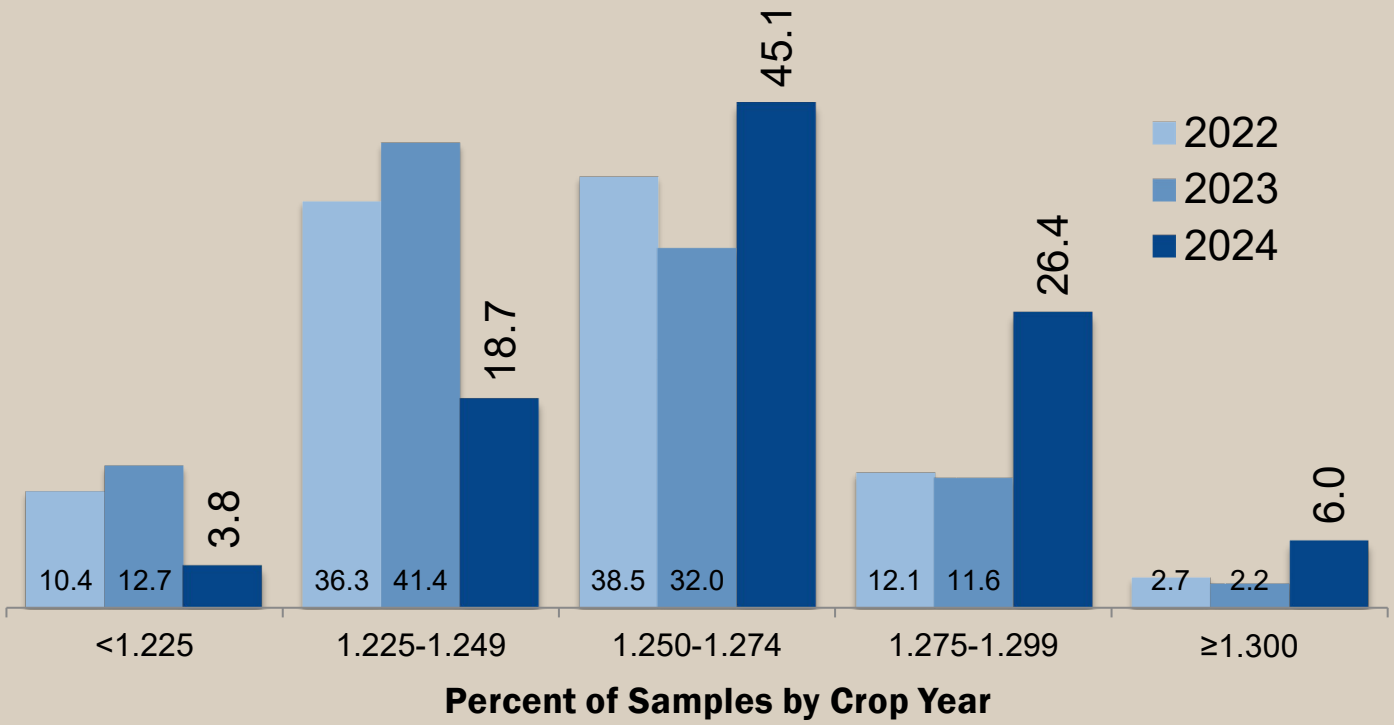


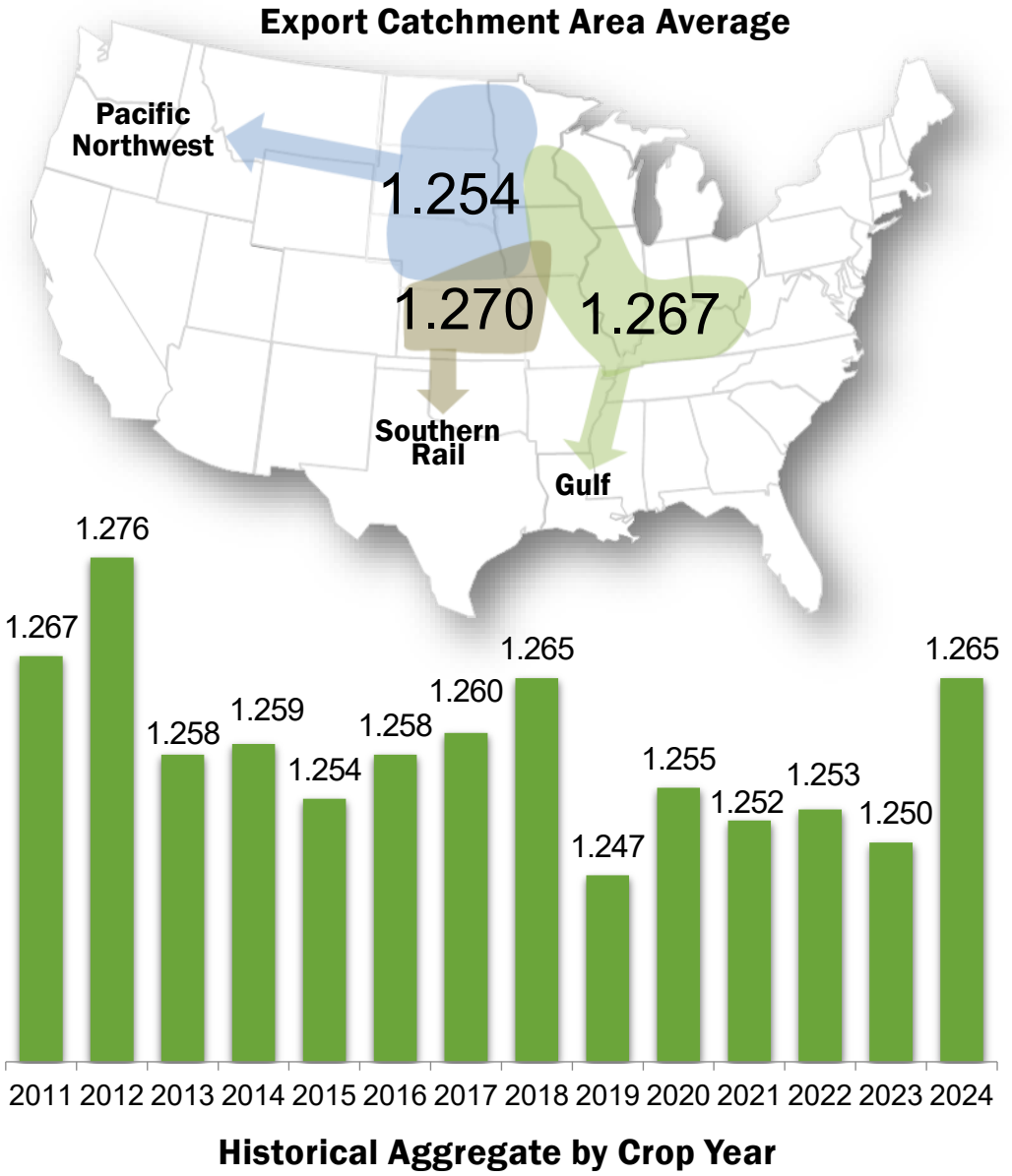


Kernel True Density (g/cm³)

U.S. Aggregate: 1.265 g/cm³

- Average **higher** than the 5YA (1.252 g/cm³)





Other Physical Properties

Whole Kernel (%)

Percentage of whole kernels of a 50-gram sample

Broken Corn in BCFM measures only kernel size, not whether it is broken or whole

< 90%	**≥ 90%**
More susceptible to storage molds and breakage	Desirable, especially for alkaline cookers

Horneous (Hard) Endosperm (%)

Measures the percent of the endosperm that is horneous or hard within a range from 70 – 100%

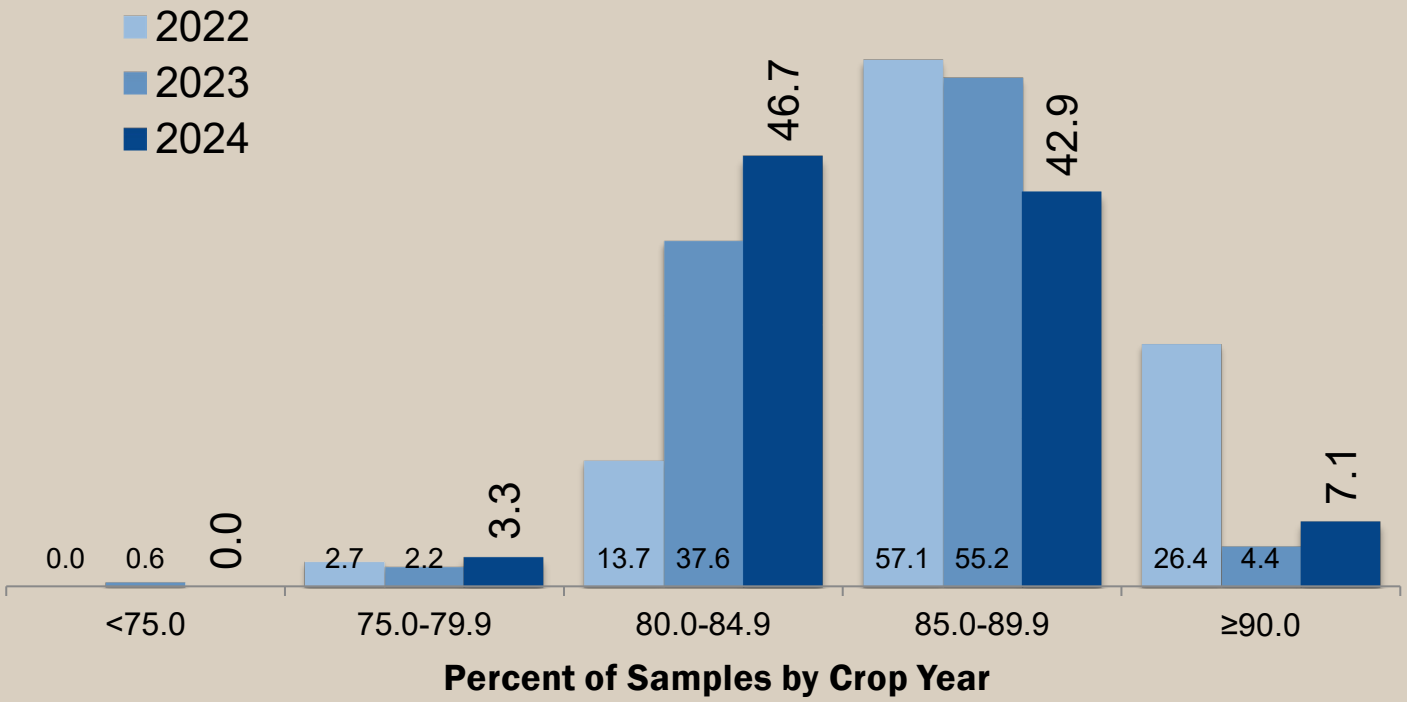
The higher the value, the harder the corn kernel

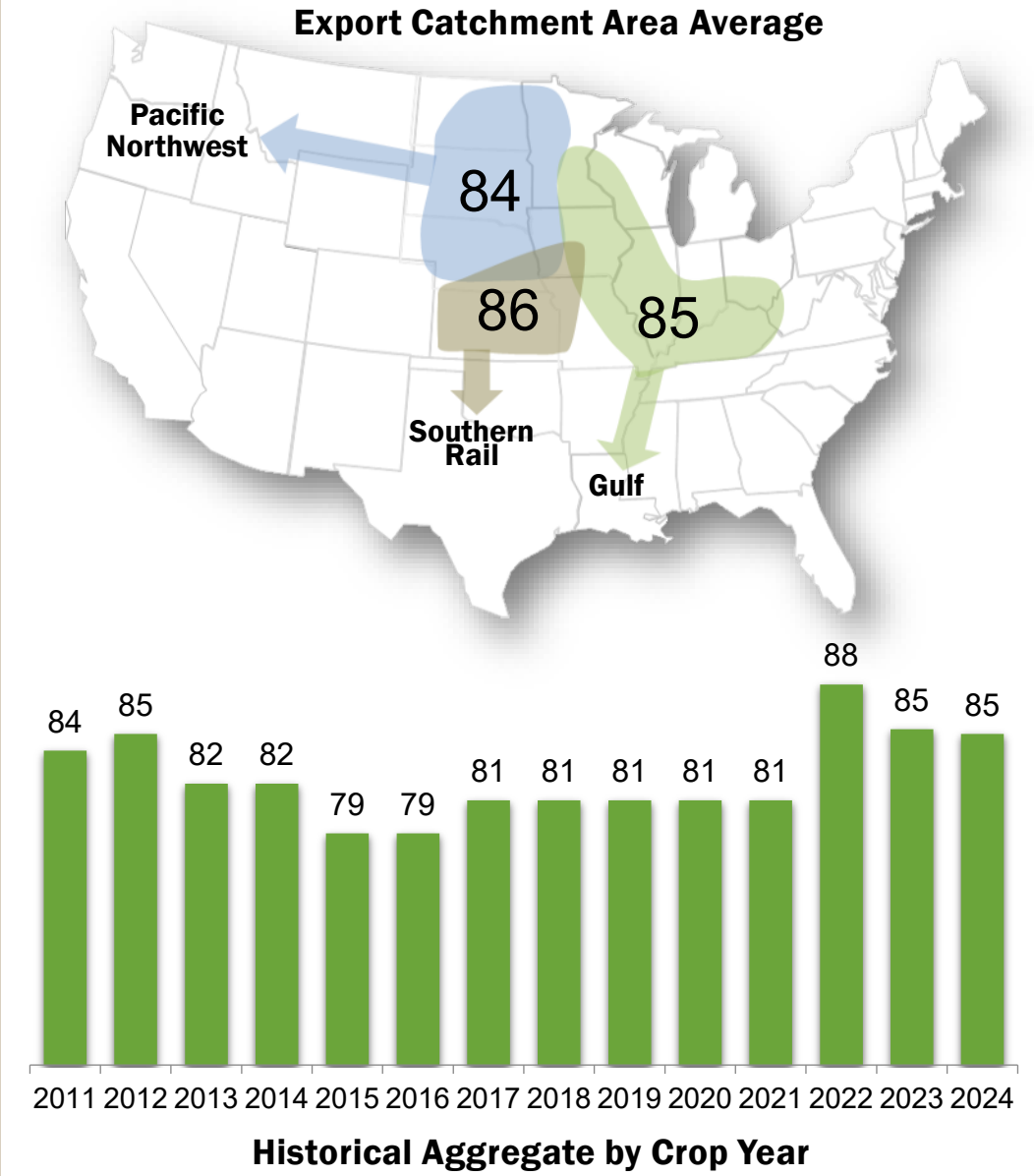
≤ 85%	**> 85%**
Good for wet millers and feeders	Good for dry millers and alkaline cookers

Horneous (Hard) Endosperm (%)

U.S. Aggregate: 85%

- Average **higher** than the 5YA (83%)





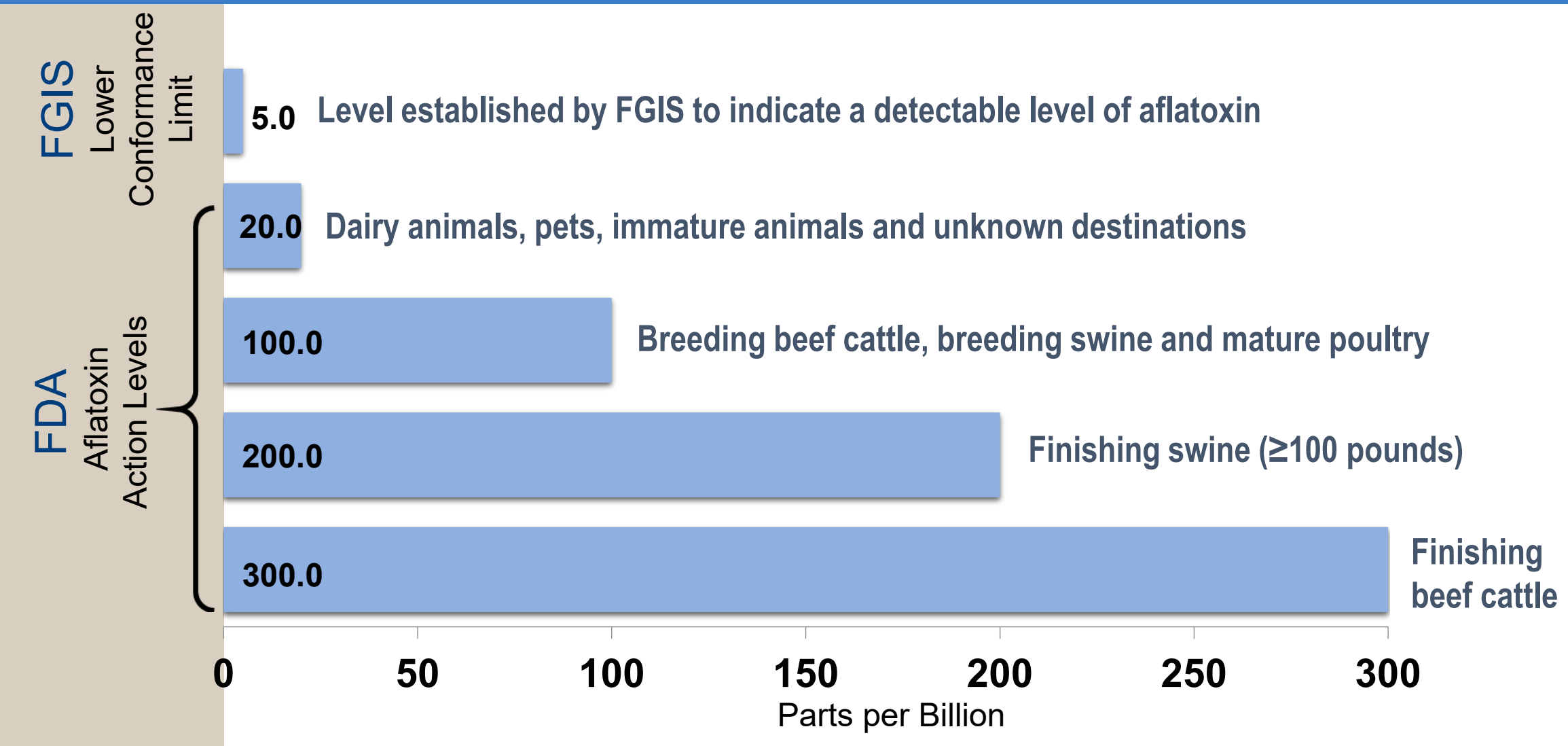
Mycotoxins

Aflatoxin,
Deoxynivalenol (DON or Vomitoxin)
Fumonisin
Ochratoxin A
Trichothecenes (T-2)
and Zearalenone

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
- **Targeting a minimum of 25%** of collected samples, the same as in 2023 and 2022 (Target of 180 samples)
- The *Corn Harvest Quality Report* contains the results from 180 samples.

Key Aflatoxin Levels (ppb)

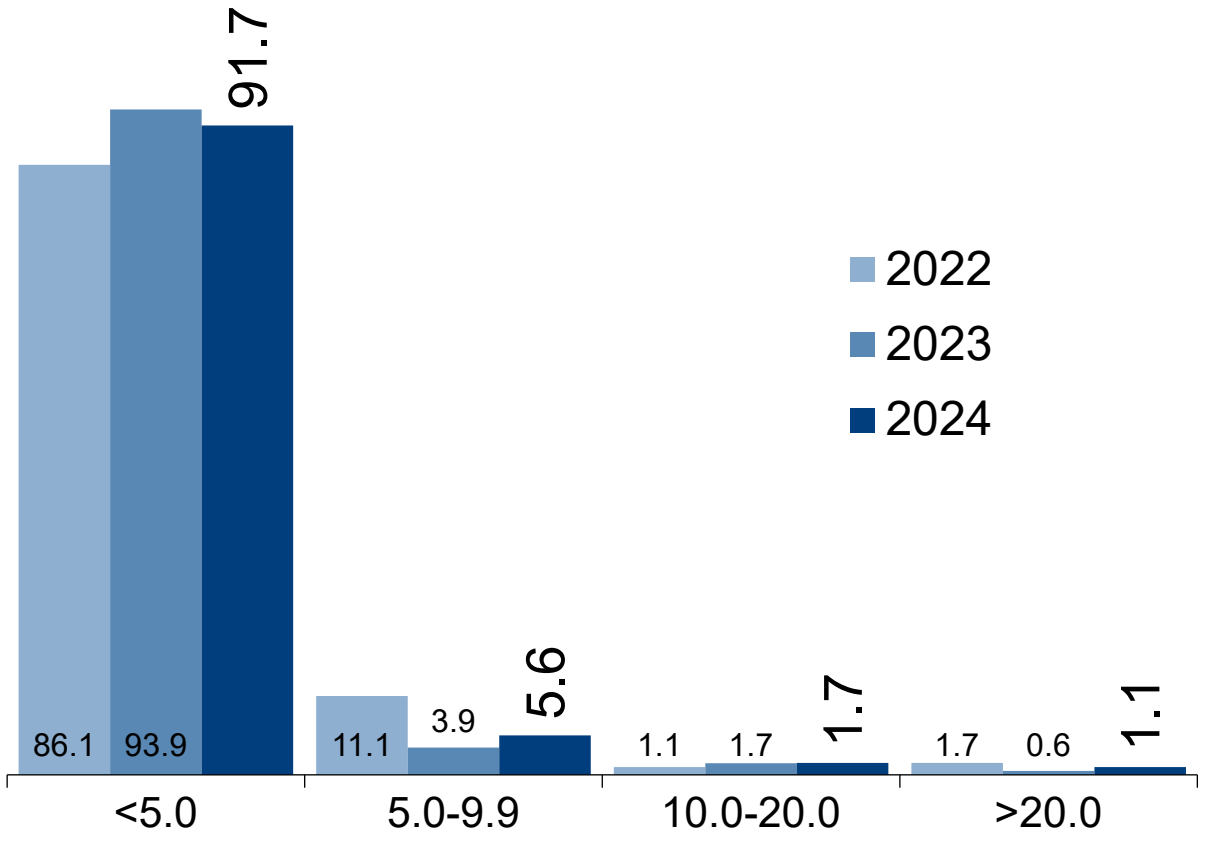


Aflatoxin Testing Results (ppb)

Percentage of samples with **no detectable** levels of aflatoxin in 2024 was 91.7%

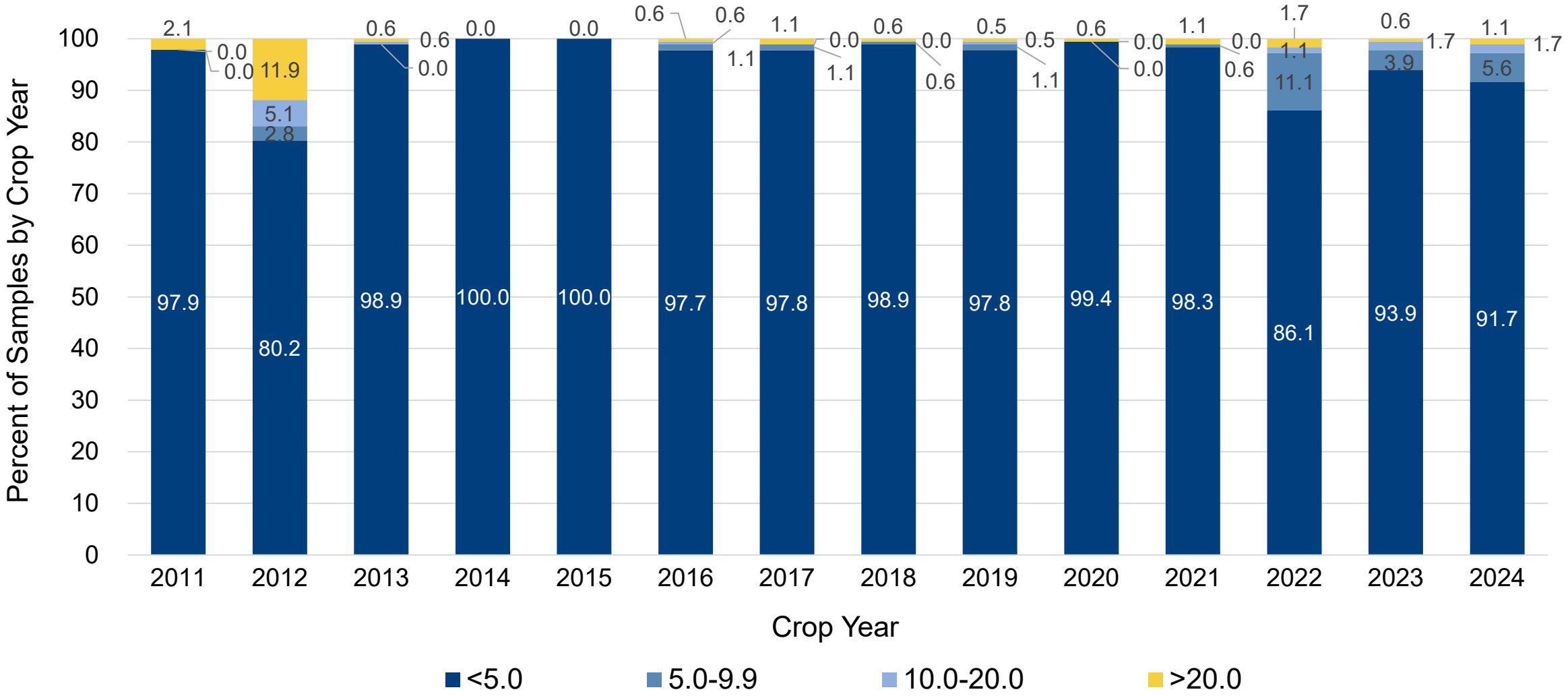
98.9% of samples tested below the FDA action level of 20.0 ppb

Growing season conditions not conducive to aflatoxin development in most areas

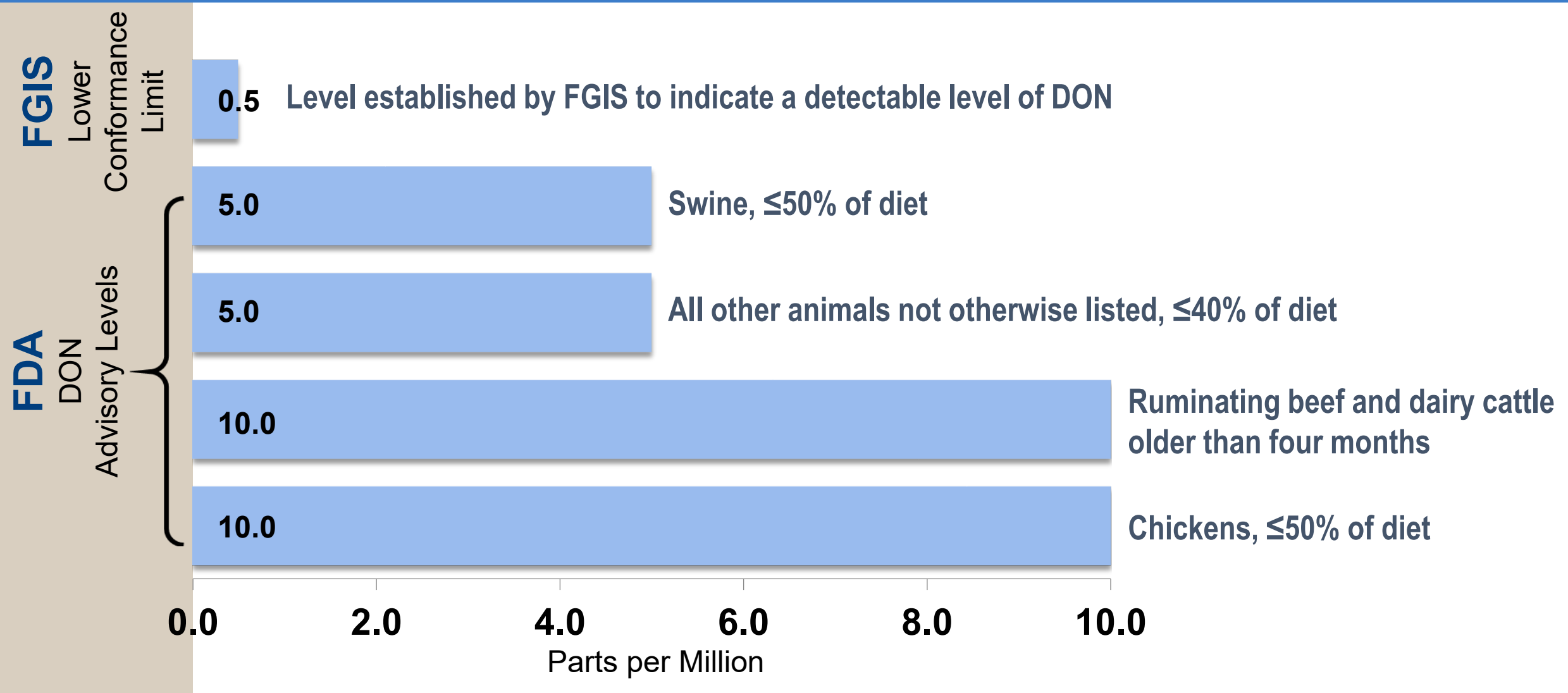


Percent of Samples by Crop Year

Aflatoxin Testing Results (ppb)



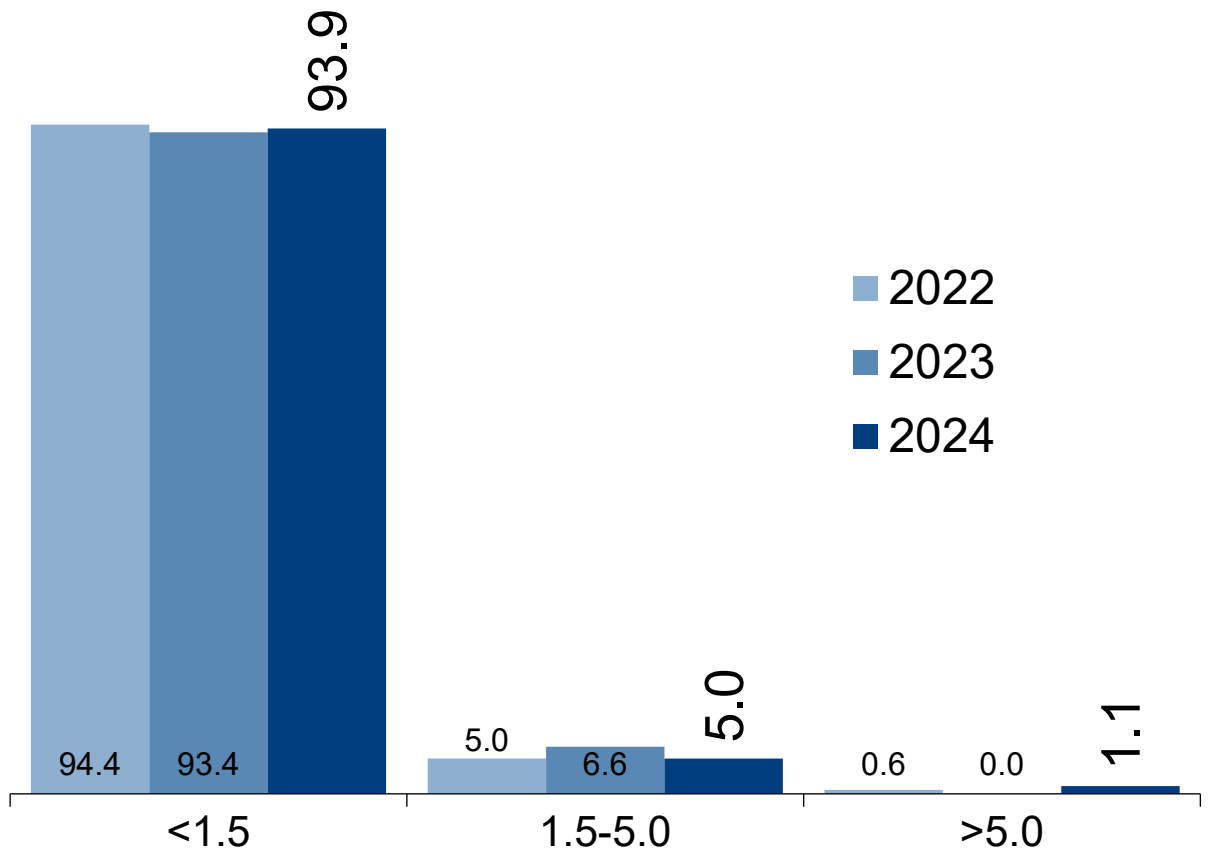
Key DON Levels (ppm)



DON (Vomitoxin) Testing Results (ppm)

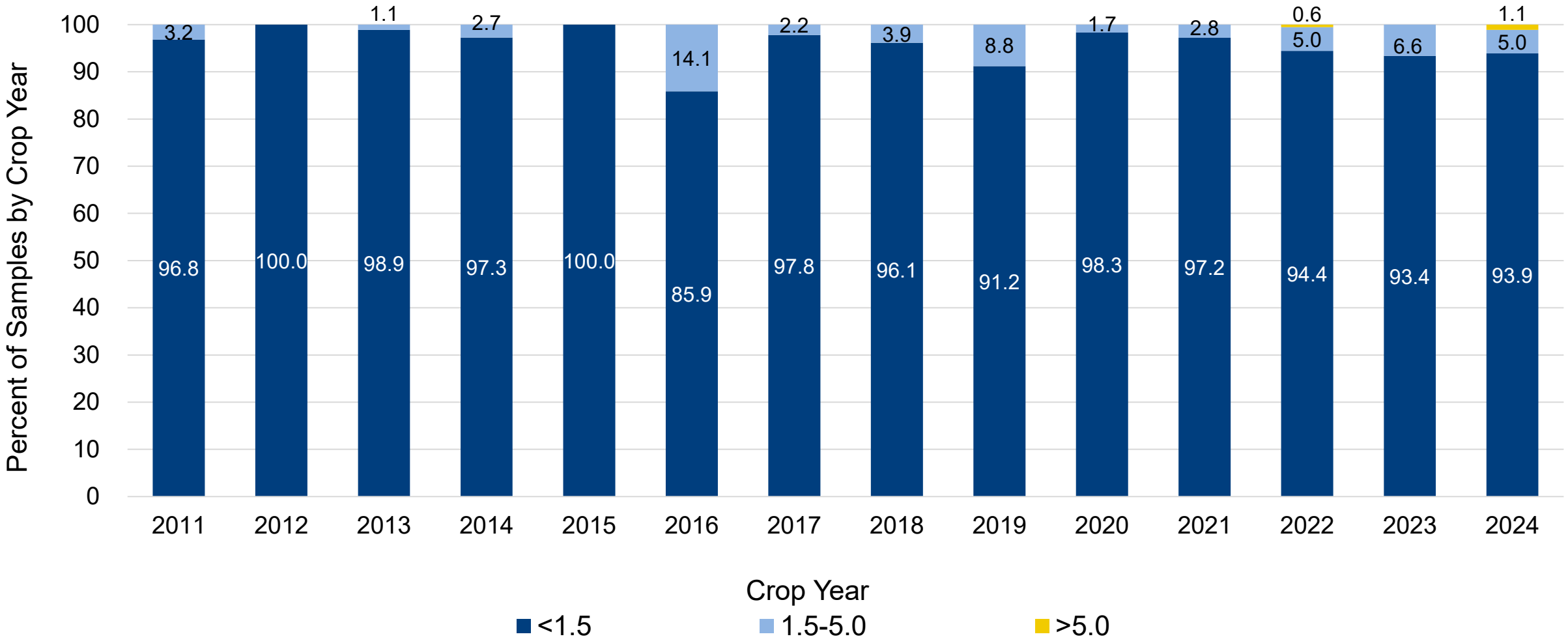
Percentage of samples below 1.5 ppm (93.9%) **similar** to 2023 and 2022.

98.9% of samples did not exceed the FDA advisory level for DON of 5.0 ppm

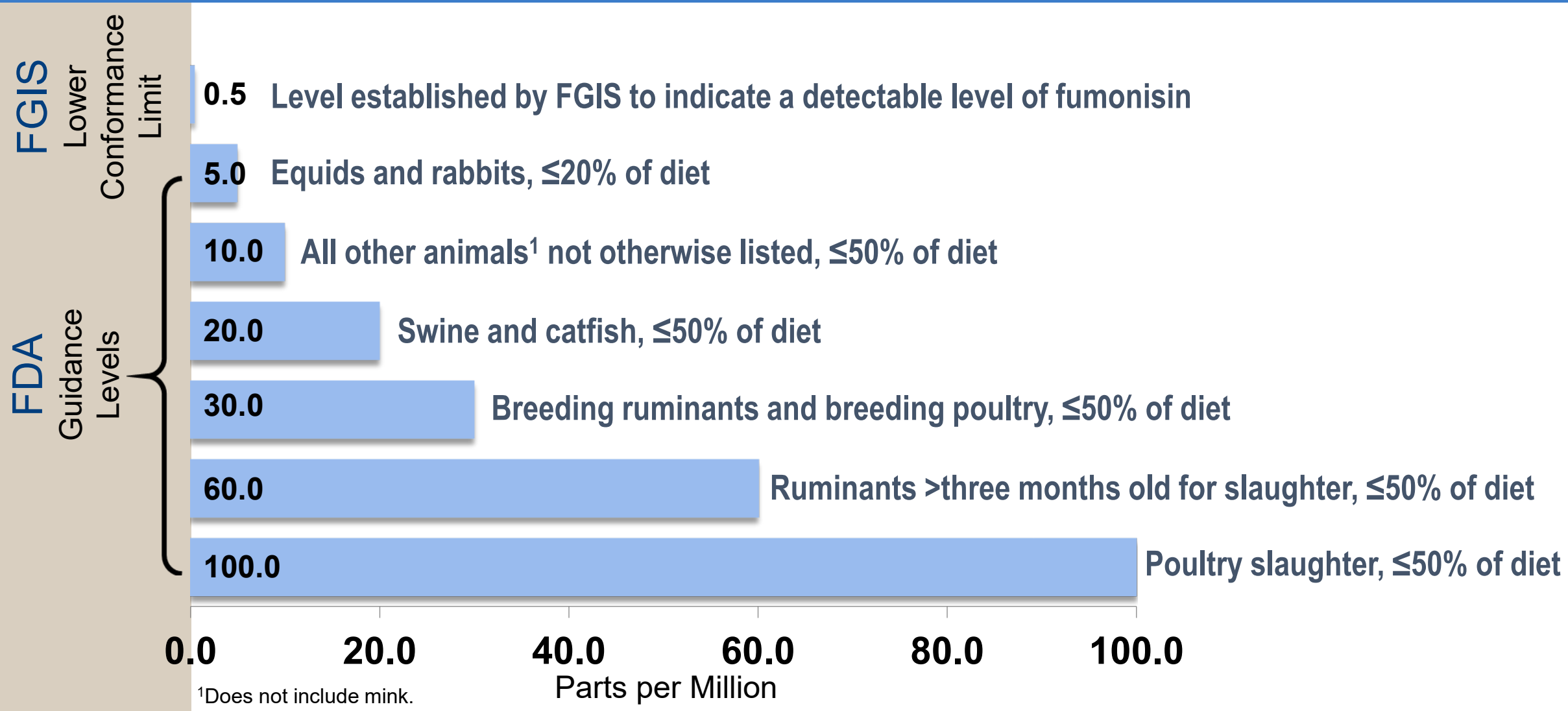


Percent of Samples by Crop Year

DON (Vomitoxin) Testing Results (ppm)

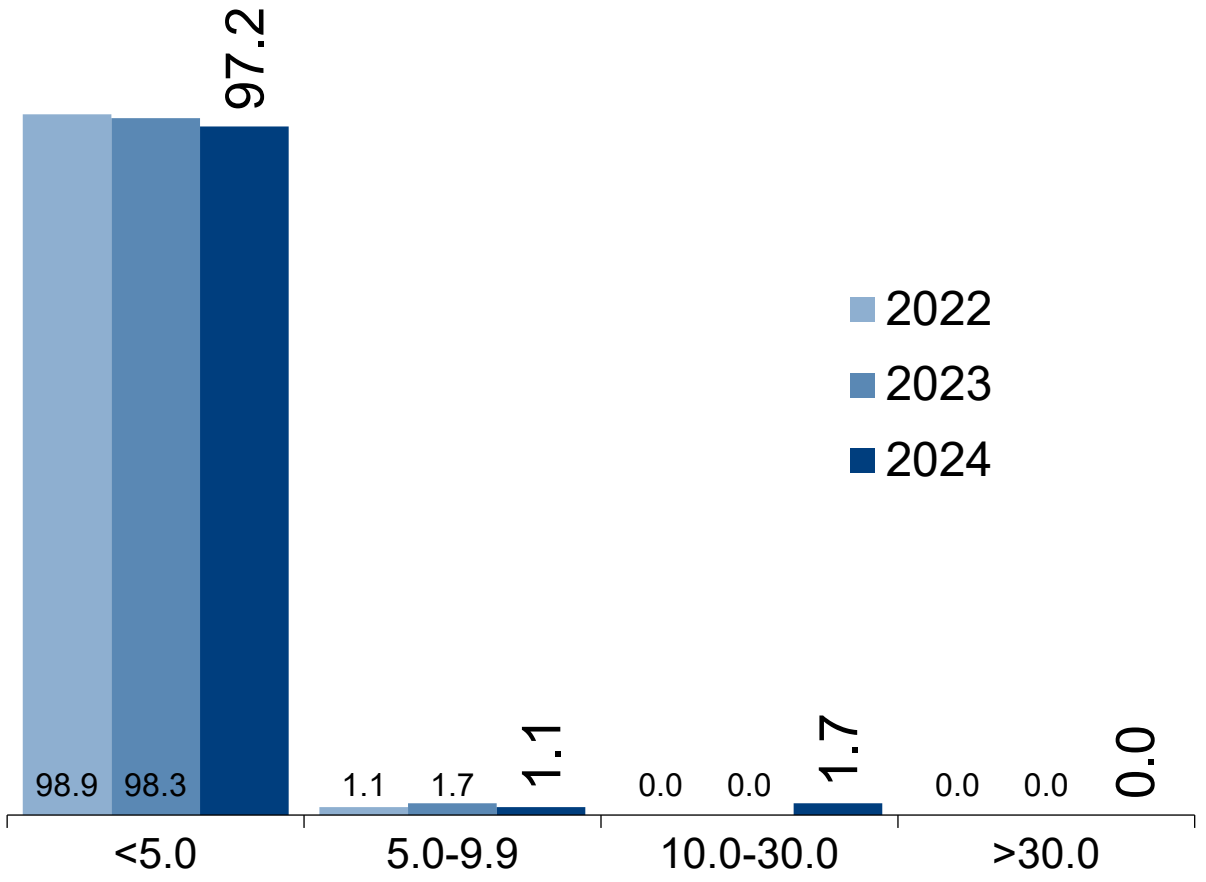


Key Fumonisin Levels (ppm)



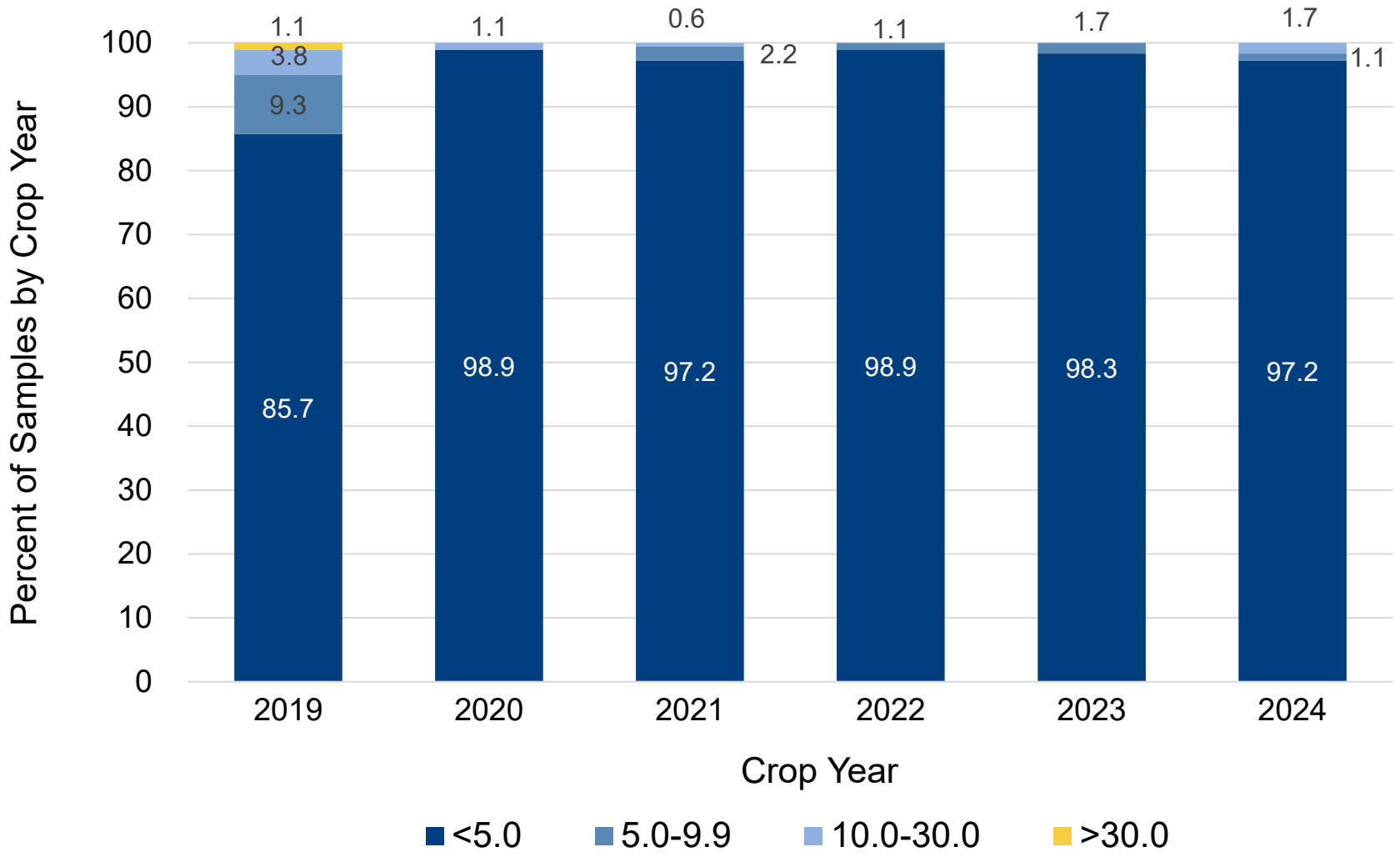
Fumonisin Testing Results (ppm)

Percentage of samples below 5.0 ppm (97.2%) **slightly lower** than 2023 and 2022



Percent of Samples by Crop Year

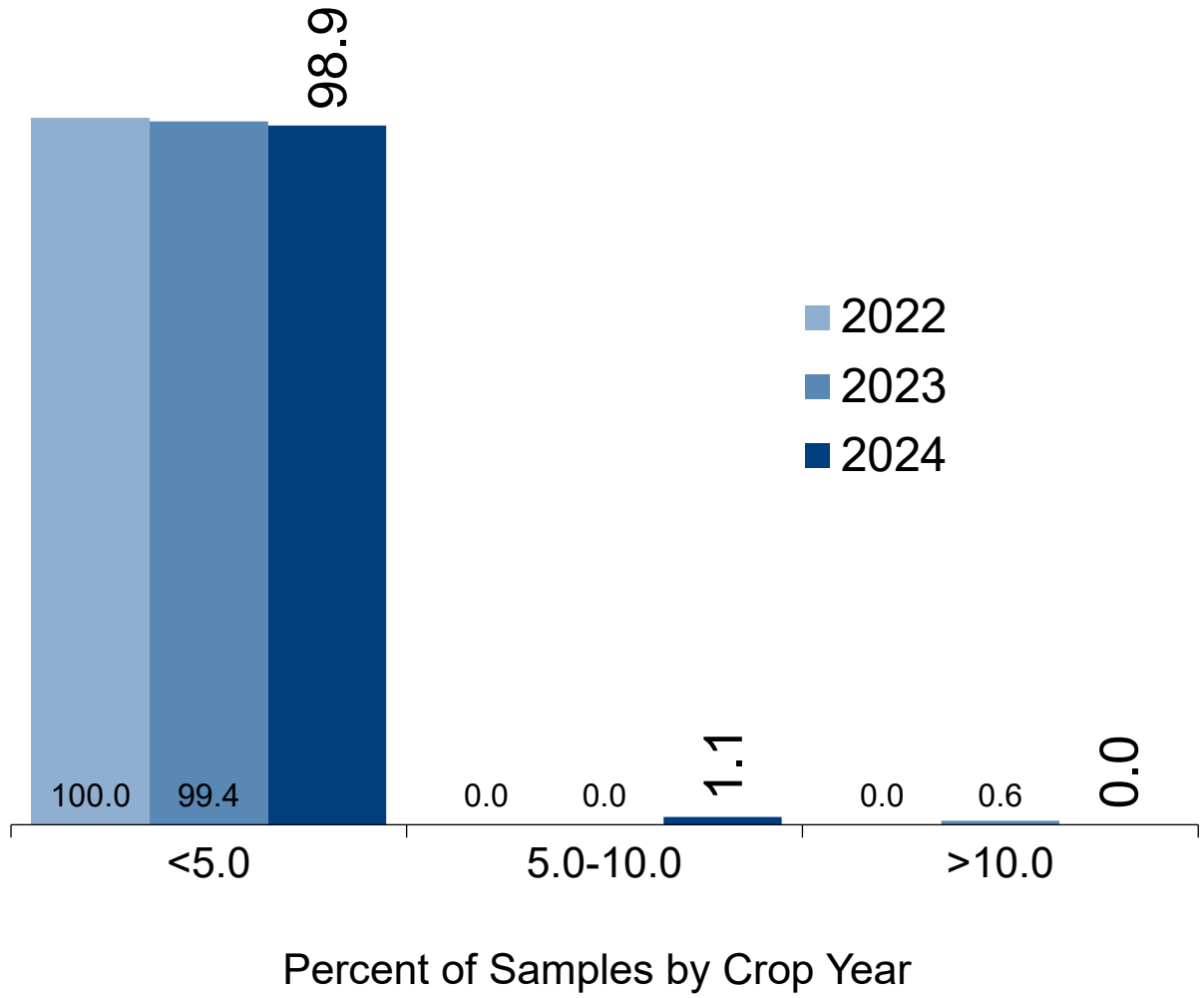
Fumonisin Testing Results (ppm)



Ochratoxin A Testing Results (ppb)

Fifth year of Ochratoxin A testing

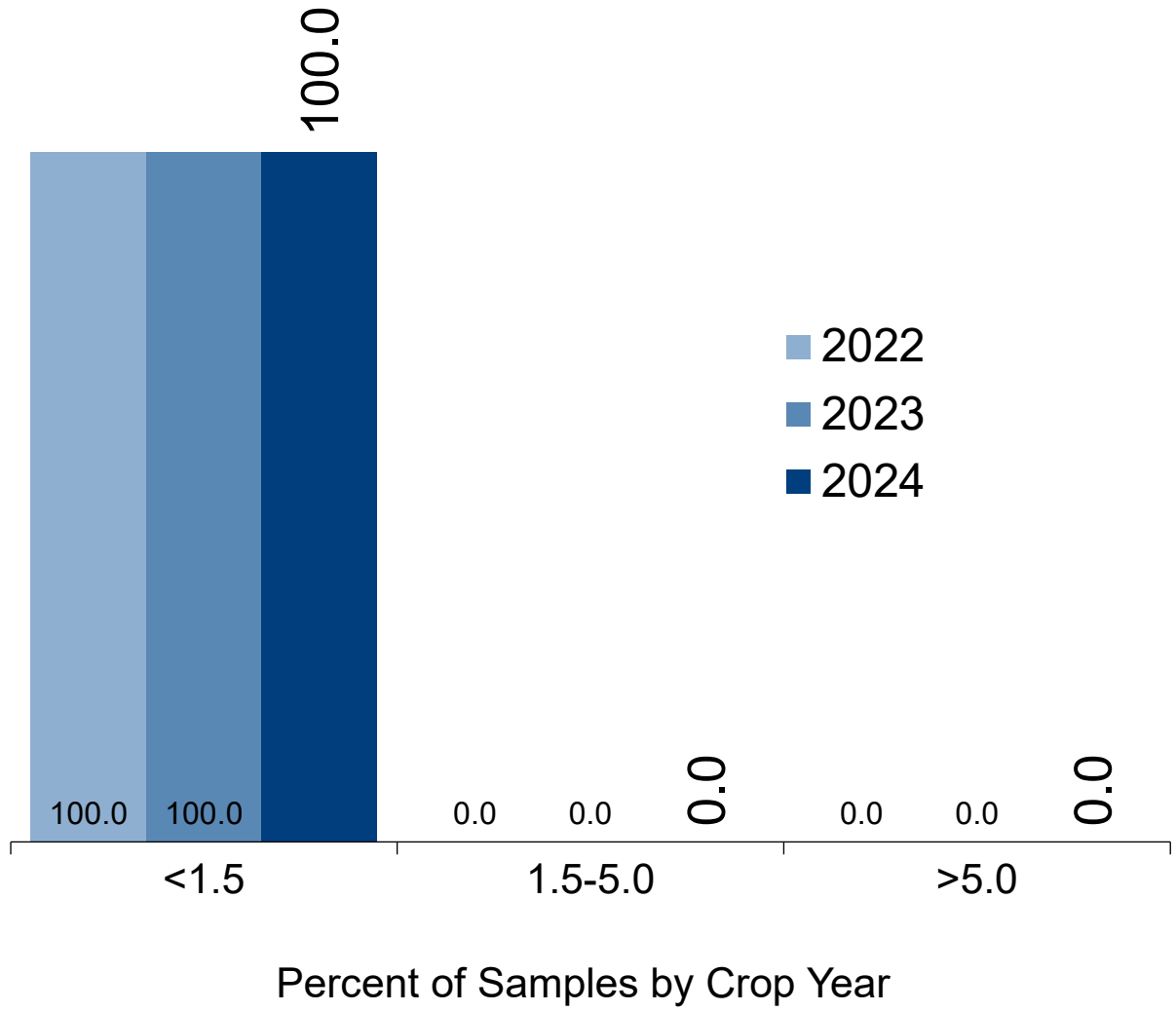
98.9% of samples below 5.0 ppb (European Commission's established maximum level for Ochratoxin A in raw cereals.)



T-2 Testing Results (ppm)

Fifth year of T-2 testing

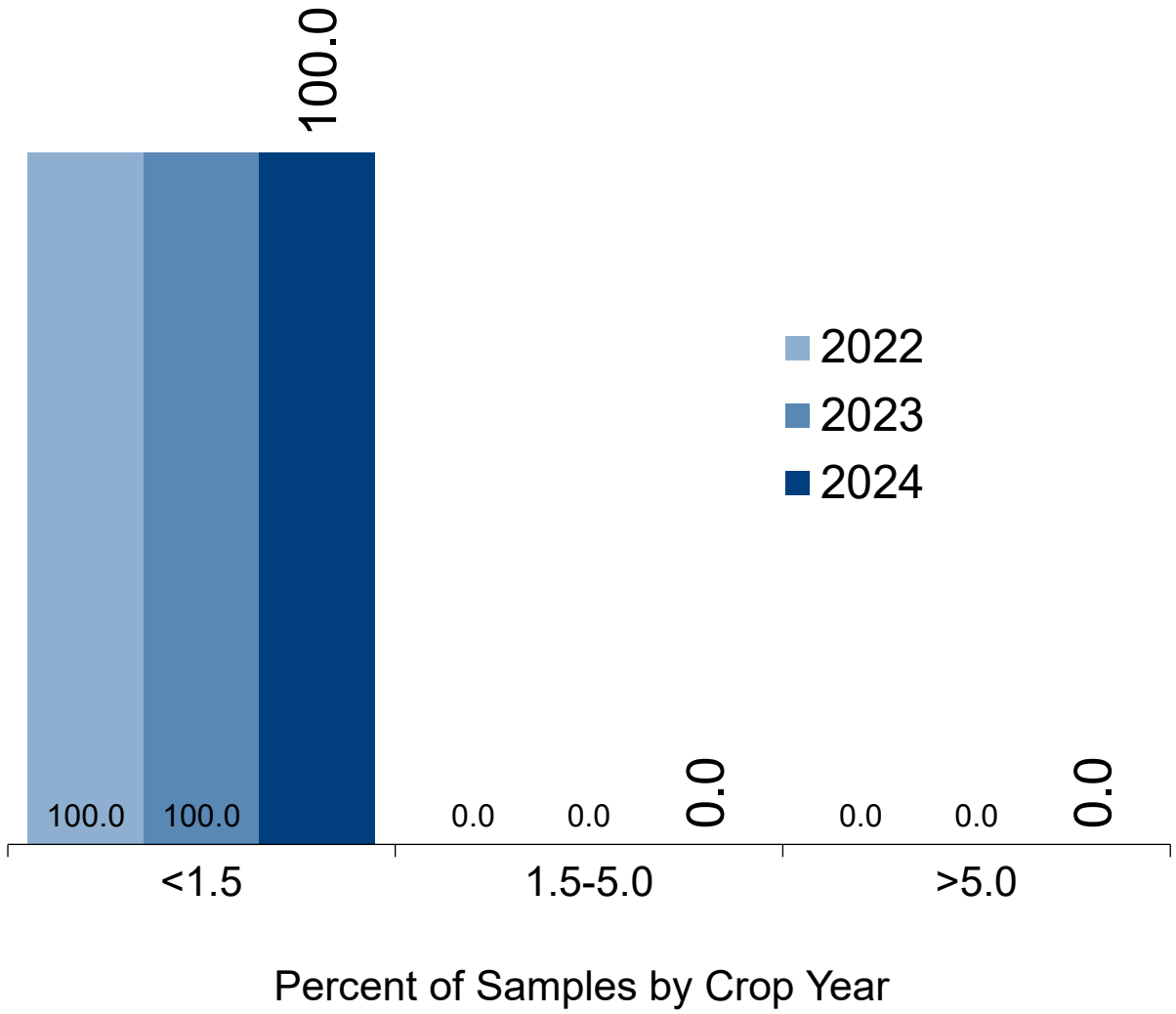
100% of samples
below 1.5 ppm



Zearalenone Testing Results (ppm)

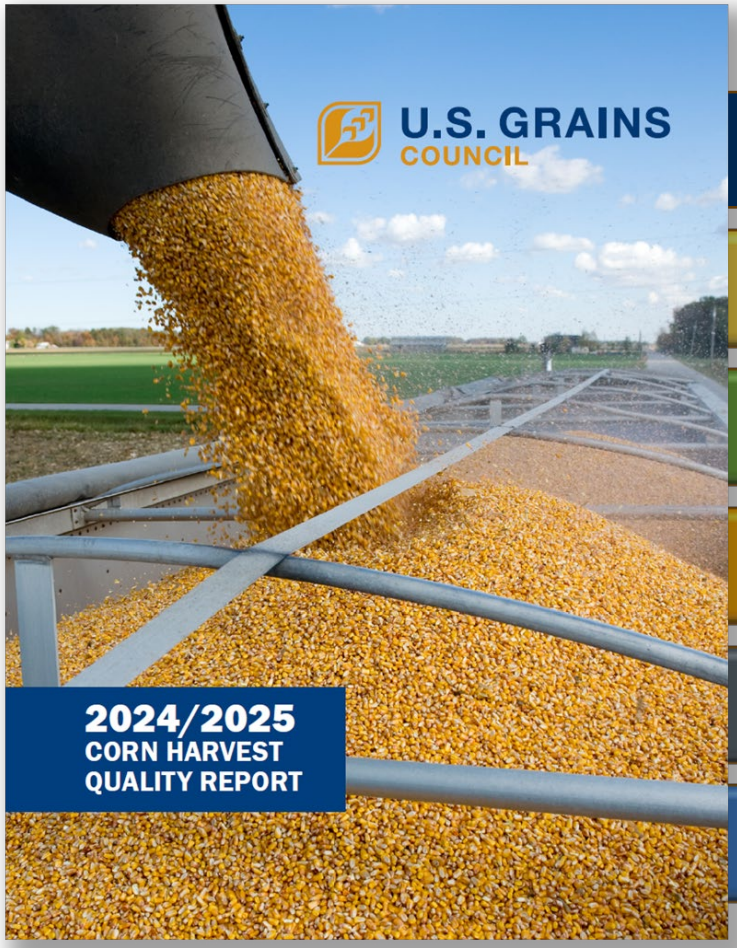
Fifth year of Zearalenone testing

100% of samples below 1.5 ppm



Other Components of the Corn Harvest Quality Report

Other Components of the Report



- Quality Test Results
- Crop and Weather Conditions
- U.S. Corn Production, Usage and Outlook
- Survey and Statistical Analysis Methods
- Testing Analysis Methods
- Historical Perspective

Harvest Report: Conclusions

- 2024 harvest samples were, on average, good with **89.2%** of samples grading No. 1 or better, compared to **88.0%** in 2023 and **81.5%** in 2022.
- Averages for **Test Weight, 100-Kernel Weight, and Kernel Volume** were all the highest or tied for the highest values observed in the report's 14-year history, reflecting growing and harvesting conditions.
- **BCFM** and **Total Damage** were lower than the 5YA.
- Average **Moisture** tied 2012 for the lowest average in the history of the report.
- The growing season was not conducive to mycotoxin development in most areas.

Building a Tradition

Thank You!

U.S. GRAINS COUNCIL

U.S. Grains Council 2024/2025 Corn Harvest Quality Report

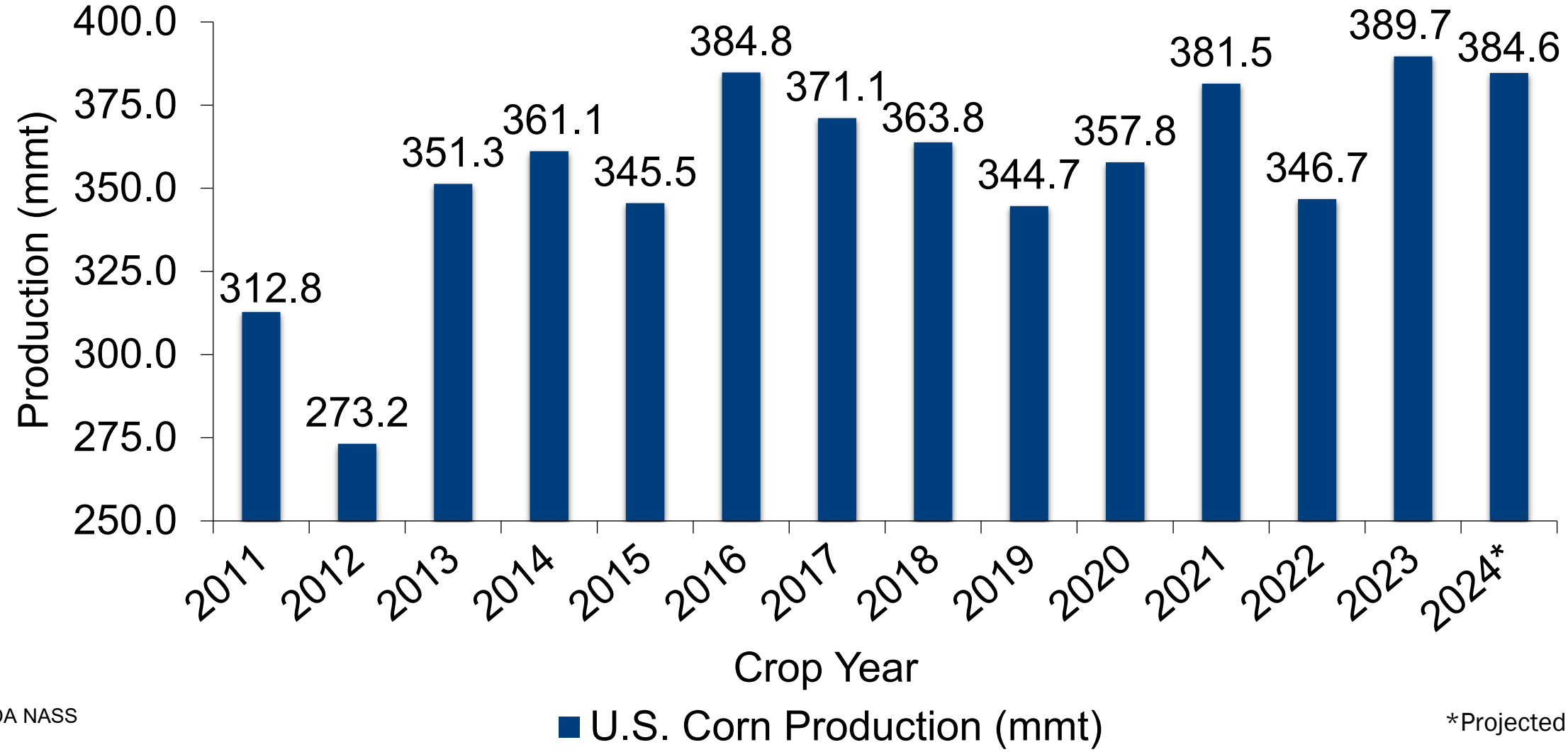
SUPPLEMENTAL SLIDES

U.S. GRAINS COUNCIL

U.S. Corn Production Supply & Demand Outlook

U.S. GRAINS COUNCIL

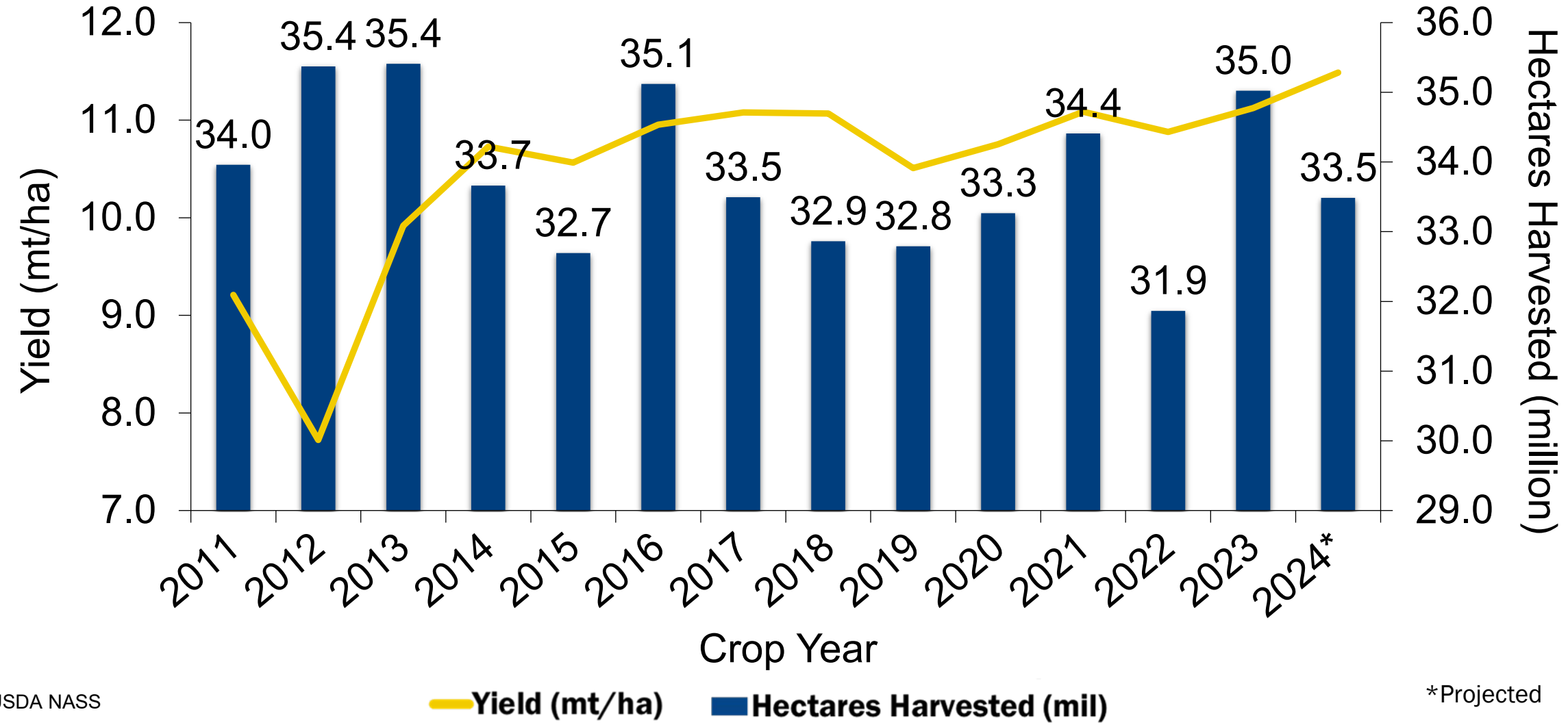
U.S. Production and Yield



Source: USDA NASS

*Projected

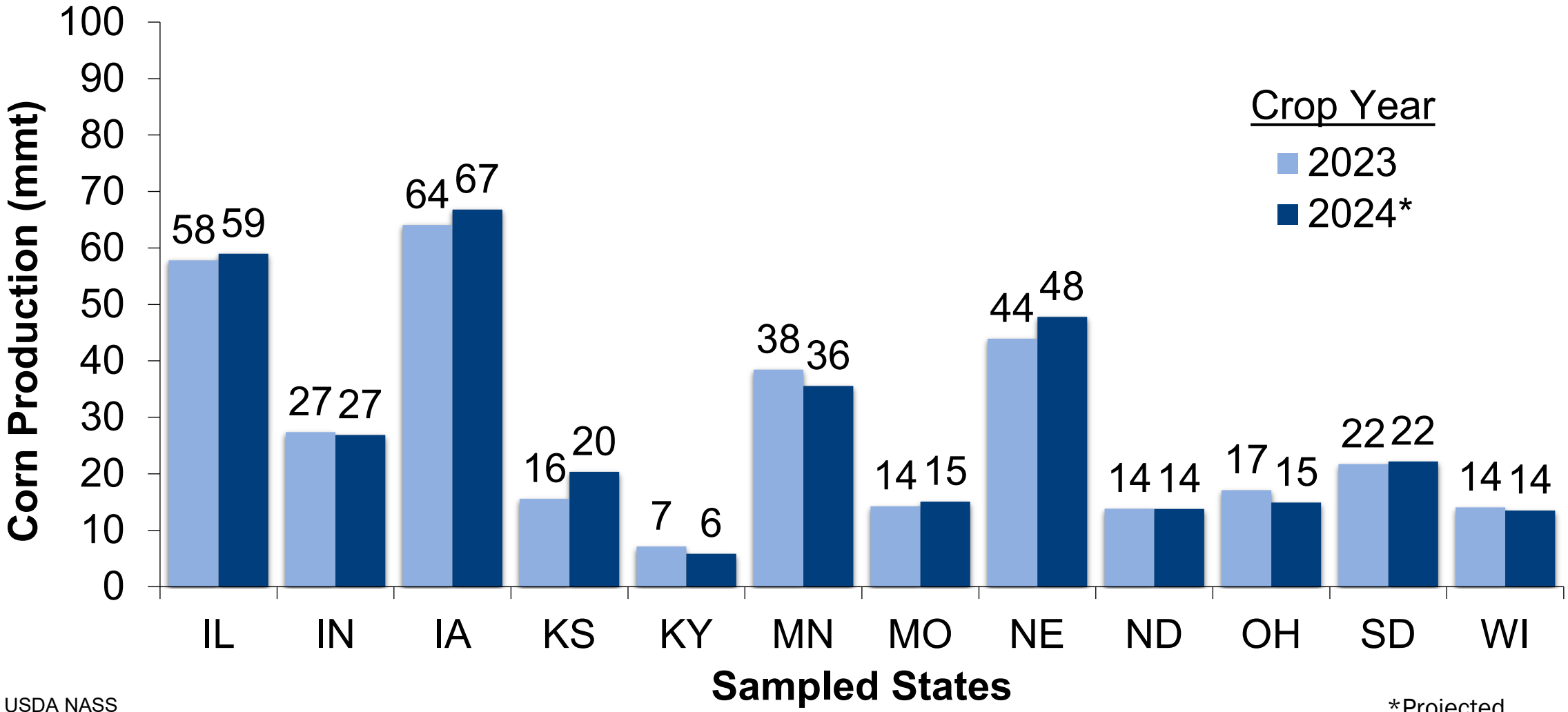
U.S. Production and Yield



Source: USDA NASS

*Projected

U.S. Production by State



Source: USDA NASS

*Projected

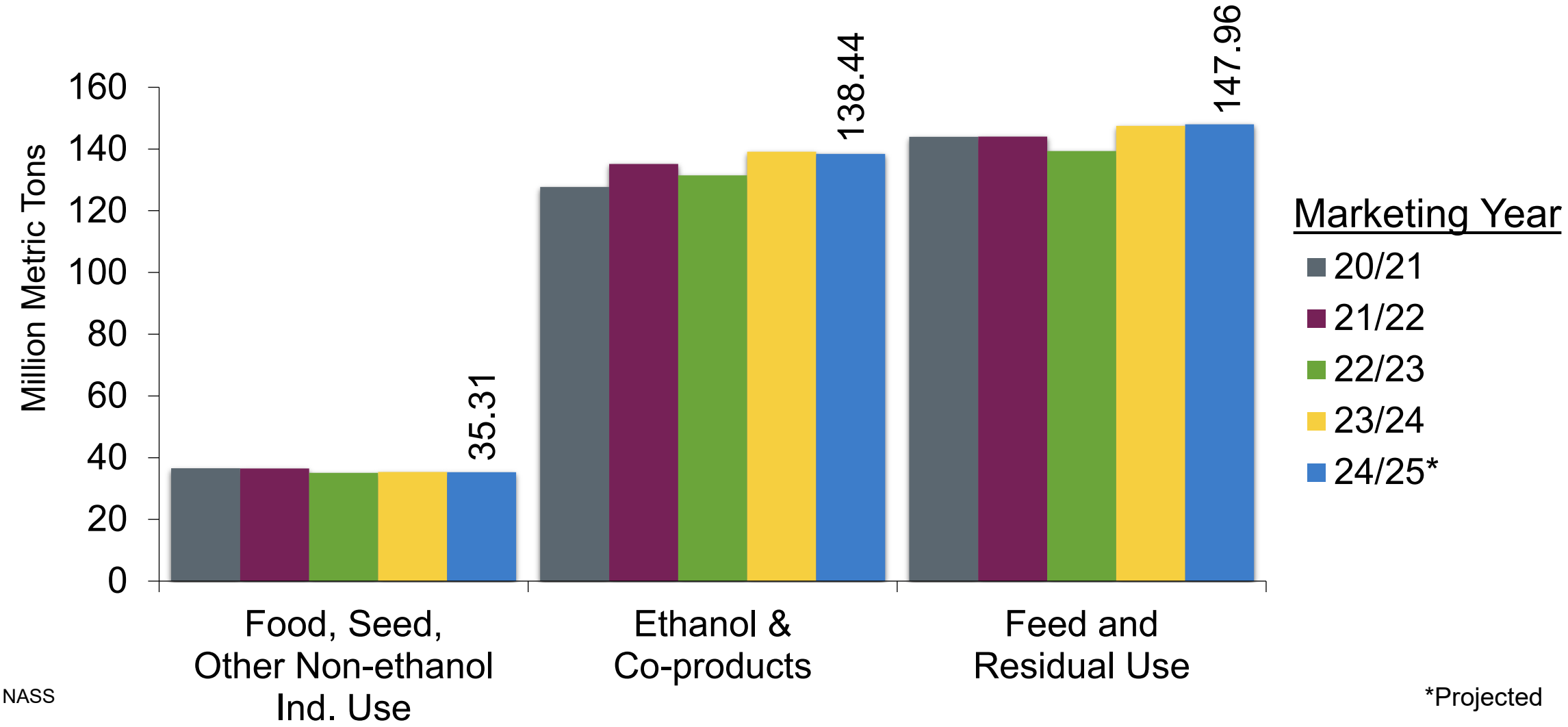
Surveyed State Production (MMT)

State	2023	2024*	MMT	Percent	Acres	Yield
Illinois	57.82	58.97	1.15	2.0%		
Indiana	27.38	26.86	(0.52)	-1.9%		
Iowa	64.08	66.82	2.74	4.3%		
Kansas	15.57	20.33	4.76	30.6%		
Kentucky	7.13	5.85	(1.27)	-17.9%		
Minnesota	38.44	35.56	(2.88)	-7.5%		
Missouri	14.26	15.07	0.81	5.7%		
Nebraska	43.92	47.80	3.88	8.8%		
North Dakota	13.80	13.78	(0.03)	-0.2%		
Ohio	17.10	14.90	(2.20)	-12.9%		
South Dakota	21.70	22.18	0.48	2.2%		
Wisconsin	14.04	13.52	(0.52)	-3.7%		
Total U.S.	**389.67**	**384.64**	**(5.02)**	**-1.3%**		

†Green indicates 2024 is higher than in 2023; red indicates 2024 is lower than in 2023; bar height indicates the relative amount.
*Projected

Source: USDA NASS

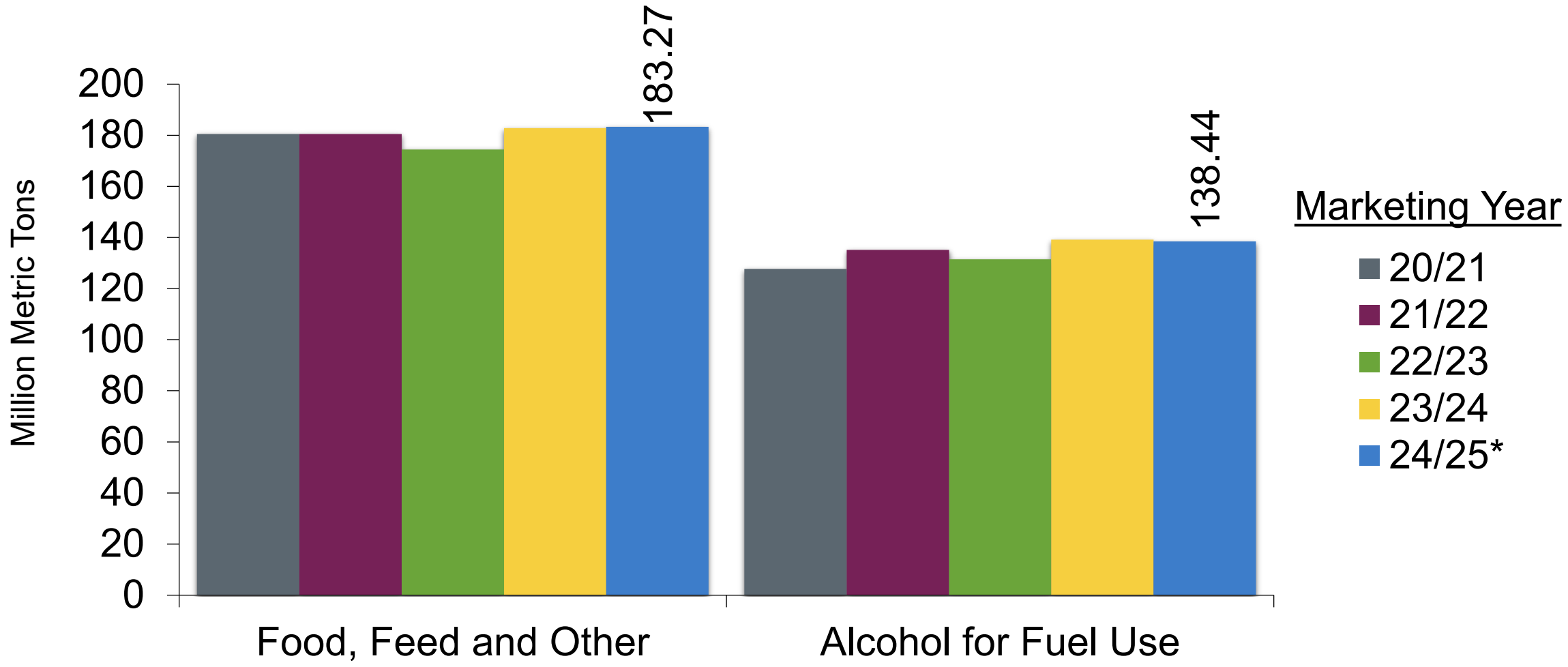
U.S. Production and Use



Source: USDA NASS

*Projected

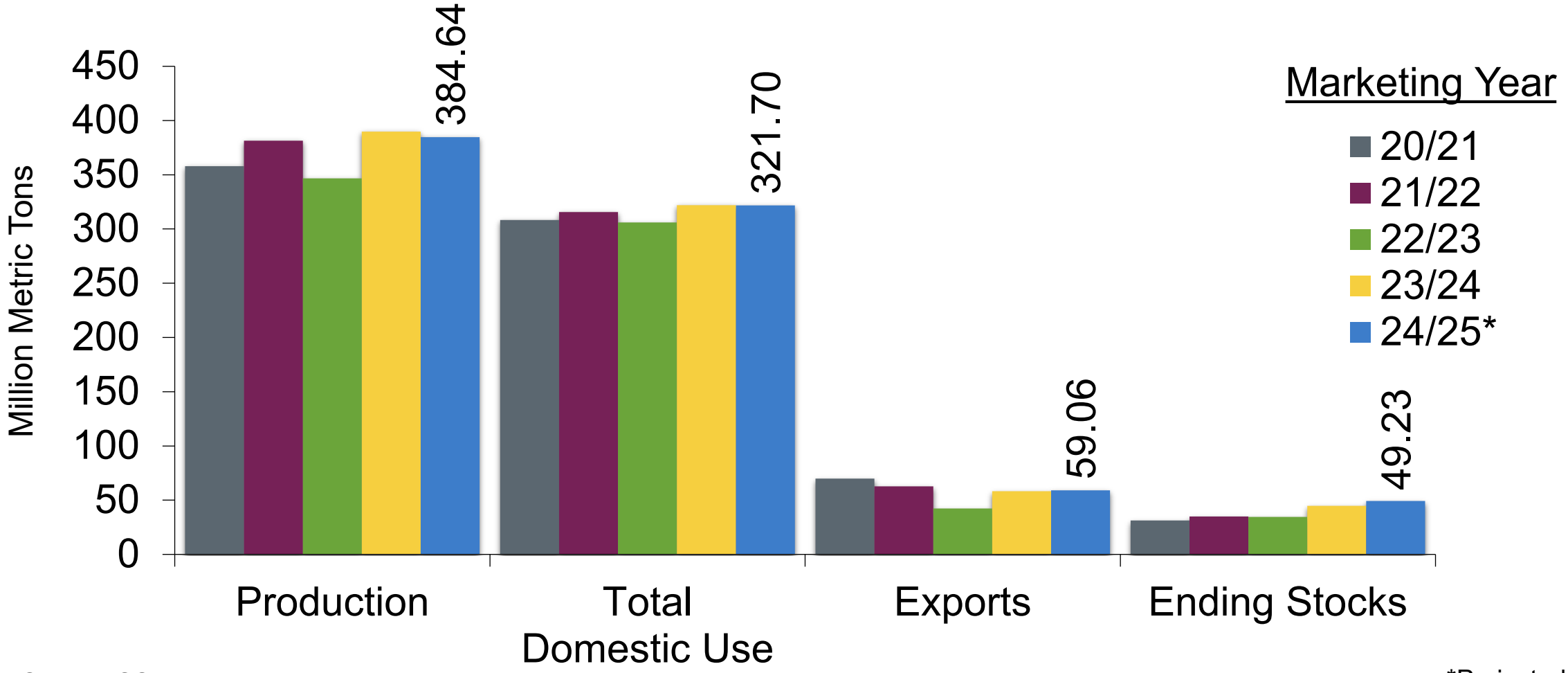
U.S. Domestic Corn Use



Source: USDA NASS

*Projected

U.S. Production and Disappearance



Source: USDA NASS

*Projected

U.S. Corn Supply and Usage Summary — Metric Units

	19/20	20/21	21/22	22/23	23/24	24/25*
Acreage (million hectares)						
Planted	36.33	36.72	37.77	35.71	38.30	36.72
Harvested	32.79	33.27	34.41	31.86	35.02	33.49
Yield (metric ton/hectare)	10.51	10.75	11.09	10.88	11.12	11.49
			In Millions of Metric Tons			
Supply (million metric tons)						
Beginning Stocks	56.82	50.91	31.36	34.97	34.55	44.72
Production	344.65	357.82	381.47	346.74	389.67	384.64
Imports	1.06	0.62	0.62	0.98	0.72	0.64
Total Supply	402.54	409.35	413.44	382.70	424.94	430.00
Usage (million metric tons)						
Food, seed, other non-ethanol ind. use	36.31	36.55	36.49	35.10	35.33	35.31
Ethanol and co-products	123.37	127.71	135.13	131.48	139.15	138.44
Feed and residual	146.78	143.96	144.04	139.35	147.50	147.96
Exports	45.18	69.78	62.80	42.22	58.23	59.06
Total Use	351.62	377.99	378.47	348.15	380.23	380.76
Ending Stocks	50.91	31.36	34.97	34.55	44.72	49.23
Average farm price (dollar per metric ton†)	140.15	178.34	236.21	257.47	179.13	161.41

*Projected
†The average farm price for 24/25 based on WASDE November projected price

Source: USDA WASDE, November 2024

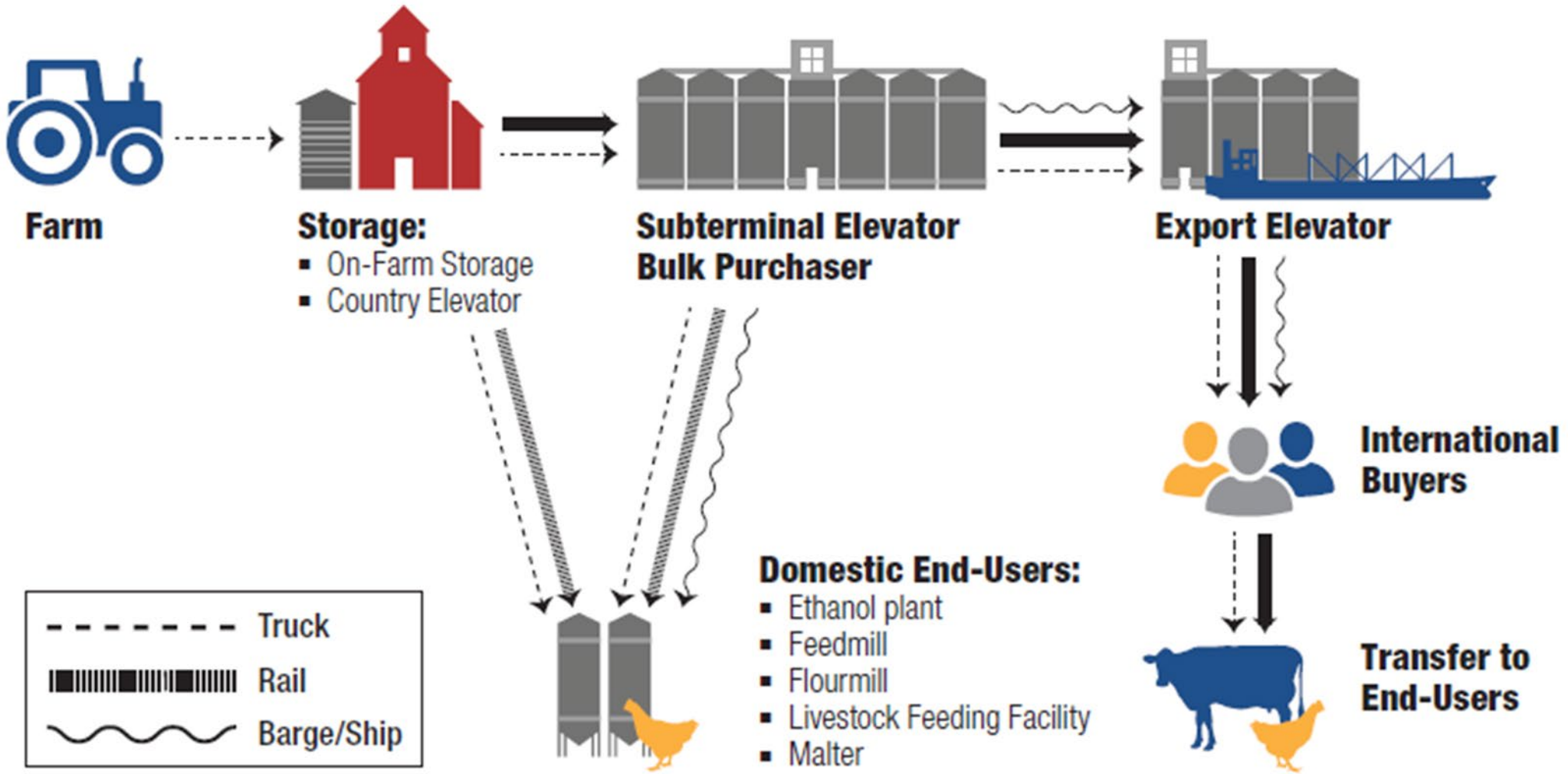
U.S. Corn Supply and Usage Summary — English Units

	19/20	20/21	21/22	22/23	23/24	24/25*
Acreage (million acres)						
Planted	89.7	90.7	93.3	88.2	94.6	90.7
Harvested	81.0	82.2	85.0	78.7	86.5	82.7
Yield (bushels per acre)	167.5	171.4	176.7	173.4	177.3	183.1
			In Millions of Bushels			
Supply (million bushels)						
Beginning Stocks	2,237	2,004	1,235	1,377	1,360	1,760
Production	13,568	14,087	15,018	13,651	15,341	15,143
Imports	42	24	24	39	28	25
Total Supply	15,847	16,115	16,277	15,066	16,729	16,928
Usage (million bushels)						
Food, seed, other non-ethanol ind. use	1,429	1,439	1,437	1,382	1,391	1,390
Ethanol and co-products	4,857	5,028	5,320	5,176	5,478	5,450
Feed and residual	5,778	5,667	5,671	5,486	5,807	5,825
Exports	1,778	2,747	2,472	1,662	2,292	2,325
Total Use	13,843	14,881	14,900	13,706	14,469	14,990
Ending Stocks	2,004	1,235	1,377	1,360	1,760	1,938
Average farm price (dollar per bushel†)	3.56	4.53	6.00	6.54	4.55	4.10

*Projected
†The average farm price for 24/25 based on WASDE November projected price

Source: USDA WASDE, November 2024

How Does U.S. Grain Move?



Testing Analysis Methods

Test Weight (lb/bu or kg/hl)

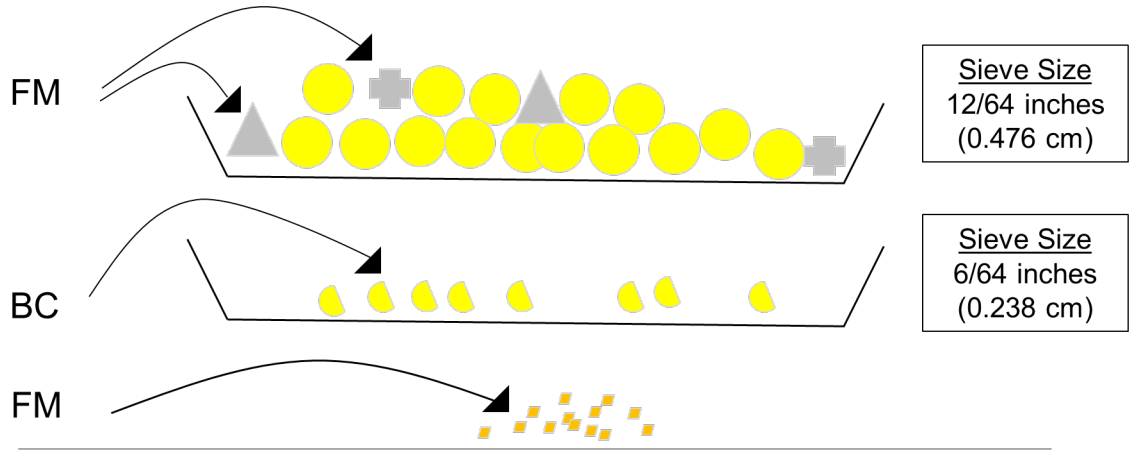
Test weight is a measure of the volume of grain required to fill a Winchester bushel (2,150.42 cubic inches). Test weight is a part of the FGIS Official U.S. Standards for Corn grading criteria.

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 test cup's sides. 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).

Broken Corn & Foreign Material (%)

BCFM is part of the FGIS Official U.S. Standards for Grain and grading criteria.

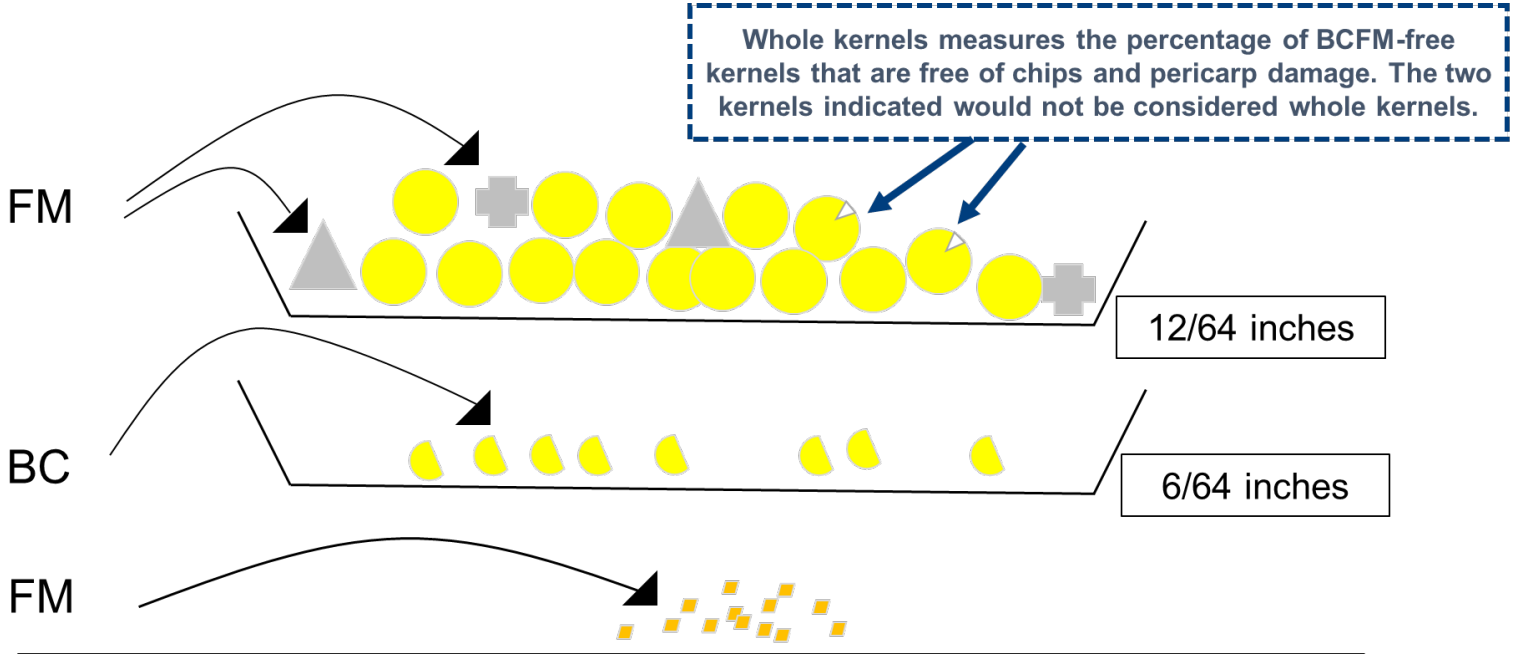
The BCFM test determines the amount of all matter that passes through a 12/64th-inch round-hole sieve and all matter other than corn that remains on the top of the sieve. BCFM measurement can be separated into broken corn and foreign material. Broken corn is defined as all material passing through a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



*Measured as percent of weight

Whole Kernels (%)

In the whole kernels test, 50 grams of cleaned (BCFM-free) corn are inspected by the kernel. Cracked, broken or chipped grain, along with any kernels showing significant pericarp damage, are removed. The whole kernels are then 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 kernel score of 97.0% equates to a cracked & broken rating of 3.0%.



Total Damage and Heat Damage (%)
Moisture (%)

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

A trained and licensed inspector visually examines a representative working sample of 250 grams of BCFM-free corn for 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), 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 trained and licensed inspector visually inspecting a 250-gram sample of BCFM-free corn. Heat damage, if found, is reported separately from total damage.

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 increases. Moisture is reported as a percent of total wet weight.

Chemical Composition

Protein, starch and oil (dry basis %) were determined using near-infrared transmission spectroscopy (NIR) proximate analysis. The technology uses unique interactions of specific wavelengths of light with each sample. It is calibrated to traditional chemistry methods to predict protein, oil and starch concentrations in the sample. This procedure is nondestructive to the corn.

Chemical composition tests for protein, oil and starch were conducted using a 550 to 600-gram sample in a whole-kernel Foss Infratec 1241 NIR instrument. The NIR was calibrated to chemical tests, and the standard errors of predictions for protein, oil and starch were about 0.22%, 0.26% and 0.65%, respectively. Comparisons of the Foss Infratec 1229 used in Harvest Reports before 2016 to the Foss Infratec 1241 on 21 laboratory check samples showed the instruments averaged within 0.25%, 0.26% and 0.25% points of each other for protein, oil and starch, respectively. Results are reported on a dry basis percentage (percent of non-water material).

Stress Cracks (%)

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 each kernel's stress crack damage can be evaluated. Kernels are sorted into two categories: (1) no cracks; (2) one or more cracks. Stress cracks, expressed as a percent, are all kernels containing one or more cracks divided by 100 kernels. Lower levels of stress cracks are always better since higher stress cracks lead to more breakage in handling. Some end-users will specify by contract the acceptable level of cracks based on the intended use.

100-Kernel Weight (grams)

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 milligrams. The averaged 100-kernel weight is reported in grams.

Kernel Volume (cm^3)

The kernel volume for each 100-kernel replicate is calculated using a helium pycnometer and is expressed in cubic centimeters (cm^3) per kernel. Kernel volumes usually range from 0.14 cubic centimeters to 0.36 cubic centimeters per kernel for small and large kernels, respectively.

Kernel True Density (g/cm^3)

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 1.20 grams per cubic centimeter to 1.30 grams per cubic centimeter at "as is" moisture contents of about 12 to 15%.

Horneous (Hard) Endosperm (%)

The horneous (or hard) endosperm test is performed by visually rating 20 externally sound kernels, placed germ facing up, on a backlit viewing board. Each kernel is rated for the estimated portion of the kernel's total endosperm that is horneous endosperm. The soft endosperm is opaque and will block light, while the 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 to 100%, though most individual kernels fall in the 70 to 90% range.

Mycotoxins

For this study, a 1,000-gram laboratory sample was subdivided from the two-kilogram survey sample of shelled kernels for the mycotoxin analysis. The one-kilogram survey sample was ground in a Romer Model 2A mill so that 60 to 75% would pass through a 20-mesh screen. From this well-mixed ground material, a 50-gram test portion was removed for each mycotoxin tested. EnviroLogix AQ 309 BG, AQ 304 BG and AQ 411 BG quantitative test kits were used for the aflatoxin, DON and fumonisin analysis, respectively. EnviroLogix AQ 113 BG, AQ 314 BG, and AQ 412 BG quantitative test kits were used for ochratoxin A, T-2 and zearalenone, respectively.

DON and fumonisin were extracted with water (5:1), while the aflatoxin was extracted with buffered water (3:1). The extracts were tested using the EnviroLogix QuickTox lateral flow strips, and the QuickScan system quantified the mycotoxins.

The limit of detection 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 limit of detection will vary among different types of mycotoxins, test kits and commodity combinations. Using the test kits mentioned above, the limit of detection was 2.7 parts per billion for aflatoxin, 0.1 parts per million for DON, and 0.1 parts per million for fumonisin.

Mycotoxins (continued)

The EnviroLogix AQ 113 BG quantitative test kit used for the ochratoxin A tests has a limit of detection of 1.5 parts per billion. The ochratoxin A was extracted with a grain buffer (five milliliters per gram).

For the T-2 tests, the AQ 314 BG quantitative test kit has a limit of detection of 50 parts per billion. T-2 was extracted with water (five milliliters per gram).

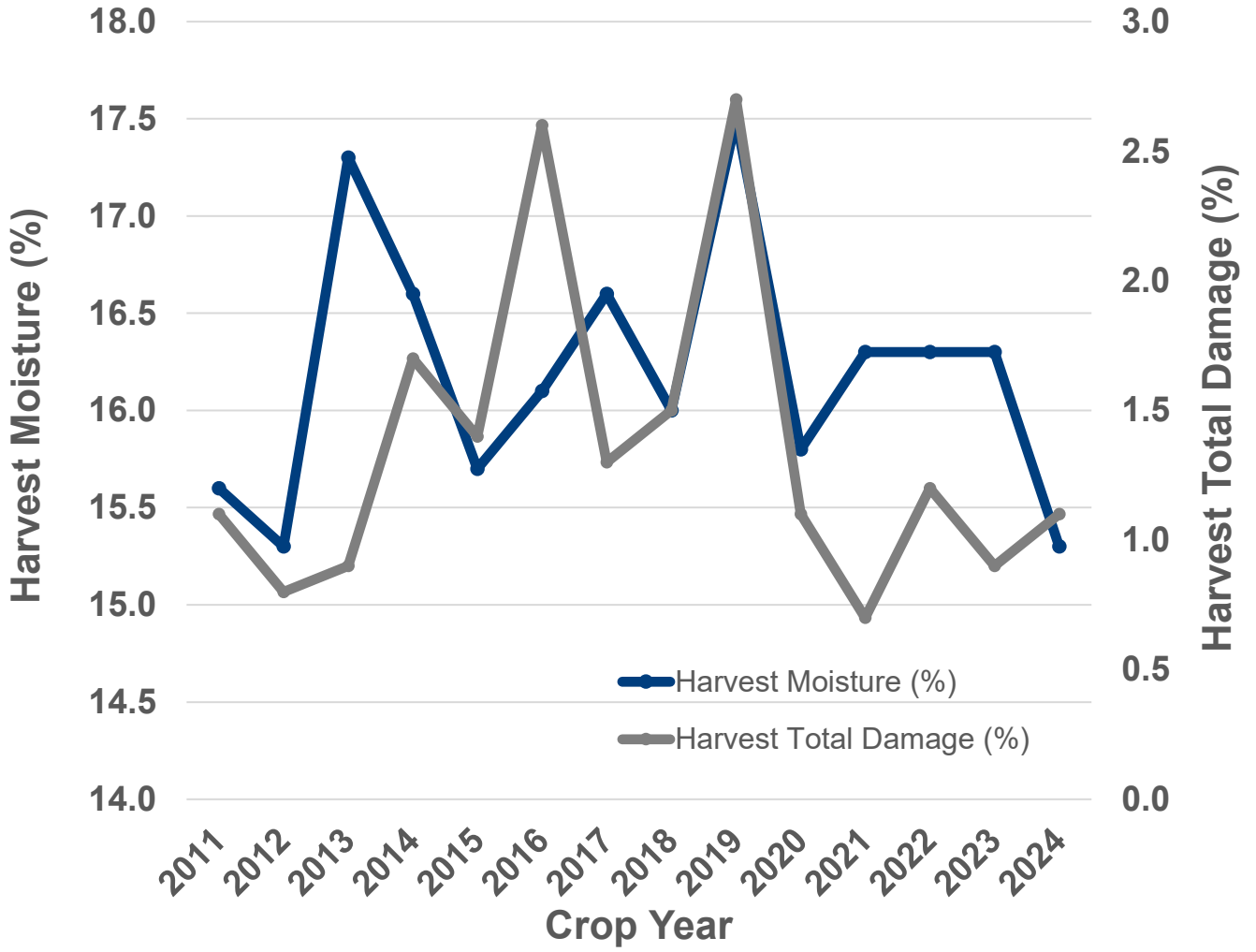
The EnviroLogix AQ 412 BG quantitative test kit used for the zearalenone tests has a limit of detection of 50 parts per billion. The zearalenone test uses a 25-gram test portion of corn. The zearalenone was extracted using a reagent of EB17 extraction powder and a water buffer of 75 milliliters per sample.

Other Supplemental Slides

Harvest Moisture (%) vs. Harvest Total Damage (%)

High moisture may be a precursor to mold damage and possible mycotoxin development later in storage or transport.

In some years, Harvest Moisture (%) may be a contributing factor to higher levels of Total Damage (%) at harvest.



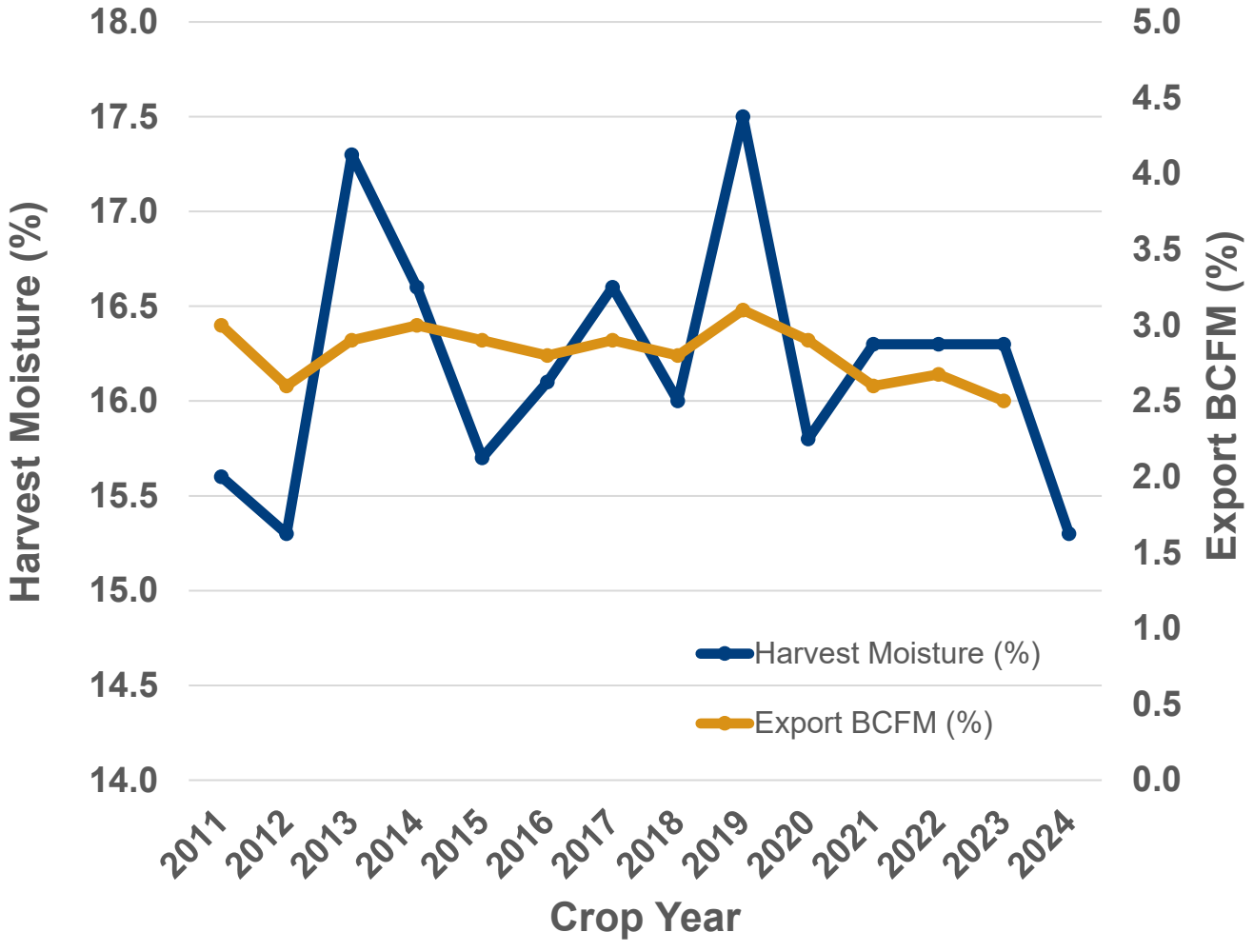
Harvest Moisture (%) vs. Export BCFM (%)

It is difficult to predict BCFM (%) observed in the Export Cargo Report using quality factor results from the Harvest Quality Report.

BCFM within 0.3% of 3.0% in each of the past 13 years.

Note the following quality factors' relationships with BCFM (%) at export:

- Harvest Moisture (%)
- Harvest Whole Kernels (%)
- Harvest Stress Cracks (%)



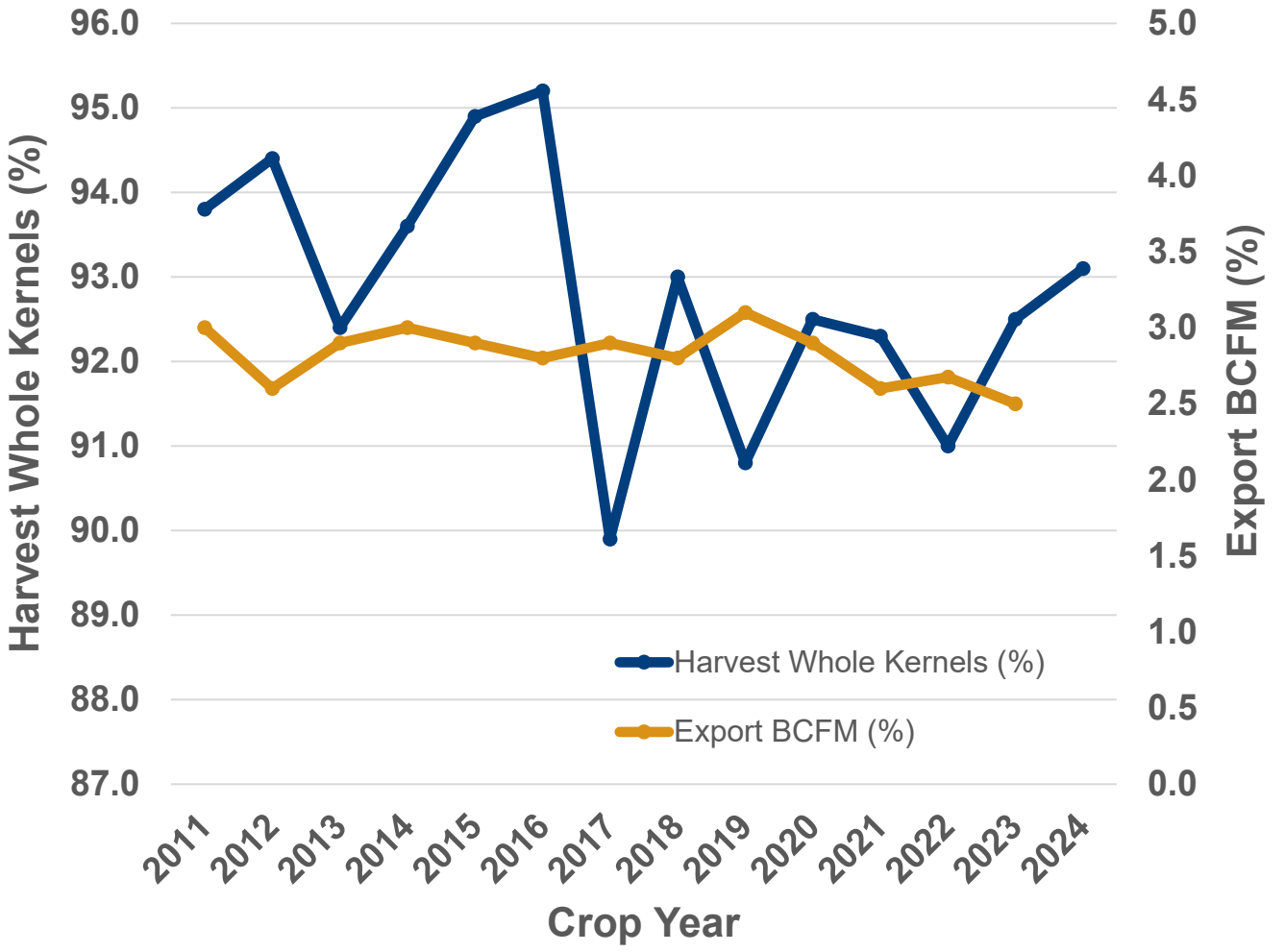
Harvest Whole Kernels (%) vs. Export BCFM (%)

It is difficult to predict BCFM (%) observed in the Export Cargo Report using quality factor results from the Harvest Quality Reports.

BCFM within 0.3% of 3.0% in each of the past 13 years.

Note the following quality factors' relationships with BCFM (%) at export:

- Harvest Moisture (%)
- Harvest Whole Kernels (%)
- Harvest Stress Cracks (%)



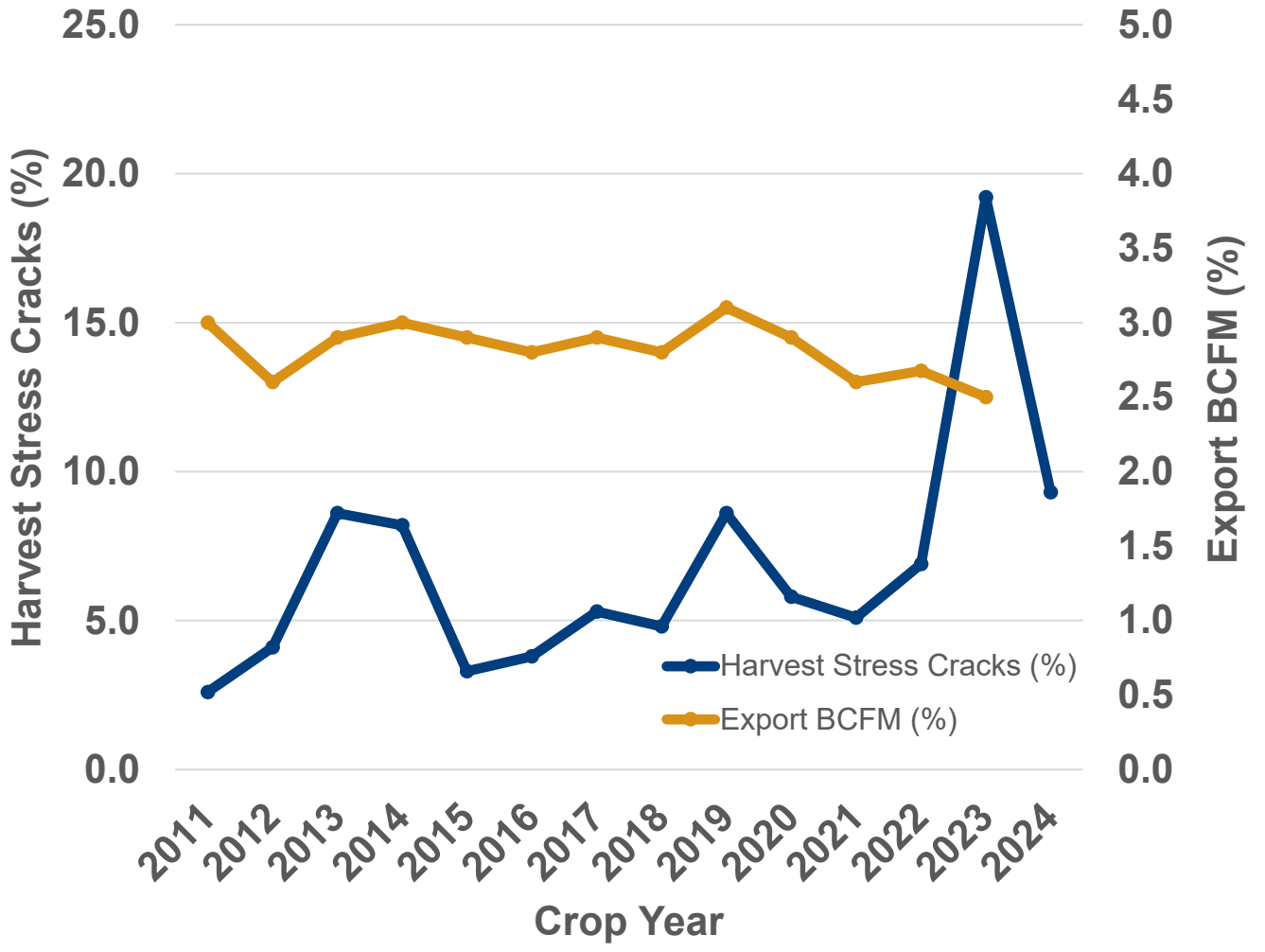
Harvest Stress Cracks (%) vs. Export BCFM (%)

It is difficult to predict BCFM (%) observed in the Export Cargo Report using quality factor results from the Harvest Quality Reports.

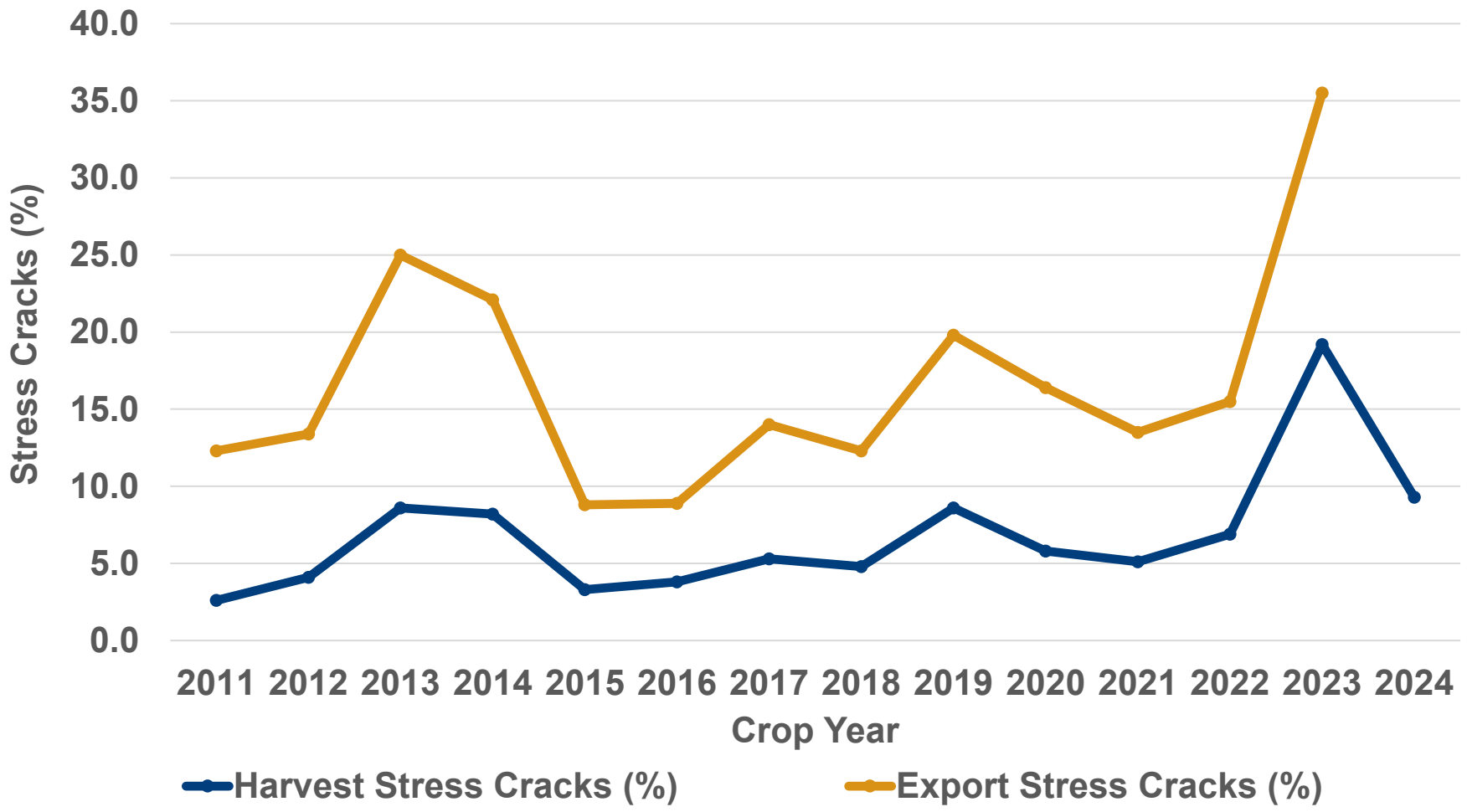
BCFM within 0.3% of 3.0% in each of the past 13 years.

Note the following quality factors' relationships with BCFM (%) at export:

- Harvest Moisture (%)
- Harvest Whole Kernels (%)
- Harvest Stress Cracks (%)



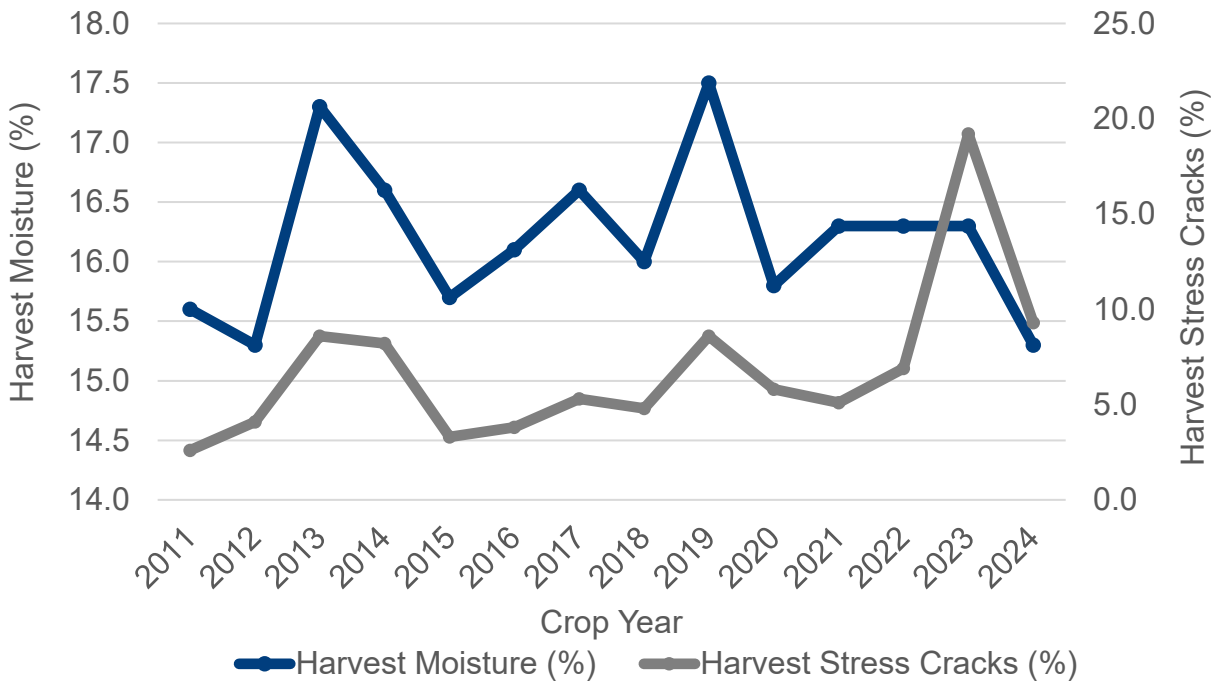
Harvest Stress Cracks (%) vs. Export Stress Cracks (%)

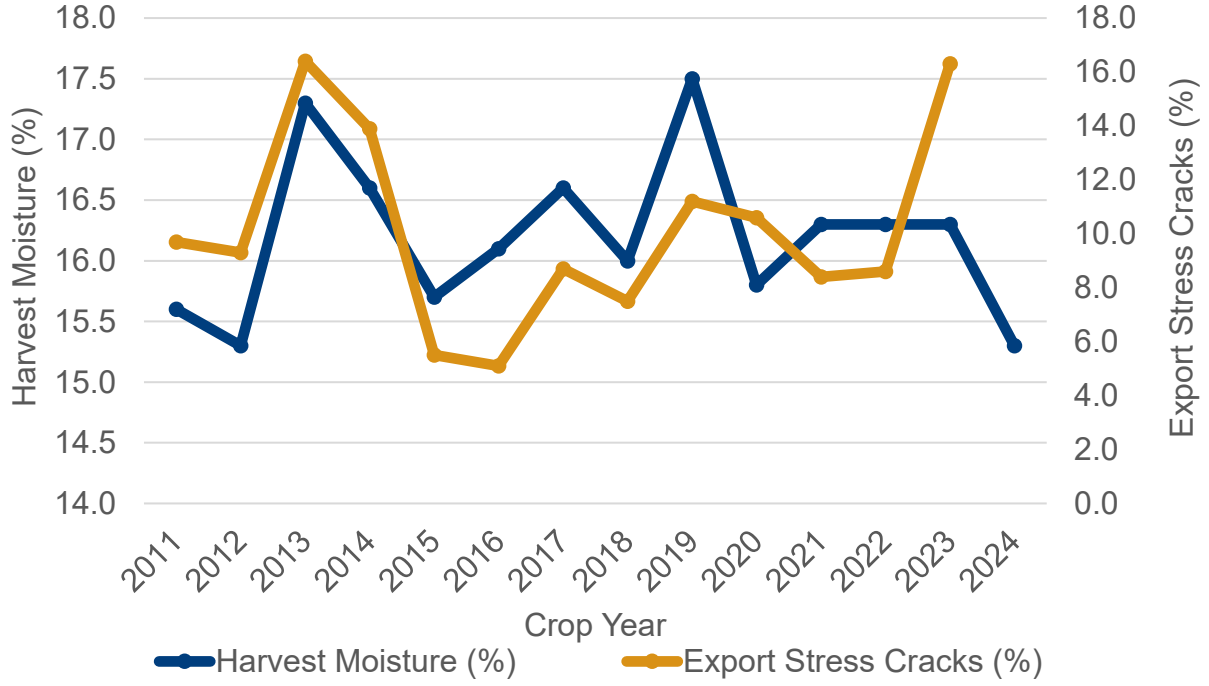


Harvest Moisture (%) vs. Stress Cracks (%)

The Council has observed that Harvest Moisture (%) tends to impact Stress Cracks (%) in both the Harvest and Export Cargo reports.

While the 2024 crop's harvest moisture was lower than the 5YA, stress cracks at harvest were similar to the 5YA.





Harvest Moisture (%) vs. Broken Kernels (%)
(Inverse of Whole Kernels)

The Council has observed that Harvest Moisture (%) tends to impact the percentage of broken kernels at harvest. This is likely due to:

- Lower breakage created during harvest
- Less handling and artificial drying required to reduce moisture to levels safe for storage