



U.S. WHEAT
ASSOCIATES

The World's Most Reliable Choice

2014 CROP QUALITY REPORT



Dear Customers:

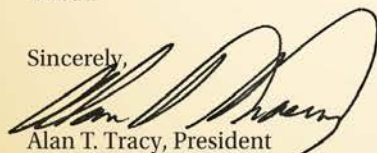
On behalf of U.S. Wheat Associates (USW) and the farmers we represent, I am happy to welcome you to our 2014 Crop Quality Report featuring data for all six classes of wheat grown in the United States.

This report is just one part of our long-standing commitment to produce the highest quality wheat in the world and to provide information about each year's crop that customers need. Through our Overseas Varietal Analysis program, end users play an influential role in the quality characteristics of new U.S. wheat varieties. By selecting innovative varieties and employing precision agricultural technology, U.S. farmers are producing more and better wheat with less impact on the environment every year. Grain handlers segregate our wheat carefully by class and protein levels. Using detailed crop quality and price information, as well as years of experience with grain inspection resources, USW representatives help customers get the best possible value from their purchases. Finally, the USDA Federal Grain Inspection Service independently certifies that buyers receive wheat with the characteristics they specified.

Objective crop data is needed each year because wheat quality in every class varies each year. Yet, the wide range of classes and the diversity of our growing regions are important assets for the world's wheat buyers. In the face of drought in the Southern Plains and Pacific Northwest and too much rain in the Northern Plains and Midwest, U.S. wheat farmers still produced abundant supplies of high quality wheat for millers, bakers and food processors.

I encourage you to carefully consider the information in this report and meet with your local USW representative to reveal the true value of U.S. wheat. So from all of my colleagues, our farmers, our 19 state wheat commission members, our crop quality and educational partners and USDA's Foreign Agricultural Service, thank you again for choosing U.S. wheat.

Sincerely,



Alan T. Tracy, President
U.S. Wheat Associates



U.S. Wheat Associates is funded by the U.S. Department of Agriculture's Foreign Agricultural Service, and by wheat producers through the following member organizations:

Arizona Grain Research and Promotion Council

Arkansas Wheat Promotion Board

California Wheat Commission

Colorado Wheat Administrative Committee

Idaho Wheat Commission

Kansas Wheat Commission

Maryland Grain Producers Utilization Board

Minnesota Wheat Research and Promotion Council

Montana Wheat & Barley Committee

Nebraska Wheat Board

North Dakota Wheat Commission

Ohio Small Grains Marketing Program

Oklahoma Wheat Commission

Oregon Wheat Commission

South Dakota Wheat Commission

Texas Wheat Producers Board

Virginia Small Grains Board

Washington Grain Commission

Wyoming Wheat Marketing Commission

U.S. Wheat Associates (USW) is the industry's market development organization working in more than 100 countries. Its mission is to "develop, maintain, and expand international markets to enhance the profitability of U.S. wheat producers." The activities of USW are made possible by producer checkoff dollars managed by 19 state wheat commissions and through cost-share funding provided by USDA's Foreign Agricultural Service. For more information, visit www.uswheat.org.

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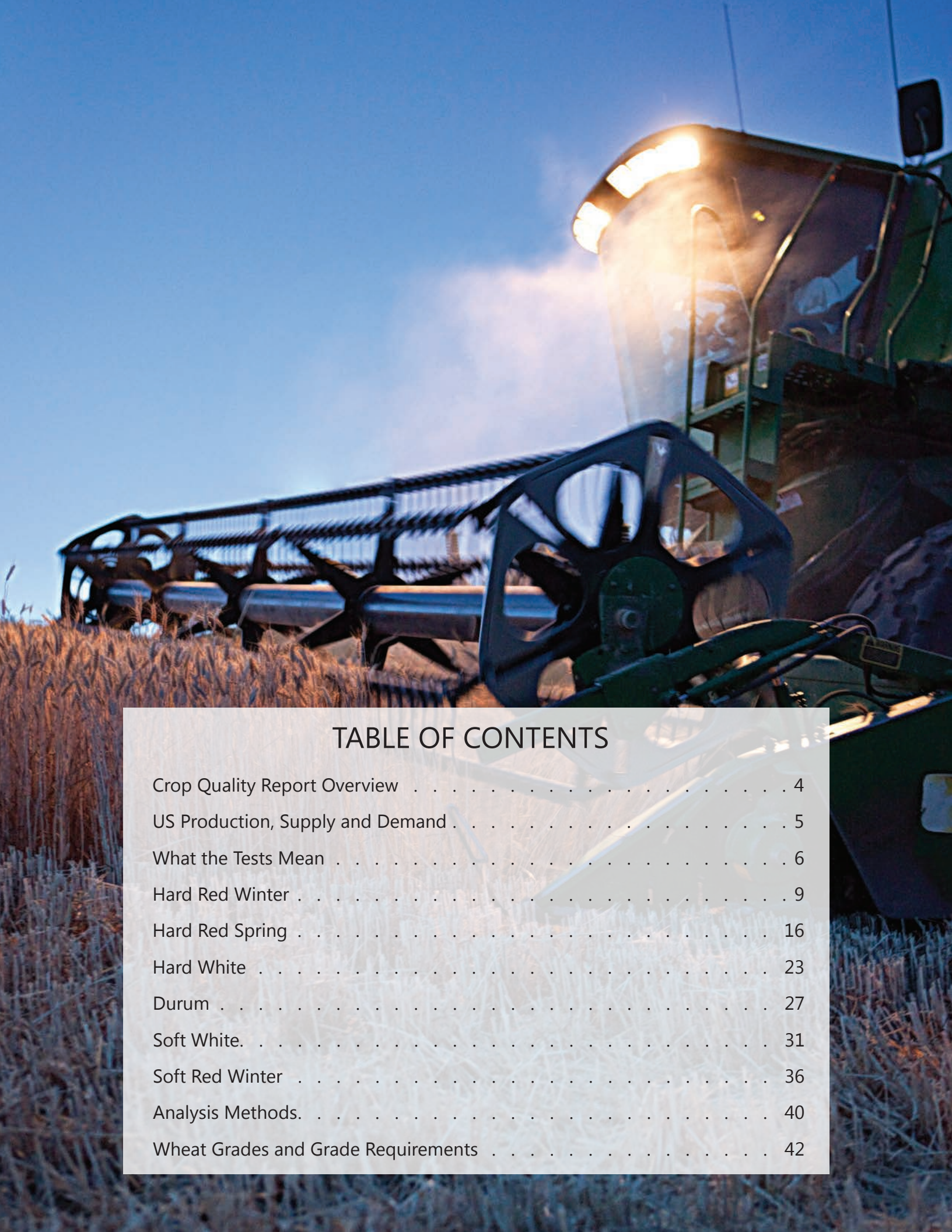


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2014 CROP QUALITY REPORT OVERVIEW

SUMMARY OF CLASSES

	Hard Red Winter ¹		Hard Red Spring		Northern Durum ²		Desert Durum [®]		Soft White		Soft Red Winter	
	2014	5-Year Avg	2014	5-Year Avg	2014	5-Year Avg	2014	5-Year Avg	2014	5-Year Avg	2014	5-Year Avg
Test Weight (lb/bu)	60.7	60.7	61.2	61.5	59.0	60.5	63.2	62.7	60.6	60.5	58.0	58.6
(kg/hl)	79.9	79.8	80.5	80.9	76.8	78.8	82.3	81.6	79.7	79.6	76.3	77.1
Grade	1 HRW	1 HRW	1 NS	1 NS	2 AD	1 HAD	1 HAD	1 HAD	1 SW	1 SW	2 SRW	2 SRW
Dockage (%)	0.4	0.5	0.6	0.7	0.7	1.1	0.3	0.3	0.4	0.6	0.4	0.7
Wheat Moisture (%)	11.7	11.0	12.6	12.2	12.4	11.5	6.4	6.5	9.2	9.4	13.0	12.9
Wheat Protein (%) ³	13.3	12.4	13.6	14.0	13.2	13.6	13.3	13.4	10.9	9.9	9.8	10.1
Wheat Ash (%) ³	1.49	1.55	1.47	1.58	1.64	1.57	1.72	1.73	1.32	1.36	1.52	1.53
1000 Kernel Weight (g)	30.7	29.0	31.6	30.7	38.0	40.1	47.8	49.3	32.7	35.4	31.3	32.5
Wheat Falling Number (sec)	385	410	337	390	276	378	n/a	n/a	353	327	311	322
Flour/Semolina Extraction (%)	73.9	72.7	66.1	69.1	64.5	65.0	62.0	62.3	75.7	73.7	70.5	70.4
Flour/Semolina Ash (%) ³	0.54	0.48	0.45	0.52	0.74	0.65	0.81	0.87	0.54	0.49	0.43	0.44
Wet Gluten (%)	32.2	28.7	31.9	35.1	32.8	35.5	33.2	32.9	28.7	21.6	22.2	22.2
Farinograph:												
Peak Time (min)	6.2	5.1	6.4	6.8	n/a	n/a	n/a	n/a	3.0	1.6	1.3	1.6
Stability (min)	9.3	12.6	9.4	11.2	n/a	n/a	n/a	n/a	2.5	3.1	2.4	2.8
Absorption (%)	60.3	57.9	62.2	64.8	n/a	n/a	n/a	n/a	55.3	53.6	52.0	52.5
Alveograph W (10 ⁻⁴ joules)	266	244	392	364	135	126	247	191	108	101	72	86
Loaf Volume (cc)	859	816	944	960	n/a	n/a	n/a	n/a	n/a	n/a	724	715
Production (mmt)	20.1	24.3	15.3	13.6	1.2	1.7	0.3	0.7	5.5	6.7	12.4	11.4
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¹HRW data does not include California.

² Durum extraction and ash values are for semolina.

³Protein - 12% moisture basis; ash - 14% moisture basis.



US Production by Class

Crop Year (Beginning June 1)
(million metric tons)

	2014	2013	2012	2011	2010
Hard Red Winter	20.1	20.3	27.3	21.2	27.7
Hard Red Spring	15.3	13.4	13.7	11.0	15.8
Hard White	0.6	0.6	0.7	0.8	0.7
Durum	1.6	1.6	2.3	1.4	2.9
Soft White	5.5	6.7	6.5	7.9	6.9
Soft Red Winter	12.4	15.5	11.4	12.5	6.5
Total	55.4	58.1	61.7	54.4	60.1

Based on USDA crop estimates of September 30, 2014.

US Supply and Demand

Estimated for 2014/2015 (year beginning June 1)
(million metric tons)

	HRW	HRS	Durum	White	SRW	TOTAL
Beginning Stocks	6.4	4.6	0.6	1.4	3.1	16.1
Production	20.1	15.3	1.6	6.1	12.4	55.4
Imports	0.3	2.3	1.4	0.2	0.4	4.6
Total Supply	26.8	22.2	3.5	7.7	15.9	76.1
Domestic Use	12.3	8.4	2.4	2.7	7.2	33.1
Exports	9.3	7.1	0.7	3.9	4.2	25.2
Total Demand	21.6	15.5	3.1	6.7	11.5	58.3
Ending Stocks	5.2	6.7	0.4	1.0	4.4	17.8
Stocks Five-year Average	9.1	4.9	0.8	1.9	4.6	21.2

Based on USDA Supply/Demand estimates of October 10, 2014.

Planting and Harvest Dates

WHEAT	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
HRW Planting												
HRW Harvest												
HRS Planting												
HRS Harvest												
HW Planting												
HW Harvest												
Durum Planting												
Durum Harvest												
SW Planting												
SW Harvest												
SRW Planting												
SRW Harvest												



California-Arizona Planting Dates
California-Arizona Harvest Dates



Other States Planting Dates
Other States Harvest Dates

WHAT THE TESTS MEAN

Wheat Grades reflect the physical quality and condition of a sample and thus may indicate the general suitability for milling. The U.S. grade of a sample is determined by measurement of such factors as test weight, damaged kernels, foreign material, shrunken and broken kernels, and wheat of contrasting classes. (See table on page 42.) All numeric factors other than test weight are reported as a percentage by weight of the sample. Grade determining factors include:

- **Test Weight** is a measure of the density of the sample and may be an indicator of milling yield and the general condition of the sample, as problems that occur during the growing season or at harvest often reduce test weight.
- **Damaged Kernels** are kernels which may be undesirable for milling because of disease, insect activity, frost or sprout damage, etc.
- **Foreign Material** is any material other than wheat that remains after dockage is removed. Because foreign material may not be removed by normal cleaning equipment, it may have an adverse effect on milling and flour quality.
- **Shrunken and Broken Kernels** are kernels which either were insufficiently filled during growing and have a shrunken or shriveled appearance or have been broken in handling. Such kernels may reduce milling yield.
- **Total Defects** is the sum of damaged kernels, foreign material and shrunken and broken kernels.
- **Vitreous Kernels** in hard red spring wheat are kernels which are uniformly dark and have no spots which appear chalky or soft. In durum, vitreous kernels have a glassy and translucent appearance without any spots that appear chalky.

Dockage is the percentage by weight of any material easily removed from a wheat sample using the Carter Dockage Tester. Dockage, because it can be removed, should not have any effect on milling quality but may have other economic effects for buyers. Grade factors are determined only after dockage is removed.

Moisture content is the percentage water by weight of a sample and is an important indicator of profitability in milling. Flour millers add water to adjust wheat moisture to a standard level before milling. Lower wheat moisture allows more water to be added, increasing the weight of grain to be milled at virtually no cost. Moisture content is also an indicator of grain storability as wheat and flour with low moisture are more stable during storage. Because moisture can be readily added to or physically removed from a sample, other analysis results are often mathematically converted to a standard moisture basis, such as 14%, 12% or dry matter, so results can be meaningfully compared.

Protein content is the percentage protein by weight in a sample. Protein can be quickly and easily measured and therefore is an important factor in determining the value of wheat since it relates to many processing properties, such as water absorption and gluten strength. Low protein is desired for products such as snacks or cakes. High protein is desired for products such as pan breads, buns and frozen yeast-raised products.

Ash content is the percentage of minerals by weight in wheat or flour. In wheat, ash is primarily concentrated in the bran and is an indication of the flour yield that can be expected during milling. In flour, ash content indicates milling performance by indirectly revealing the amount of bran contamination in flour. Ash in flour can impart a darker color to finished products. Products requiring particularly white flour call for low ash content while whole wheat flour has higher ash content.

1000 Kernel Weight is the weight in grams of one thousand kernels of wheat and may indicate grain size and expected milling yield.

Kernel Size is a measure of the percentage by weight of large, medium and small kernels in a sample. Large kernels or more uniform kernel size may help improve milling yield.

Single Kernel Characterization System (SKCS) measures 300 individual kernels from a sample for size (diameter), weight, hardness (based on the force needed to crush) and moisture. Detailed SKCS results (not reported in this booklet) include the distribution of these factors, which may be an indicator of the uniformity of the sample and may help millers experienced with the system optimize flour milling yields. Kernel characteristics are related to milling properties such as tempering, roll gap settings, and flour starch damage content.

Sedimentation value is a measure of the sediment that results when lactic acid is added to a sifted ground wheat sample and can be used as an indicator of gluten quality and thus the baking quality of wheat flour.

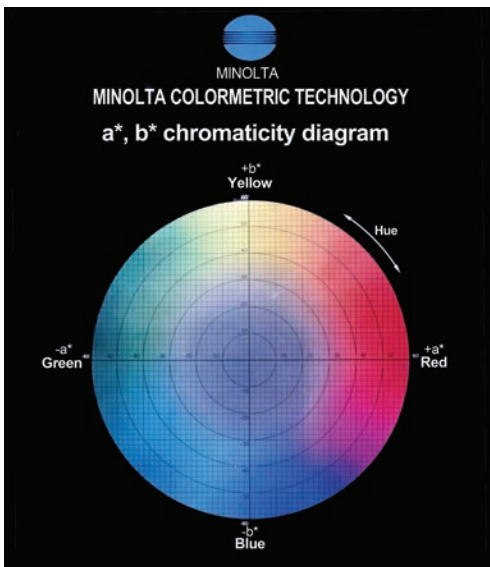
Falling Number indirectly indicates alpha-amylase activity, which results from sprout damage. High Falling Number values indicate low alpha-amylase activity. Sufficient alpha-amylase activity is required in flour for some products such as yeast-raised bread. However, excessive alpha-amylase in wheat cannot be removed and is difficult to blend to lower alpha-amylase content, and the resulting flour produces a sticky dough that can cause problems during processing and products with poor color and weak texture. Falling Number usually correlates closely with amylograph.

Extraction is the percentage by weight of flour obtained from a wheat sample. In a commercial flour mill the extraction rate is critically important to mill profitability. In a laboratory, milling with the Buhler Laboratory Mill is mainly done to

WHAT THE TESTS MEAN

obtain flour for other tests. The Buhler Laboratory Mill extraction rate is always significantly lower than the rate that can be obtained on a commercial mill, but may be useful for comparison between crop years.

Color is a numerical system to measure a sample's lightness (L^*) on a scale of 0 to 100 and "chromaticity" or hue on two scales each running from -60 to +60 for green-red (a^*) and blue-yellow (b^*). High L^* values indicate a bright color, and higher b^* values indicate more yellow. Flour color is



influenced by the wheat's endosperm color particle size and the ash content of the flour and often affects the color of the finished product. Durum semolina color is heavily influenced by particle size.

Wet Gluten is a measure of the quantity of gluten in

wheat or flour samples as determined using the Glutomatic system. Gluten forms when water is added to the protein in wheat and is responsible for the elasticity and extensibility characteristics of flour dough.

Gluten Index is also determined by the Glutomatic system and is a measure of gluten strength regardless of the quantity of gluten present. Gluten index is used commercially to select durum samples with strong gluten characteristics. In bread wheat a variety of factors other than gluten quality can affect the results though very low gluten index may be an indication of protein damage from insect or disease activity.

Amylograph measures flour starch pasting properties that are important to some end products such as sheeted Asian noodles. Amylograph also measures enzyme (alpha-amylase) activity which results from sprout damage. Amylograph results usually correlate very closely with Falling Number results.

Starch Damage, the percentage by weight of damaged starch in a flour sample, is a measure of the physical damage done to starch granules during milling. Bread (hard) wheat flour typically has higher starch damage than soft wheat flour. Highly damaged starch readily absorbs more water which affects dough mixing and other processing properties. Because starch damage depends on how the sample was

milled, starch damage is important for interpreting other results reported.

Farinograph generates a curve that indicates the power being used over time as flour and water are mixed into dough. The results describe the mixing properties of the dough and include:

- **Peak Time** is the time interval from the first addition of water to the maximum consistency immediately prior to the first indication of weakening. Long peak times indicate strong gluten and dough properties while short peak times may indicate weak gluten.
- **Stability** is the interval between the point where the top of the curve first intersects the 500-BU line (called the "arrival time") and the point where the top of the curve departs the 500-BU line ("departure time"). Long stability times also indicate strong gluten and dough properties, useful in such products as yeast-raised breads while short stability times indicate weaker gluten useful in many confectionary products.
- **Absorption** is the amount of water (as a percent by weight of 14 percent moisture wheat flour) required to center the curve peak on the 500-BU line. High water absorption provides economic advantages for producing more dough pieces than flour with lower water absorption.
- **Classification** rates the curves produced by the farinograph ("farinograms") on a scale of 1 to 8, with higher values indicating stronger gluten and dough mixing properties for hard red spring wheat flour.

FARINOGRAPH



Photo courtesy of Wheat Marketing Center

WHAT THE TESTS MEAN

Alveograph generates a curve indicating the air pressure necessary to inflate a piece of dough like a bubble to the point of rupture and indicates the gluten strength and extensibility of dough. Values reported include:

- **P** ("overpressure" or resistance), measured in millimeters to the maximum height of the curve, reflects the maximum pressure while blowing the bubble of dough and indicates dough resistance to extension.
- **L** (length), the length of the curve measured in millimeters, reflects the size of the bubble and indicates dough extensibility.
- **W** (the area under the curve) reflects the amount of energy needed to inflate the dough to the point of rupture and indicates dough strength.

The alveograph is well suited for measuring the dough characteristics of weaker gluten wheat and, with adaptive hydration and mix time, of stronger wheats including durum. Requirements differ depending on intended flour use. For example, low P value (indicating weak gluten) and long L value (high extensibility) are preferred for cakes and confectionery products; P/L close to 1 and high W values (strong gluten) are preferred for pan breads; and low P and long L values are favored for durum for pasta semolina.

Extensograph generates a force-time curve for a piece of dough stretched until it breaks. Results include:

- **Resistance**, measured at the maximum curve height in Brabender units (B.U.), reflects the maximum force applied and indicates the resistance of the dough to extension.
- **Extensibility**, measured as the total length of the curve at the base line in centimeters, reflects how far the dough was stretched.
- **Area** is the area under the curve reported in square centimeters.

These factors help describe the gluten strength and dough extensibility characteristics of flour for a wide range of end

products. The extensograph can also evaluate the effects of fermentation time and additives on dough performance.

Mixograph, similar to the farinograph but quicker and using a smaller amount of flour sample, generates a graph that records the force needed to mix flour or semolina and water into dough. The graph is classified on a scale of 1 to 8, with higher values indicating stronger gluten characteristics for durum milled fractions.

Solvent Retention Capacity (SRC) is the weight of solvent held by flour after centrifugation, and expressed as a percent of the flour weight on a 14 percent moisture basis. The different solvents used relate flour functionality to specific flour components and thus can be useful for predicting commercial baking performance, especially for soft wheat flours.

Baking Absorption is the water required for optimum dough mixing performance, expressed as a percent of flour weight on a 14 percent moisture basis.

Crumb Grain and Texture is determined on a scale of 1 to 10 by visual comparison to a standard using a constant illumination source. Higher scores are preferred.

Loaf Volume is the volume of the test loaf after baking. Higher loaf volumes indicate better baking performance for pan breads.

Specks are visually counted in a semolina sample and reported as the number in 10 square inches. Specks, which can detract from pasta appearance and desirability, are small particles of bran or other material that escaped the wheat cleaning and semolina purifying process and thus depend on the milling process as well as the characteristics of the durum.

Sugar Snap Cookie, Sponge Cake, Chinese Southern-Type Steamed Bread, Spaghetti, and the Hard White noodle and steamed bread tests all use standardized methods to prepare specific end products to evaluate the suitability of the sample for that product or similar products. Details on many of these tests can be found in the Analysis Methods.

ALVEOGRAPH

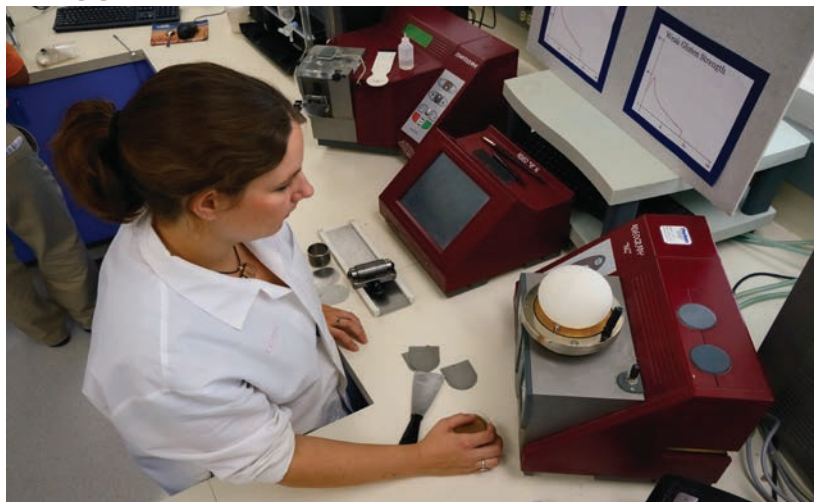


Photo courtesy of Wheat Marketing Center

MIDWEST AND PNW HARVEST SURVEY

Weather and Harvest: Despite persistent drought conditions in southern and central Great Plains, early growth of the 2014 HRW crop was generally very good; adequate moisture at planting prevailed through late fall and early winter. However, most areas of Kansas southward were in severe to exceptional drought for the rest of the growing season. A hard mid-April freeze further damaged crops in parts of southern Kansas, Oklahoma and Texas. By late May USDA rated 67% to 75% of the latter two states poor to very poor. In early June relentless rain halted harvest in these same areas that had been so dry.

In contrast to drought in the south, good soil moisture extended into spring further north. The June rain, too late for southern states, benefited northern Kansas, western Nebraska and northeastern Colorado. Hot July temperatures in Montana and the Pacific Northwest caused stress. As harvest started rain also fell across the north. Much of Montana and North Dakota received over 10" (25.4 cm) of rain - about half the annual average - during the last half of August.

Survey Methods: Sample collection and analysis were conducted by the USDA ARS Hard Winter Wheat Quality Lab and Plains Grains, Inc. A total of 525 samples were collected from elevators after at least 30% of the local harvest was complete in Texas, Oklahoma, Colorado, Kansas, Nebraska, South Dakota, North Dakota, Wyoming, Montana, Washington, Idaho and Oregon. Grade and non-grade factors were determined on each sample. Functionality tests were done on 79 composites representing growing areas and protein ranges of <11.5%, 11.5% - 12.5%, and >12.5%. Results are presented as Gulf-tributary (about 76% of production), PNW-tributary (24%), and Overall averages. The methods are described in the Analysis Methods section of this booklet.

Wheat and Grade Data: Sixty-six percent of samples grade US No. 1 HRW (Gulf tributary - 54%, PNW tributary - 84%). Overall dockage of 0.4% is below last year and the 5-year average. Total defects of 1.4% are well below last year's 2.0% and the 5-year average of 1.6%. Foreign material, shrunken and broken, and wheat ash are also equal to or lower than the 5-year averages. Overall test weight averages 60.7 lbs/bu (79.9 kg/hl), equal to the 5-year average and above 2013's 59.9 lbs/bu (78.8 kg/hl). Overall thousand kernel weight of 30.7 g is well above 2013's 26.0 g and the 5-year average of 29.0 g. Average kernel diameter of 2.62 mm is slightly larger than 2013 but similar to the 5-year average. Average protein of 13.3% (12 % moisture basis) is similar to 2013 and almost a full percentage point above the 5-year average of 12.4%. Kernels are generally smaller in the higher protein southern region and larger with lower protein in the northern region. Approximately 10% of samples (mostly PNW tributary) are less than 11.5% protein, 22% between 11.5% and 12.5%, and 68% above 12.5%. Protein distribution varies considerably by growing area. Falling number average of 385 sec is down from 2013 and the 5-year average but still indicates sound wheat.

Flour and Baking Data: The Overall laboratory mill flour yield average is 73.9%, below 2013's 76.1%, but above the 5-year average of 72.7%. (A new Buhler mill was installed 2 years ago.) Flour ash contents are lower than 2013 and the 5-year average and within an acceptable range. Protein loss during flour conversion averages 0.7% (14% mb), below the 5-year average of 1.1%. The W value of 266 (10^{-4} J) is comparable to 2013 and the 5-year average. Overall average farinograph development and stability times average 6.2 and 9.3 min, respectively. Development time is comparable to 2013 but higher than the 5-year average while stability time is lower than the 5-year average of 12.6 min. Farinograph absorption is 60.3%, higher than 2013 and significantly higher than the 5-year average. Overall loaf volume averages 859 cc, similar to 2013 and higher than the 5-year average of 816 cc.

Summary: Despite generally dry growing conditions and slightly below average kernel characteristics, the 2014 HRW crop has unusually high protein content and very good processing characteristics. Alveograph and farinograph values indicate good protein quantity and quality in the crop. Loaf volumes are very good and exceed long-term averages.

CALIFORNIA HARVEST SURVEY

California's wheat growing regions are defined by climate, value of alternative crops, and distinct differences in variety selection. HRW is the most prevalent class grown in the state. Protein and overall quality are excellent. Yields were average. This was California's third successive year of drought, and 2014 was the driest in over 130 years for many locations. With high prices for silage and hay, record wheat acreage was cut for non-grain purposes in 2014. Harvest takes place in June and July. With the strong domestic demand for new crop wheat, importers are encouraged to express their purchasing interest in early spring or even at planting time.

Survey methods: Grade information is provided by FGIS. Milling and end-use quality analysis is conducted by the California Wheat Commission laboratory.

EXPORT CARGO SURVEY

The export cargo data represent 488 subplot samples provided by USDA's Federal Grain Inspection Service for marketing years 2014 and 2013. Of 111 2014-crop samples collected in July and August, 88 are from Gulf and 23 from PNW ports. Of the 377 2013-crop samples, 302 are from Gulf and 75 from PNW ports. Grade data are the official grades on the individual sublots. Milling and baking analyses were by Great Plains Analytical Laboratory, Kansas City, MO.



HARD RED WINTER | MIDWESTERN HARVEST DATA



Hard Red Winter	Composite Average					
	2014 By Protein				2013	5-Year
	Low	Med	High	Overall	Overall	Average
Wheat Grade Data:						
Test Weight (lb/bu)	61.2	61.4	60.5	60.7	59.9	60.7
(kg/hl)	80.5	80.8	79.6	79.9	78.8	79.8
Damaged Kernels (%)	0.4	0.4	0.5	0.5	0.2	0.2
Foreign Material (%)	0.2	0.1	0.1	0.1	0.1	0.1
Shrunken & Broken (%)	1.2	0.7	0.9	0.8	1.6	1.2
Total Defects (%)	1.8	1.2	1.5	1.4	2.0	1.6
Grade	1 HRW	1 HRW	1 HRW	1 HRW	2 HRW	1 HRW
Wheat Non-Grade Data:						
Dockage (%)	0.5	0.4	0.4	0.4	0.6	0.5
Moisture (%)	11.8	11.4	11.9	11.7	10.9	11.0
Protein (%) 12%/0% moisture basis	10.7/12.2	12.1/13.7	13.8/15.7	13.3/15.1	13.4/15.2	12.4/14.1
Ash (%) 14%/0% moisture basis	1.47/1.72	1.49/1.73	1.49/1.73	1.49/1.73	1.59/1.85	1.55/1.79
1000 Kernel Weight (g)	30.1	31.8	30.5	30.7	26.0	29.0
Kernel Size (%) lg/md/sm	59/40/1	65/34/1	56/43/1	58/41/1	46/51/3	56/42/2
Single Kernel: Hardness	66.4	62.7	64.1	64.0	68.9	69.8
Weight (mg)	30.1	31.8	30.5	30.7	26.0	29.0
Diameter (mm)	2.60	2.66	2.61	2.62	2.50	2.59
Sedimentation (cc)	46.0	50.0	59.1	56.4	52.0	53.8
Falling Number (sec)	407	381	386	385	421	410
DON (ppm)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Flour Data:						
Lab Mill Extraction (%)	73.6	74.2	74.0	73.9	76.1	72.7
Color: L*	92.0	91.6	91.2	91.2	90.8	92.0
a*	-2.2	-2.1	-2.0	-2.0	-1.9	-1.8
b*	9.8	9.8	9.8	9.7	10.5	10.4
Protein (%) 14%/0% moisture basis	9.4/11.0	10.7/12.4	12.6/14.6	12.3/14.3	12.3/14.3	11.1/12.9
Ash (%) 14%/0% moisture basis	0.49/0.57	0.52/0.60	0.54/0.63	0.54/0.63	0.60/0.70	0.48/0.56
Wet Gluten (%)	21.4	26.7	33.2	32.2	31.1	28.7
Gluten Index	99	97	92	92	93	95
Falling Number (sec)	426	413	406	404	467	410
Amylograph Viscosity 65 g (BU)	491	493	462	462	580	718
Starch Damage (%)	6.8	6.7	6.3	6.3	6.2	5.9
Dough Properties:						
Farinograph:						
Peak Time (min)	2.9	4.2	6.4	6.2	5.6	5.1
Stability (min)	7.0	7.4	9.4	9.3	12.3	12.6
Absorption (%)	57.5	58.3	60.6	60.3	59.8	57.9
Alveograph: P (mm)	82	81	77	77	81	75
L (mm)	85	88	116	112	97	96
P/L Ratio	0.96	0.92	0.66	0.69	0.84	0.79
W (10 ⁻⁴ joules)	238	257	273	266	250	244
Extensograph: Resistance (BU)	423/615	378/552	338/483	341/491	329/481	334/522
(45/135 min) Extensibility (cm)	13.2/11.7	13.8/13.2	15.2/14.8	15.0/14.5	15.5/15.0	15.0/14.2
Area (sq cm)	91/107	89/120	91/124	90/122	92/126	90/127
Baking Evaluation:						
Crumb Grain (scale 1-10)	6.3	6.5	6.2	6.2	6.7	5.7
Crumb Texture (scale 1-10)	7.0	6.4	6.9	6.8	7.2	6.5
Loaf Volume (cc)	753	801	871	859	860	816
% of Area Production:	5	14	81	100		

2014 Protein Range: Low, less than 11.5%; Med, 11.5 - 12.5%; High, 12.5% or greater

Gulf Exportable Average						PNW Exportable Average					
2014 By Protein				2013	5-Year	2014 By Protein				2013	5-Year
Low*	Med	High	Overall	Overall	Average	Low	Med	High	Overall	Overall	Average
61.0	61.2	60.2	60.3	59.7	60.5	61.5	61.9	61.2	61.5	60.6	61.2
80.3	80.5	79.1	79.4	78.6	79.6	80.9	81.3	80.5	80.9	79.7	80.5
0.4	0.4	0.5	0.5	0.2	0.2	0.3	0.4	0.5	0.4	0.4	0.2
0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1.4	0.7	0.9	0.9	1.8	1.3	0.8	0.6	0.8	0.7	1.1	1.1
2.1	1.2	1.6	1.6	2.1	1.6	1.3	1.1	1.3	1.2	1.6	1.4
1 HRW	1 HRW	1 HRW	1 HRW	2 HRW	1 HRW	1 HRW	1 HRW	1 HRW	1 HRW	1 HRW	1 HRW
0.5	0.3	0.4	0.4	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.5
12.1	11.6	12.1	12.0	10.8	11.0	11.0	11.0	11.3	11.1	11.4	11.1
10.6/12.1	12.1/13.8	14.1/16.0	13.7/15.5	13.6/15.5	12.6/14.3	10.8/12.3	12.0/13.6	13.2/15.0	12.3/14.0	12.7/14.4	12.0/13.7
1.50/1.75	1.48/1.72	1.51/1.75	1.50/1.75	1.61/1.88	1.57/1.82	1.42/1.65	1.50/1.74	1.46/1.70	1.47/1.70	1.52/1.77	1.49/1.73
29.3	30.9	29.6	29.7	24.7	28.5	31.8	33.7	32.4	32.8	30.3	30.9
53/45/2	60/39/1	50/49/1	51/48/1	41/56/3	54/44/2	70/20/1	77/22/1	69/30/1	72/27/1	64/34/2	63/36/1
66.9	62.1	63.6	63.6	69.9	70.4	65.4	64.1	65.3	64.8	66.0	67.0
29.3	30.9	29.6	29.7	24.7	28.5	31.8	33.7	32.4	32.8	30.3	30.9
2.57	2.63	2.58	2.59	2.46	2.58	2.66	2.72	2.68	2.69	2.65	2.64
	49.7	58.7	57.1	50.6	52.9	46.0	50.5	60.1	54.9	56.4	55.6
419	384	385	386	425	410	383	376	390	383	408	403
< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.7	< 0.5	< 0.5	< 0.5
	73.9	73.8	73.6	76.1	72.5	73.6	74.7	74.6	74.5	76.1	73.2
	91.6	91.0	91.0	90.7	92.0	92.0	91.5	91.4	91.5	91.1	92.2
	-2.1	-2.0	-2.0	-1.9	-1.8	-2.2	-2.0	-2.0	-2.1	-1.9	-1.9
	9.8	9.7	9.7	10.7	10.4	9.8	9.8	10.0	9.9	9.9	10.2
	10.6/12.3	12.9/15.0	12.8/14.9	12.5/14.6	11.3/13.1	9.4/11.0	10.8/12.6	11.9/13.8	11.2/13.0	11.5/13.4	10.7/12.4
	0.52/0.61	0.56/0.65	0.56/0.65	0.62/0.73	0.50/0.58	0.49/0.57	0.51/0.59	0.51/0.59	0.51/0.59	0.52/0.60	0.44/0.52
	27.2	34.9	34.6	32.1	29.1	21.4	25.6	29.7	27.2	28.1	27.5
	97	90	90	92	95	99	97	96	97	96	97
	416	398	398	477	417	426	408	422	417	437	403
	499	448	449	590	724	491	480	494	488	548	698
	6.9	6.2	6.3	6.1	5.9	6.8	6.5	6.4	6.5	6.4	6.0
	4.0	6.7	6.7	5.6	5.3	2.9	4.8	5.8	5.1	5.6	4.6
	6.9	9.7	9.7	12.2	12.7	7.0	8.5	8.7	8.4	12.6	12.4
	58.7	61.8	61.7	60.0	58.0	57.5	58.6	59.8	59.1	59.3	57.4
	83	77	77	81	75	82	76	77	77	81	76
	83	116	115	97	95	85	98	115	105	97	98
	1.00	0.66	0.67	0.84	0.79	0.96	0.78	0.67	0.74	0.84	0.77
	265	267	267	245	238	238	242	285	263	264	258
	382/551	323/461	325/464	318/474	326/509	423/615	369/553	369/530	375/549	363/502	356/554
	13.6/12.9	15.3/15.0	15.3/14.9	15.4/14.9	15.0/14.3	13.2/11.7	14.3/13.7	14.9/14.3	14.5/13.8	15.7/15.1	15.1/14.0
	87/116	87/120	87/120	88/124	88/125	91/107	92/128	98/131	95/127	105/133	98/133
	6.3	6.0	6.0	6.8	5.8	6.3	6.8	6.6	6.7	6.4	5.6
	6.3	6.8	6.8	7.3	6.5	7.0	6.9	7.0	6.9	7.0	6.6
	798	875	873	868	820	753	808	861	828	836	801
1	2	65	68			4	12	16	32		

*Too few Gulf Low Protein wheat samples to make composite sample.

HARD RED WINTER | CALIFORNIA AND EXPORT DATA

Hard Red Winter	California Harvest Data				Export Cargo Data			
	Medium Protein		High Protein		Gulf		PNW	
	2014	2013	2014	2013	2014	2013	2014	2013
Wheat Grade Data:								
Test Weight (lb/bu)	62.8	62.9	62.2	63.1	60.6	60.7	62.4	61.9
(kg/hl)	82.6	82.7	81.8	82.9	79.7	79.8	82.0	81.3
Damaged Kernels (%)	0.0	0.0	0.0	0.0	0.8	0.7	0.1	0.1
Foreign Material (%)	0.3	0.1	0.3	0.3	0.2	0.2	0.1	0.1
Shrunken & Broken (%)	0.7	0.7	0.8	0.8	1.3	1.8	1.3	1.4
Total Defects (%)	1.0	0.8	1.1	1.2	2.2	2.7	1.5	1.6
Grade	1 HRW	1 HRW	1 HRW	1 HRW	1 HRW	1 HRW	1 HRW	1 HRW
Wheat Non-Grade Data:								
Dockage (%)	0.6	0.9	0.8	1.1	0.5	0.6	0.3	0.3
Moisture (%)	8.5	8.4	8.4	7.7	11.6	11.3	10.8	10.7
Protein (%) 12%/0% moisture basis	11.6/13.3	11.7/13.3	13.0/14.8	13.3/15.1	12.8/14.5	12.3/13.9	12.4/14.1	12.1/13.8
Ash (%) 14%/0% moisture basis	1.49/1.63	1.54/1.79	1.52/1.66	1.61/1.87	1.51/1.76	1.58/1.84	1.40/1.63	1.46/1.70
1000 Kernel Weight (g)	38.6	39.2	37.6	39.5	28.6	25.4	30.2	29.1
Kernel Size (%) lg/md/sm	84/16/0	84/16/1	80/19/1	87/13/0	64/34/1	52/46/2	67/32/2	66/33/1
Single Kernel: Hardness	69.0	67.0	74.0	70.0				
Weight (mg)	38.6	39.2	37.7	39.2				
Diameter (mm)	2.90	2.49	2.90	3.01				
Sedimentation (cc)					35.8	27.9	46.5	37.8
Falling Number (sec)	363		356	403	405	465	420	403
DON (ppm)								
Flour Data:								
Lab Mill Extraction (%)	69.2	70.7	69.7	72.5	70.4	69.8	71.4	70.6
Color: L*	95.2		95.4		91.6	91.8	91.6	91.9
a*	0.0		-0.1		-3.0	-2.9	-3.0	-2.9
b*	7.4		7.5		8.7	9.0	8.6	8.7
Protein (%) 14%/0% moisture basis	10.5/11.4	10.3/12	11.7/13.1	11.8/13.7	11.4/13.2	10.9/12.6	11.3/13.2	10.9/12.7
Ash (%) 14%/0% moisture basis	0.41/0.46	0.44/0.51	0.39/0.46	0.43/0.50	0.49/0.57	0.50/0.58	0.48/0.55	0.47/0.54
Wet Gluten (%)	31.0	28.3	34.1	33.5	30.4	28.4	29.5	28.0
Gluten Index	95		92	99	96	97	98	98
Falling Number (sec)	335	414	378	438	425	486	428	428
Amylograph Viscosity 65 g (BU)					622	782	702	655
Starch Damage (%)								
Dough Properties:								
Farinograph:								
Peak Time (min)	11.8	7.3	15.2	11.3	6.6	6.4	6.9	6.7
Stability (min)	23.7	18.3	18.5	19.6	12.5	12.2	13.6	13.6
Absorption (%)	62.8	60.4	64.9	63.9	59.0	59.3	60.1	60.2
Alveograph: P (mm)	115		116	102	79	99	93	108
L (mm)	79		80	94	98	77	91	72
P/L Ratio	1.46		1.45	1.09	0.81	1.28	1.02	1.50
W (10 ⁻⁴ joules)	348		364	358	270	269	309	293
Extensograph: Resistance (BU)								
(45/135 min) Extensibility (cm)								
Area (sq cm)								
Baking Evaluation:								
Crumb Grain (scale 1-10)	7		8	8	6.4	6.5	6.2	6.6
Crumb Texture (scale 1-10)	7		8	9	6.8	6.7	6.7	6.8
Loaf Volume (cc)	876	919	946	985	914	893	918	912
Number of Samples					88	302	23	75

California HRW 2014 Protein Range: Med, 11.0 - 12.4%; High, 12.5% or greater

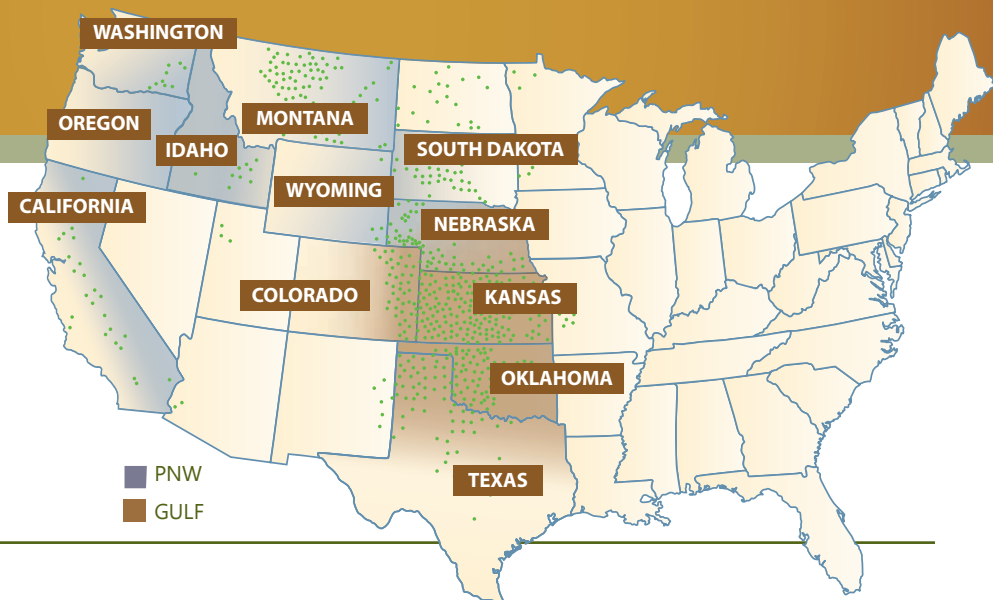
TWELVE STATES SURVEYED

California • Colorado • Idaho • Kansas

Montana • Nebraska • Oklahoma

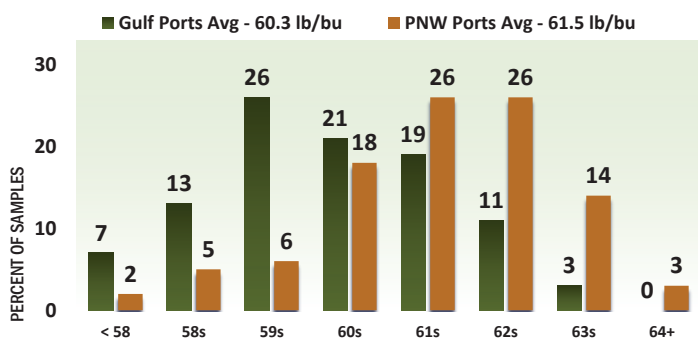
Oregon • South Dakota • Texas

Washington • Wyoming



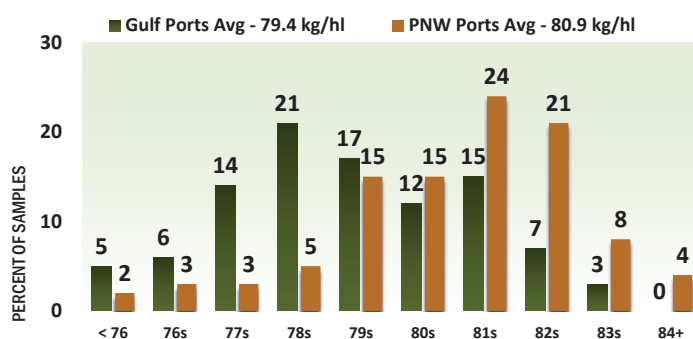
TEST WEIGHT

Pounds/Bushel



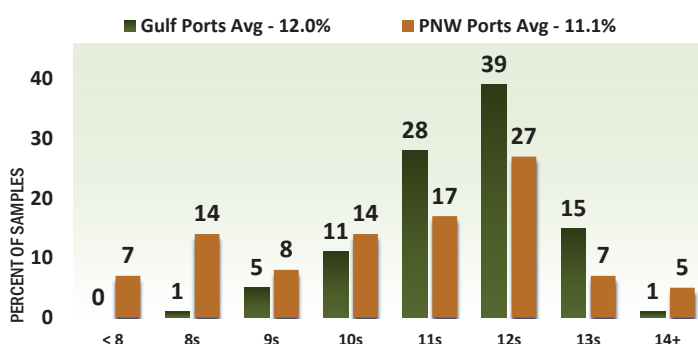
HECTOLITER WEIGHT

Kilograms/Hectoliter



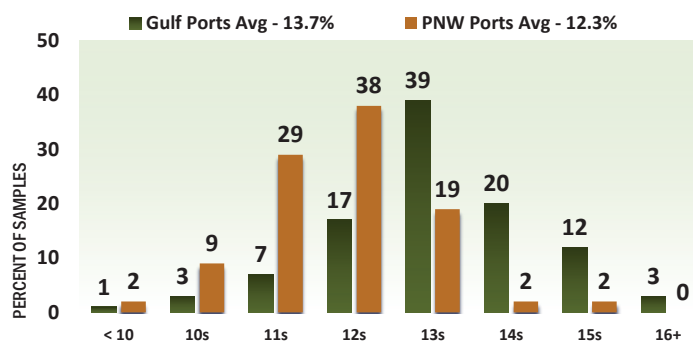
WHEAT MOISTURE

Percent



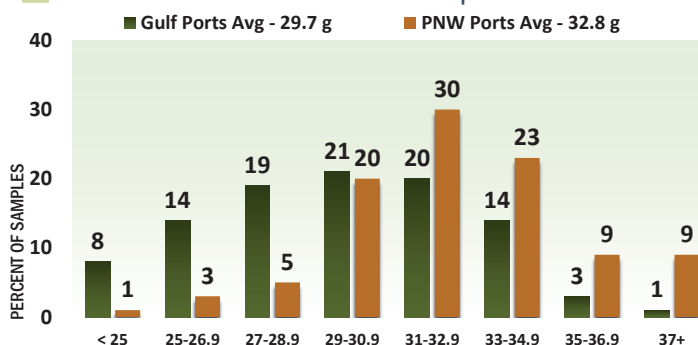
PROTEIN (12% MB)

Percent



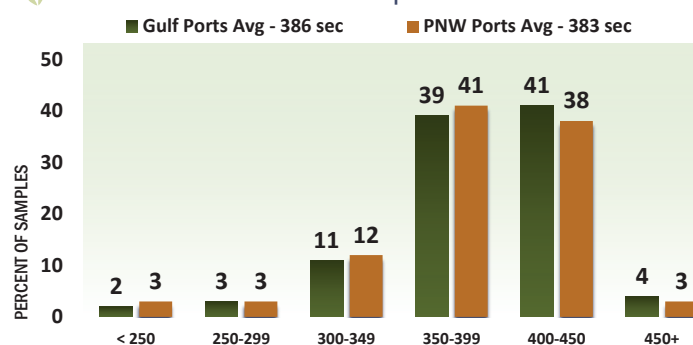
1000 KERNEL WEIGHT

Grams



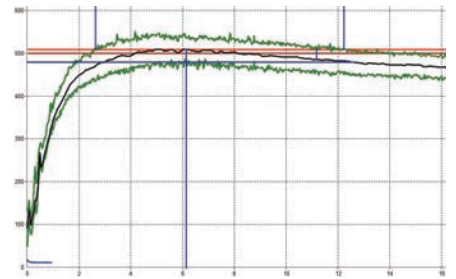
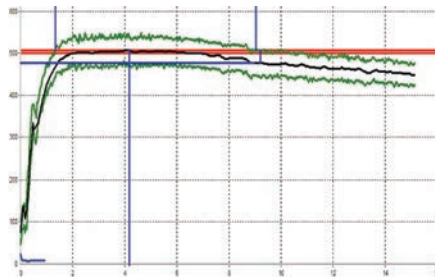
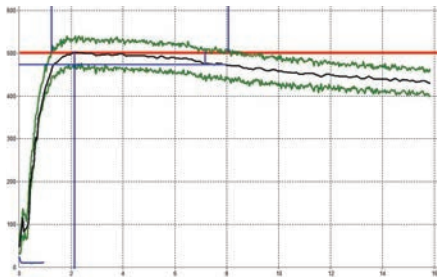
FALLING NUMBER

Seconds

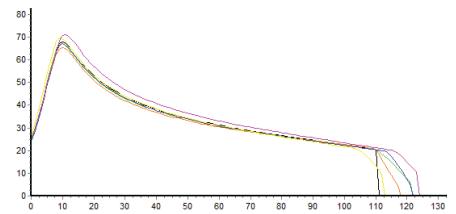
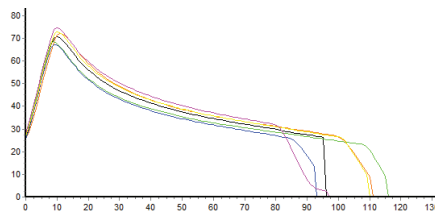
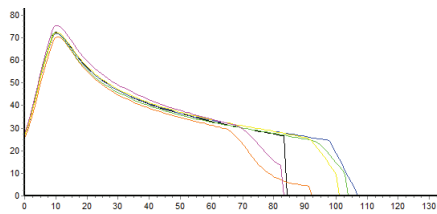


HARD RED WINTER | PHYSICAL DOUGH PROPERTIES

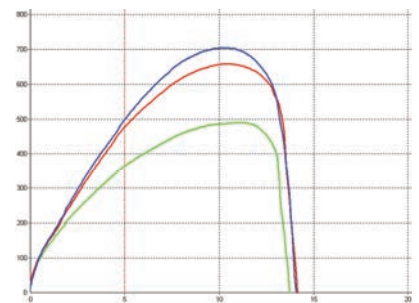
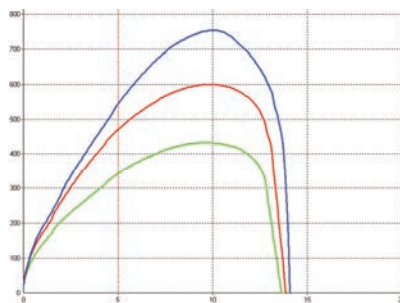
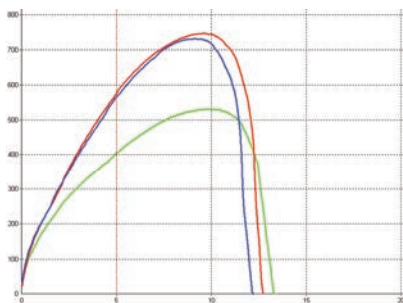
FARINOGRAMS*



ALVEOGRAMS



EXTENSOGRAMS



LOW PROTEIN

MEDIUM PROTEIN

HIGH PROTEIN

*Representing 2014 Composite Average



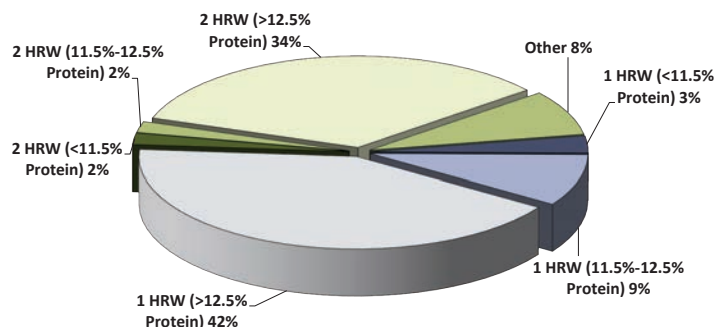
Hard Red Winter Production

for the major growing region (million metric tons)

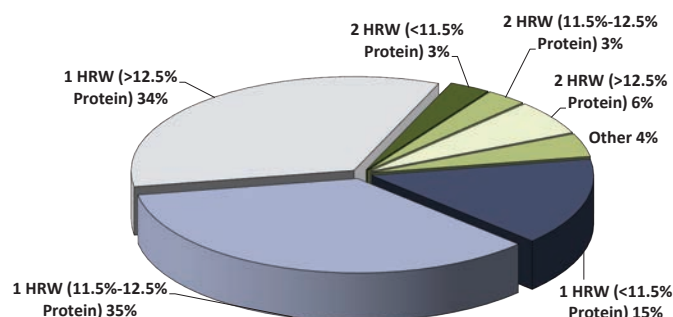
	2014	2013	2012	2011	2010
California	0.3	0.7	0.6	0.8	0.7
Colorado	2.3	1.1	2.0	2.1	2.8
Idaho	0.3	0.4	0.4	0.4	0.4
Kansas	6.5	8.6	10.2	7.4	9.6
Montana	2.5	2.2	2.3	2.4	2.5
Nebraska	1.9	1.1	1.5	1.8	1.7
Oklahoma	1.3	2.8	4.2	1.9	3.3
Oregon	0.1	0.1	0.1	0.1	0.1
South Dakota	1.6	0.7	1.6	1.8	1.7
Texas	1.7	1.7	2.4	1.3	3.4
Washington	0.3	0.4	0.6	0.5	0.5
Wyoming	0.1	0.1	0.1	0.1	0.1
Twelve-State Total	19.0	19.8	25.9	20.6	26.8
Total HRW Production	20.1	20.3	27.3	21.2	27.7

Based on USDA crop estimates of September 30, 2014.

GULF EXPORTABLE



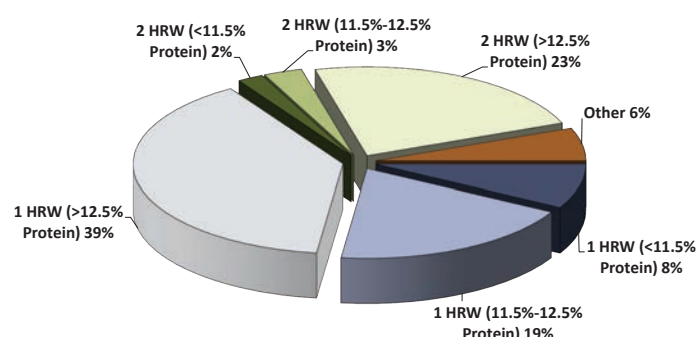
PNW EXPORTABLE



ABOUT HARD RED WINTER WHEAT

U.S. hard red winter wheat has medium to high protein, medium hard endosperm, red bran, medium gluten content and mellow gluten. Used in pan breads, Asian noodles, hearth breads, hard rolls, flatbreads, croissants and general-purpose flour.

OVERALL



HARVEST SURVEY

Weather and Harvest: Planting began in mid-April, about three weeks later than normal due to an unusually cold winter and delayed soil warming. Cool, rainy weather slowed progress in May and planting reached only 50% complete by mid-May and extended into early June in some areas.

Ample soil moisture and relatively cool temperatures during the growing season promoted high yield potential throughout the four-state Northern Plains region. Rainfall was above average, even excess in some areas, especially western North Dakota and Montana, and most areas had little incidents of disease. In contrast, hot, dry conditions reduced yields widely in the three Pacific Northwest (PNW) states.

Harvest began later than normal in the Northern Plains states as lush stands and cool temperatures delayed crop maturity. Less than 20% was harvested by mid-August. Progress remained sluggish into mid-September, hampered by above-average rainfall and cool, cloudy weather. Harvest was not completed until early October in some areas.

Samples and Methods: Sample collection and analysis were conducted by the Hard Red Spring Wheat Quality Lab, Department of Plant Sciences, North Dakota State University, Fargo, ND. A total of 784 samples were collected from fields, at bin sites on farm or at elevators during harvest in Minnesota (110), Montana (139), North Dakota (394), South Dakota (84) and Washington, Idaho and Oregon (57). The samples represent approximately 95% of the 2014 hard red spring (HRS) crop. Samples were segregated by export region (East and West) and composited by protein range (less than 13.5%, 13.5%-14.5%, and greater than 14.5%). The methods are described in the Analysis Methods section of this booklet.

Wheat and Grade Data: The 2014 HRS crop is 14% larger than 2013 due to larger planted area and excellent yields, especially in the Northern Plains. Yields were below recent years in the PNW. The average grade is No. 1 NS with 82% of the samples from the West export region and 90% from the East grading No. 1. Average vitreous kernal content (DHV) in both regions, however, is 48%, the lowest average in a number of years. Average protein is 13.6%, similar to 2013 but about one-half point below the 5-year average.

The Overall average test weight is 61.2 lb/bu (80.5 kg/hl), slightly lower than the exceptional 2013 crop but similar to the 5-year average, with the West at 60.7 lb/bu (79.8 kg/hl) and the East at 61.8 lb/bu (81.3 kg/hl). Average thousand kernel weight is 31.6 g, down from 32.4 in 2013 but above the 5-year average; the West has a lower average and distribution skew than the East. Total defects are very low, averaging 0.9%, similar to 2013 and lower than the 5-year average. Some areas experienced fusarium, and some samples had elevated DON levels, but the Overall DON average is 0.1 ppm, lower than the 0.4 ppm in the 2013 crop. DON levels are generally higher in the East than the West, and the highest levels are in the lowest protein segment of the crop.

Protein averages 13.4% (12% moisture basis) in the East region and 13.9% in the West. In the East, 55% of the crop falls below 13.5% protein and just 16% is above 14.5%. In the West, 41% percent is below 13.5% protein and 32% above 14.5%. With the lower protein levels and untimely harvest rains, DHV levels are historically low. Overall average DHV is 48%, well below 71% in 2013 and 73% as a 5-year average. Lower values were pronounced in the West where one-half of the crop is above the DNS threshold of 75% DHV but nearly 40% is below 50% DHV, compared to just 14% below 50% DHV in 2013.

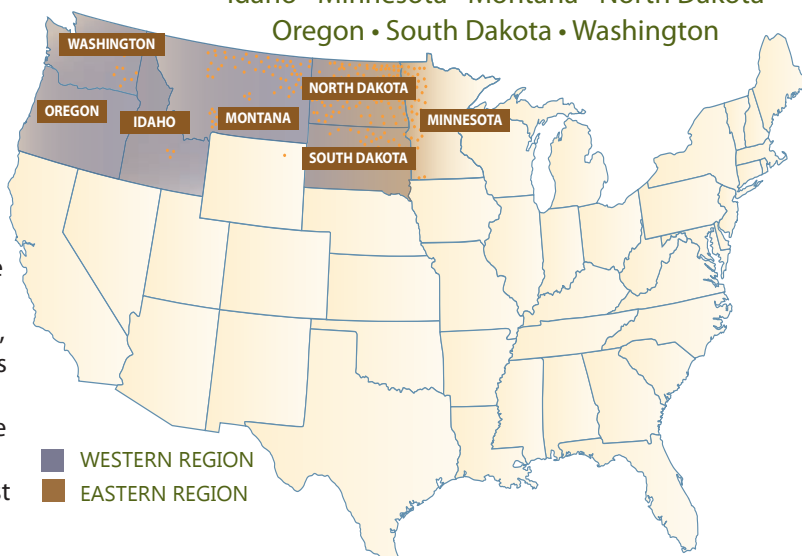
Average moisture is 12.6%, up slightly from 2013 and the 5-year average. Some isolated areas have lower falling number values due to the wet harvest conditions but the crop remains sound overall with 84% in the West and 95% in the East above 300 seconds. The West averages 318 sec compared to 402 sec in 2013, while the East averages 357 sec compared to 400 sec.

Flour and Baking Data: Average Buhler Lab Mill extraction of 66.1% is notably lower than 2013's 69.5%. Greater variability in some crop parameters along with some reduction in test weight and TKW are likely contributing factors. The lab mill is not adjusted to optimize flour yields. Flour ash of 0.45% is lower than 0.53% in 2013. Average wet gluten is 31.9%, lower than 2013's 35.3%. Amylograph viscosity is lower than 2013 and the 5-year average with a sharper drop across the West, paralleling the lower falling number values.

Dough evaluation shows weaker characteristics on the farinograph but somewhat stronger characteristics on the alveograph and extensograph compared with 2013. The Overall farinograph stability of 9.4 min compares with 10.5 min in 2013 with no significant difference between the West and East regions. Stability times are higher at higher protein levels in the East, but the longest stability times are in the lowest protein segment in the West. Absorption of 62.2% is similar to the 2013 crop but lower than the 5-year average.

SEVEN STATES SURVEYED

Idaho • Minnesota • Montana • North Dakota
Oregon • South Dakota • Washington



Average Overall extensograph resistance on the 45-minute pull is 445 BU, higher than 2013 and the 5-year average with similar extensibility. Alveograph W value is 392 and P/L ratio is 0.99, compared with 345 and 0.75, respectively, in 2013.

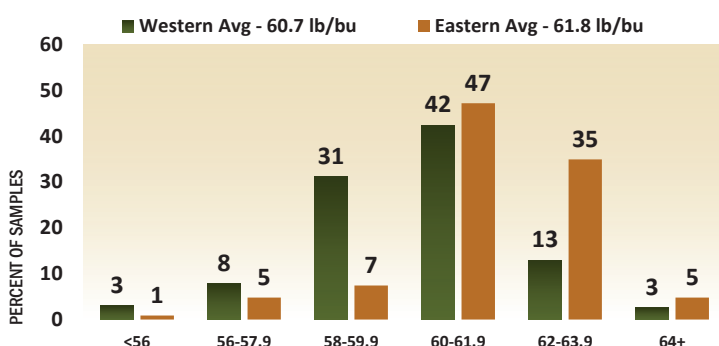
Baking quality shows improved bake absorption with similar bread scores and loaf volumes compared with 2013. The crop in the West shows higher absorption and loaf volumes compared to the East, but absorption, bread scores and loaf volume all tend to increase with protein level in the East.

Summary. The 2014 HRS crop is large with a high grade profile and generally similar functional quality to 2013.

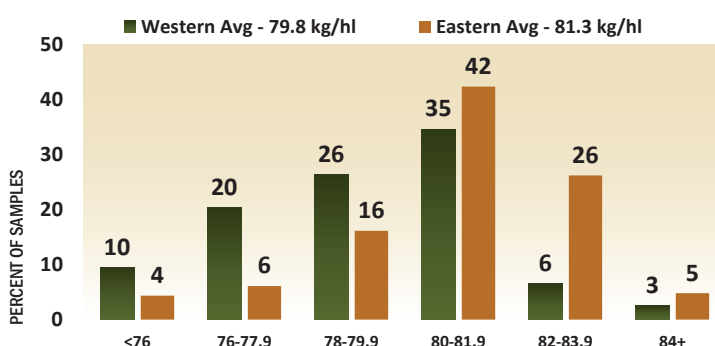
Protein and vitreous kernels will be premium pricing factors due to lower than average values and distributions for both. DON and lower falling numbers affected some areas but are not significant in the overall crop averages. Functional performance tends to improve with higher protein segments, though buyers may find good value opportunities in lower protein segments due to wide spreads in market pricing. Because of the quality variability this year, diligent contract specifications for DON, DHV and falling number are encouraged to ensure buyers get the quality they demand.

Continued on next page

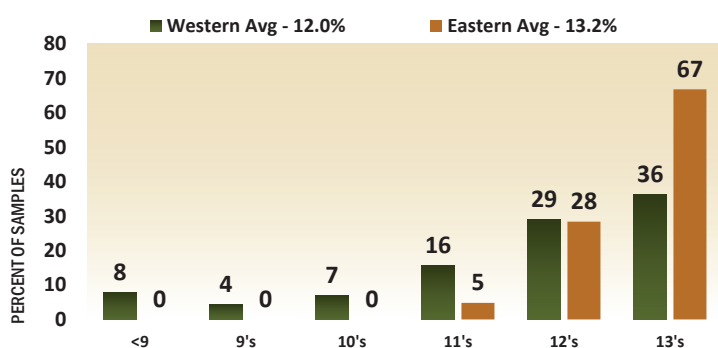
TEST WEIGHT | Pounds/Bushel



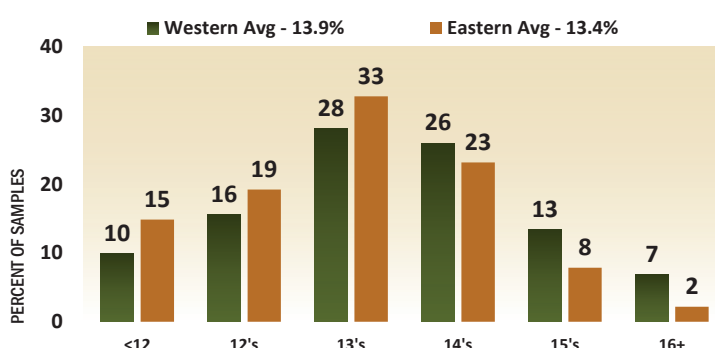
HECTOLITER WEIGHT | Kilograms/Hectoliter



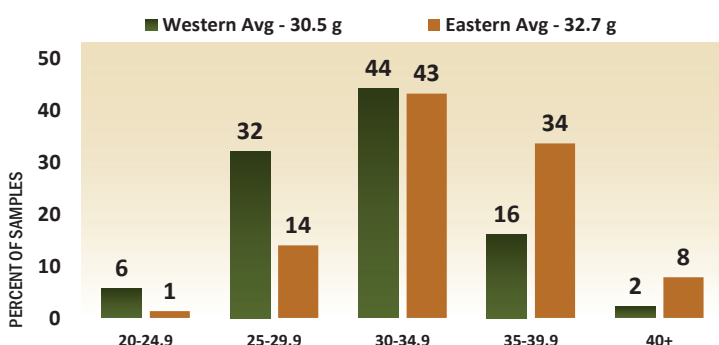
WHEAT MOISTURE | Percent



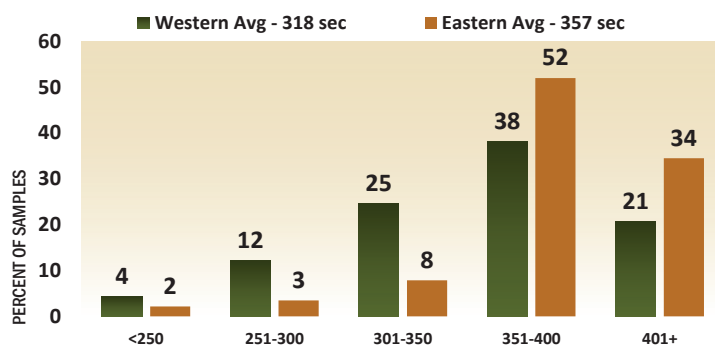
PROTEIN (12% MB) | Percent



1000 KERNEL WEIGHT | Grams



FALLING NUMBER | Seconds



HARD RED SPRING | HARVEST DATA

EXPORT CARGO SURVEY

The export cargo data represents 344 individual subplot samples provided by USDA's Federal Grain Inspection Service for crop years 2013 (collected from October 2013 through June 2014) and 2012. Of 156 2013-crop samples, 133 were from PNW and 23 from Gulf ports. Grade data are the official grades on the individual subplots. Milling and baking analyses were conducted by North Dakota State University.



Hard Red Spring	Composite Average					
	2014 By Protein				2013	5-year
	Low	Med	High	Overall	Overall	Average
Wheat Grade Data:						
Test Weight (lb/bu)	61.2	61.6	60.8	61.2	62.5	61.5
(kg/hl)	80.5	81.0	80.0	80.5	82.2	80.9
Damaged Kernels (%)	0.3	0.2	0.3	0.2	0.0	0.1
Foreign Material (%)	0.0	0.0	0.0	0.0	0.0	0.0
Shrunken & Broken (%)	0.7	0.6	0.7	0.7	0.9	1.2
Total Defects (%)	0.9	0.8	0.9	0.9	0.9	1.3
Vitreous Kernels (%)	37	67	47	48	71	73
Grade	1 NS	1 NS	1 NS	1 NS	1 NS	1 NS
Wheat Non-Grade Data:						
Dockage (%)	0.5	0.6	0.6	0.6	0.6	0.7
Moisture (%)	12.9	12.7	12.0	12.6	12.2	12.2
Protein (%) 12%/0% moisture basis	12.7/14.5	14.0/15.9	15.2/17.3	13.6/15.5	13.6/15.5	14.0/15.9
Ash (%) 14%/0% moisture basis	1.47/1.71	1.48/1.72	1.46/1.70	1.47/1.71	1.53/1.78	1.58/1.84
1000 Kernel Weight (g)	31.6	33.0	30.0	31.6	32.4	30.7
Kernel Size (%) lg/md/sm	56/42/2	57/41/1	48/49/3	54/43/2	53/45/2	45/51/3
Single Kernel: Hardness	78.5	80.6	83.2	80.2	83.9	81.6
Weight (mg)	30.7	31.9	30.0	30.9	35.3	33.5
Diameter (mm)	2.31	2.37	2.32	2.33	2.49	2.56
Sedimentation (cc)	62.7	67.0	70.7	65.8	57.8	59.2
Falling Number (sec)	344	327	336	337	401	390
DON (ppm)	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Flour Data:						
Lab Mill Extraction (%)	66.9	66.2	64.2	66.1	69.5	69.1
Color: L*	90.8	90.6	90.5	90.7	90.9	90.7
a*	-1.1	-1.1	-1.1	-1.1	-1.0	-1.0
b*	9.2	9.5	9.7	9.4	9.5	9.3
Protein (%) 14%/0% moisture basis	11.5/13.3	12.7/14.8	13.8/16.1	12.4/14.4	12.6/14.7	12.9/15.0
Ash (%) 14%/0% moisture basis	0.47/0.54	0.43/0.50	0.45/0.52	0.45/0.53	0.53/0.62	0.52/0.61
Wet Gluten (%)	28.5	32.8	37.8	31.9	35.3	35.1
Gluten Index	99	99	96	98	95	92
Falling Number (sec)	372	364	362	367	411	403
Amylograph Viscosity: 65g (BU)	562	458	470	511	587	616
100g (BU)	2075	1676	1543	1836	2170	2322
Starch Damage (%)	7.6	7.6	6.8	7.4	7.2	7.7
Dough Properties:						
Farinograph:						
Peak Time (min)	5.7	6.6	7.6	6.4	7.5	6.8
Stability (min)	9.4	9.3	9.7	9.4	10.5	11.2
Absorption (%)	60.9	62.6	64.2	62.2	62.8	64.8
Classification	4.0	4.0	4.0	4.0	4.2	5.1
Alveograph: P (mm)	104	105	111	106	89	95
L (mm)	98	113	117	107	117	115
P/L Ratio	1.06	0.92	0.94	0.99	0.76	0.83
W (10 ⁻⁴ joules)	361	409	437	392	345	364
Extensograph: Resistance (BU)	480/733	431/791	391/799	445/765	422/633	420/566
(45/135 min) Extensibility (cm)	16.8/13.8	17.2/14.1	16.1/12.4	16.7/13.5	16.8/15.4	17.4/16.4
Area (sq cm)	104/131	97/146	81/134	96/136	93/126	96/118
Baking Evaluation:						
Absorption (%)	66.2	68.1	69.7	67.6	67.0	64.4
Crumb Grain and Texture	7.2	8.0	8.2	7.7	7.9	8.3
Loaf Volume (cc)	898	951	1027	944	962	960
% Area Production:						
	48	28	24	100		

2014 Protein Range: Low, less than 13.5%; Med, 13.5 - 14.5%; High, 14.5% or greater

Western Regional Average						Eastern Regional Average					
2014 By Protein				2013	5-year	2014 By Protein				2013	5-year
Low	Med	High	Overall	Overall	Average	Low	Med	High	Overall	Overall	Average
60.4	61.2	60.5	60.7	62.1	61.4	61.8	62.0	61.5	61.8	63.0	61.6
79.5	80.5	79.6	79.8	81.7	80.7	81.3	81.5	80.9	81.3	82.8	81.0
0.2	0.0	0.4	0.2	0.0	0.0	0.3	0.4	0.0	0.3	0.0	0.1
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.2	0.9	0.8	1.0	1.0	1.4	0.3	0.4	0.4	0.3	0.7	1.0
1.4	0.9	1.2	1.2	1.0	1.5	0.6	0.8	0.4	0.6	0.7	1.1
32	68	50	48	70	80	41	67	40	48	72	67
1 NS	1 NS	1 NS	1 NS	1 NS	1 DNS	1 NS	1 NS	1 NS	1 NS	1 NS	1 NS
0.6	0.7	0.6	0.6	0.7	0.7	0.5	0.5	0.5	0.5	0.5	0.7
12.4	12.1	11.5	12.0	11.5	11.6	13.2	13.2	13.1	13.2	12.9	12.7
12.6/14.3	13.9/15.8	15.4/17.5	13.9/15.7	13.7/15.6	14.2/16.1	12.7/14.4	14.0/15.9	14.9/16.9	13.4/15.2	13.4/15.2	13.8/15.7
1.45/1.69	1.44/1.68	1.43/1.67	1.44/1.68	1.56/1.81	1.55/1.80	1.48/1.72	1.52/1.77	1.53/1.78	1.50/1.74	1.50/1.74	1.60/1.87
30.5	32.2	29.2	30.5	31.6	30.3	32.4	33.7	31.7	32.7	33.2	31.1
45/52/3	52/46/2	44/53/3	47/51/3	47/50/3	40/56/4	64/34/2	62/37/1	58/40/2	62/36/2	58/40/2	50/47/3
82.5	80.9	84.4	82.7	82.2	80.3	75.4	80.4	80.6	77.7	85.7	82.8
33.1	32.5	29.6	31.8	34.3	32.9	28.9	31.2	30.9	29.9	36.3	34.0
2.48	2.45	2.33	2.42	2.43	2.51	2.18	2.30	2.28	2.23	2.56	2.60
65.0	68.0	71.3	67.8	60.3	61.7	61.0	66.0	69.3	63.7	55.2	57.2
319	298	334	318	402	385	363	355	341	357	400	393
< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5
66.2	66.0	63.9	65.4	69.1	68.3	67.5	66.4	64.8	66.8	69.8	69.8
91.0	90.7	90.5	90.8	91.0	90.8	90.6	90.6	90.5	90.6	90.9	90.6
-1.3	-1.1	-1.1	-1.2	-1.1	-1.1	-1.0	-1.0	-1.1	-1.0	-1.0	-0.9
9.5	9.5	9.7	9.6	9.6	9.5	8.9	9.5	9.7	9.2	9.3	9.2
11.5/13.4	12.8/14.9	14.0/16.3	12.7/14.7	12.9/15.0	13.1/15.3	11.4/13.3	12.6/14.7	13.4/15.6	12.1/14.1	12.3/14.3	12.8/14.9
0.45/0.52	0.42/0.49	0.47/0.54	0.45/0.52	0.53/0.62	0.50/0.58	0.48/0.56	0.44/0.51	0.41/0.48	0.46/0.53	0.53/0.61	0.54/0.63
29.3	32.4	38.8	33.2	36.2	35.8	27.8	33.3	35.6	30.6	34.4	34.5
98	99	97	98	95	90	99	98	96	98	96	93
364	353	357	358	416	411	379	376	374	377	406	397
549	416	456	483	560	653	572	499	499	540	615	588
2003	1492	1422	1677	2018	2411	2129	1859	1802	2001	2328	2264
7.2	7.5	6.6	7.1	7.2	7.4	7.9	7.8	7.0	7.7	7.2	7.8
5.9	6.8	8.2	6.8	8.3	7.4	5.7	6.4	6.4	6.0	6.6	6.2
9.8	8.8	9.3	9.3	10.6	11.3	9.1	9.7	10.8	9.5	10.4	11.1
60.3	62.3	64.4	62.1	63.3	65.1	61.4	63.0	63.8	62.2	62.3	64.6
4.0	4.0	4.0	4.0	4.3	5.2	4.0	4.0	4.0	4.0	4.2	5.0
105	100	112	106	90	97	103	109	108	106	89	94
93	114	119	107	123	118	101	113	114	106	111	112
1.13	0.88	0.94	0.99	0.73	0.82	1.02	0.96	0.95	0.99	0.80	0.84
348	391	443	390	359	377	370	427	423	395	330	353
480/712	410/727	372/797	426/743	425/669	431/577	480/749	452/854	431/803	464/788	419/596	412/555
17.4/14.1	17.5/13.9	16.3/12.5	17.1/13.5	17.0/15.6	17.6/16.6	16.3/13.5	17.0/14.2	15.6/12.3	16.4/13.5	16.5/15.3	17.2/16.2
109/126	93/132	78/136	95/131	95/134	100/123	101/134	100/159	86/129	98/140	91/117	94/115
66.0	68.3	70.4	68.1	67.5	64.8	66.4	67.8	68.2	67.1	66.5	64.1
7.5	8.5	8.0	7.9	7.6	8.2	7.0	7.5	8.5	7.4	8.2	8.4
898	978	1050	968	961	958	898	925	978	918	963	961
21	14	16	51			27	14	8	49		

2014 Protein Range: Low, less than 13.5%; Med, 13.5 - 14.5%; High, 14.5% or greater

HARD RED SPRING | EXPORT CARGO DATA

Hard Red Spring	PNW Average		Great Lakes Average		Gulf Average	
	2013	2012	2013	2012	2013	2012
Wheat Grade Data:						
Test Weight (lb/bu)	62.3	61.9	61.5	61.5	62.7	61.5
(kg/hl)	82.0	81.4	80.8	80.8	82.4	80.8
Damaged Kernels (%)	0.3	0.2	0.7	0.7	0.8	1.0
Foreign Material (%)	0.1	0.1	0.0	0.1	0.1	0.1
Shrunken & Broken (%)	1.0	1.6	1.3	0.8	0.8	1.2
Total Defects (%)	1.3	1.9	2.1	1.7	1.7	2.3
Vitreous Kernels (%)	74	84	47	60	60	54
Grade	1 NS	1 DNS	1 NS	1 NS	1 NS	1 NS
Wheat Non-Grade Data:						
Dockage (%)	0.3	0.3	0.6	0.5	0.5	0.6
Moisture (%)	11.5	10.8	12.5	12.4	12.4	12.6
Protein (%) 12%/0% moisture basis	13.9/15.8	14.3/16.2	14.3/16.3	13.5/15.3	13.5/15.3	14.2/16.1
Ash (%) 14%/0% moisture basis	1.54/1.79	1.56/1.82	1.53/1.78	1.50/1.74	1.50/1.74	1.58/1.84
1000 Kernel Weight (g)	32.4	30.0	30.3	33.7	33.7	30.6
Kernel Size (%) lg/md/sm	48/48/5	34/60/5	43/53/4	60/38/2	60/38/2	44/52/4
Single Kernel: Hardness		81.3	81.4			81.6
Weight (mg)		29.3	29.7			29.7
Diameter (mm)		2.61	2.69			2.66
Sedimentation (cc)						
Falling Number (sec)	401	469	440	401	401	465
DON (ppm)		0.2	0.9			0.4
Flour Data:						
Lab Mill Extraction (%)	71.1	70.9	71.3	71.6	71.6	71.2
Color: L*	90.1	90.3	89.9	90.0	90.0	90.1
a*	-1.0	-0.9	-0.9	-0.9	-0.9	-0.9
b*	9.4	9.4	9.1	9.2	9.2	9.4
Protein (%) 14%/0% moisture basis	13.2/15.3	13.5/15.6	13.6/15.8	12.7/14.8	12.7/14.8	13.4/15.6
Ash (%) 14%/0% moisture basis	0.56/0.66	0.56/0.65	0.53/0.61	0.57/0.66	0.57/0.66	0.56/0.65
Wet Gluten (%)	35.1	34.8	33.4	33.1	33.1	34.7
Gluten Index	92	92	97	95	95	92
Falling Number (sec)	441	529	489	421	421	502
Amylograph Viscosity: 65g (BU)	565	693	683	562	562	640
100g (BU)						
Starch Damage (%)						
Dough Properties:						
Farinograph:						
Peak Time (min)	6.8	7.2	7.3	6.6	6.6	7.5
Stability (min)	8.2	8.8	10.1	9.0	9.0	10.7
Absorption (%)	63.2	62.7	62.0	62.6	62.6	61.5
Classification	3.9	4.4	4.8	4.0	4.0	4.8
Alveograph: P (mm)	87	86	90	88	88	83
L (mm)	125	123	125	114	114	121
P/L Ratio	0.70	0.70	0.72	0.77	0.77	0.69
W (10 ⁻⁴ joules)	335	338	381	320	320	337
Extensograph: Resistance (BU)						
(45/135 min) Extensibility (cm)						
Area (sq cm)						
Baking Evaluation:						
Absorption (%)	71.2	64.2	63.3	70.7	70.7	62.9
Crumb Grain and Texture	7.9	8.3	8.3	8.0	8.0	8.2
Loaf Volume (cc)	906	939	934	902	902	925
Sample Count:	133	156	4	23	23	28

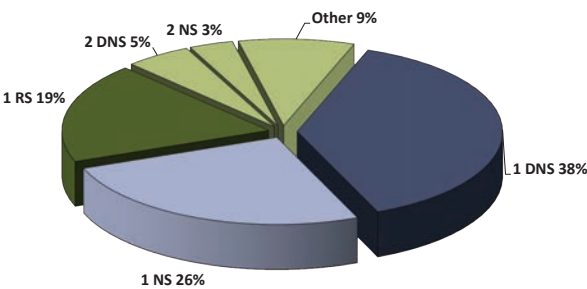
*No 2013 samples were collected from the Great Lakes

Hard Red Spring Production
for the major producing states (million metric tons)

	2014	2013	2012	2011	2010
Idaho	0.4	0.5	0.5	0.6	0.7
Minnesota	1.8	1.8	2.0	1.9	2.3
Montana	2.9	2.8	2.6	2.1	2.8
North Dakota	8.0	6.4	7.0	4.7	7.8
Oregon	0.0	0.1	0.1	0.1	0.1
South Dakota	2.0	1.4	1.1	1.0	1.6
Washington	0.2	0.3	0.4	0.5	0.4
Seven-State Total	15.3	13.3	13.7	11.0	15.8
Total HRS Production	15.3	13.4	13.7	11.0	15.8

Based on USDA crop estimates of September 30, 2014.

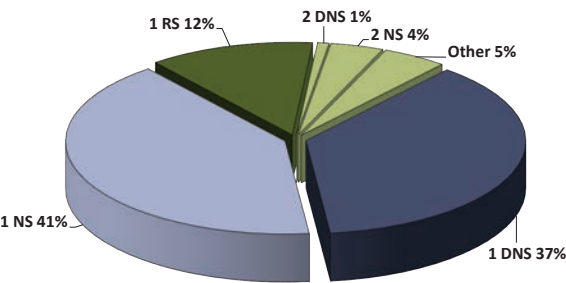
WESTERN REGION



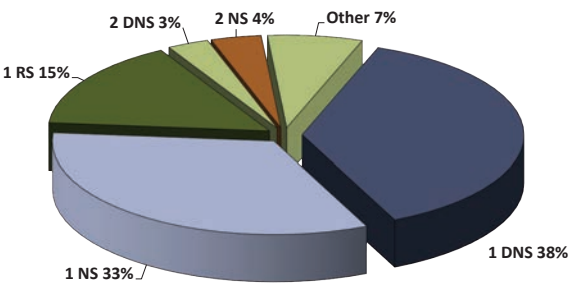
ABOUT HARD RED
SPRING WHEAT

Highest protein content, hard endosperm, red bran, strong gluten, high water absorption. Used in pan breads, hearth breads, rolls, croissants, bagels, hamburger buns, pizza crust and for blending.

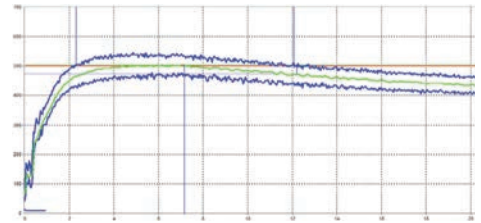
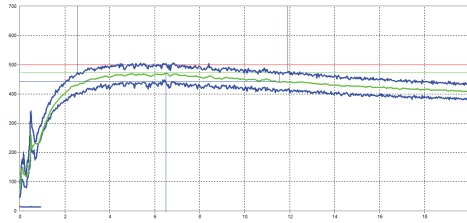
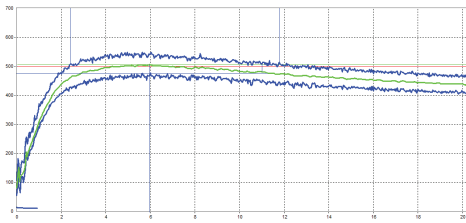
EASTERN REGION



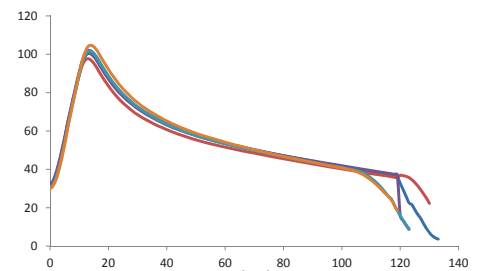
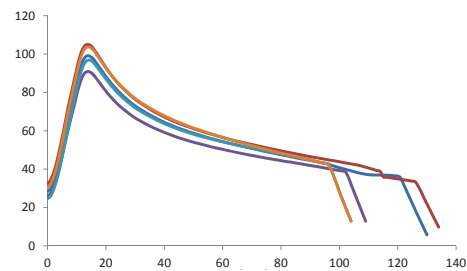
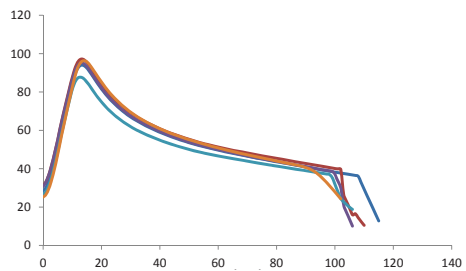
OVERALL



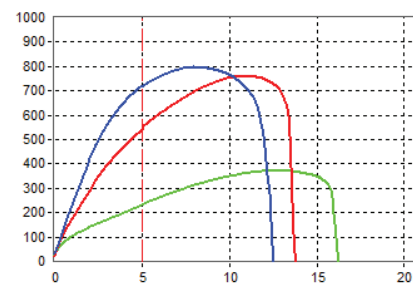
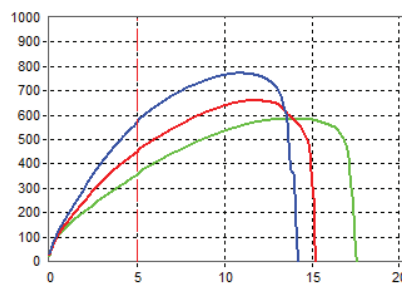
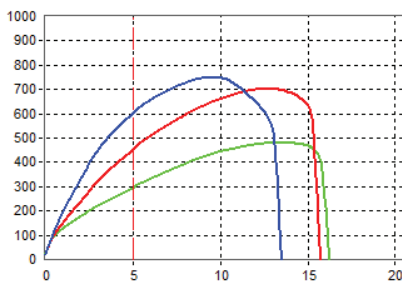
FARINOGRAMS*



ALVEOGRAMS



EXTENSOGRAMS



LOW PROTEIN

MEDIUM PROTEIN

HIGH PROTEIN

*Representing 2014 Composite Average



HARVEST SURVEY

Hard white wheat (HW) for the 2014 crop was primarily grown in Idaho, Colorado, Kansas, California, Washington, and Nebraska. Other states such as Montana, North Dakota, and South Dakota had limited production. U.S. Wheat Associates estimates HW production for the 2014/15 marketing year at 534,000 MT, down from 2013/14's 589,000 MT (USDA).

Survey Methods: Samples were collected by state and private grain inspection agencies; commercial wheat handlers; Plains Grains, Inc. (Stillwater, OK); South Dakota State University and a number of state wheat commissions. The samples represent diverse growing conditions across the country. Wheat grading was conducted by the Federal Grain Inspection Service (FGIS), Portland, Oregon. All other tests were conducted by the Wheat Marketing Center (WMC), Portland, Oregon.

HW samples were made into eight composites based on the four growing regions sampled (Pacific Northwest or PNW, California, Southern Plains, and Northern Plains) and four protein levels (less than 11.5%, 11.5 – 12.5%, 12.6 – 13.5%, and greater than 13.5%). Wheat, flour and end-product methods are described in the Analysis Methods section of this booklet.

Wheat and Grade Data: The grade for all samples except the PNW very-high protein composite is US No. 1 with test weights from 61.3 to 64.8 lb/bu (80.6 to 85.1 kg/hl). The grade of the PNW very-high protein composite is US No. 2 because the test weight is 59.0 lb/bu (77.6 kg/hl). Wheat moisture contents are in the range of 8.3-11.8%, wheat proteins are 11.4-15.8% (12% mb), and ash contents range from 1.41 to 1.65% (14% mb). The thousand kernel weights (TKW) of the PNW low- and medium-protein and California medium-protein composites are 33 g or higher, while the TKW values of other composites are less than 30 g. Kernel diameters range from 2.46 to 2.99 mm. Falling number values are 339 sec or higher for all composites, indicating sound grain.

Flour, Dough and Baking Data: Buhler laboratory mill straight-grade flour extractions range from 62.4 to 68.4%, whiteness (L^*) values are from 91.5 to 91.9, flour protein contents are 10.5-15.3% (14% mb), and flour ash contents vary from 0.40 to 0.49% (14% mb). These values are typical of HW flours.

Flour wet gluten contents range from 25.2 to 45.7% depending on flour protein content. Amylograph peak viscosities are between 690 and 1103 BU, which show good starch pasting properties. Starch damage values are in the range of 5.2 to 7.1%. Lactic acid SRC values are 138% or higher, indicating strong gluten strength for bread baking.

Farinograph absorptions range from 59.2 to 66.3%, and stability times are 10.7-20.8 min, exhibiting typically medium to strong dough characteristics of HW wheat. HW

farinograph water absorption is usually similar to that of HRW, but stability time is longer indicating more tolerance to overmixing. The ranges of alveograph values are: 40-117 mm for P values; 94-186 mm for L values; and 204-425 10^{-4} J for W values. Extensograph data at 135-minute resting show that maximum resistance is in the range of 510-867 BU, extensibility from 13.9-20 cm, and area from 95-170 cm^2 .

All samples show very good baking performance relative to protein content, with the bake absorptions in the range of 64.8-72.5%, loaf volume from 794 to 904 cc, and crumb grain and texture scores of 6.8-8.0 points.

Noodle Evaluation: HW flours and a control flour were evaluated for both Chinese raw noodles (white salted) and Chinese wet noodles (yellow alkaline). For Chinese raw noodles, the L^* values (lightness) at 0 hr of production are acceptable for most samples; however, the L^* values after 24 hr of storage at room temperature are acceptable (72 or higher) for the PNW low- and medium-protein, California medium-protein, and Southern Plains medium-protein composites, while other composites showed either lower L^* values or greater discoloration than desired (maximum 10 units). Sensory color stability scores are acceptable for PNW medium-protein and California medium-protein composites. Cooked noodle texture is acceptable for all samples (a minimum of 1200 g is considered acceptable). For Chinese wet noodles, sensory color stability scores are acceptable for most samples except the PNW very-high protein, Southern Plains high-protein, and Northern Plains high-protein composites. The cooked noodle texture values of all Chinese wet noodles are acceptable.

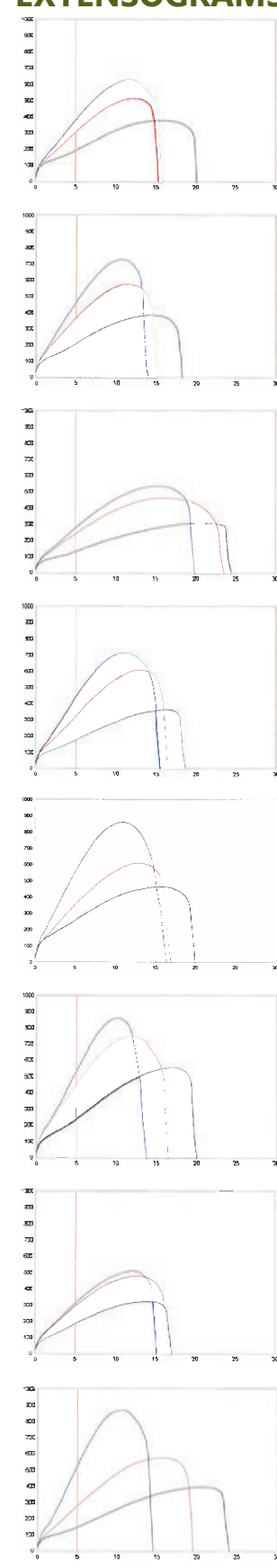
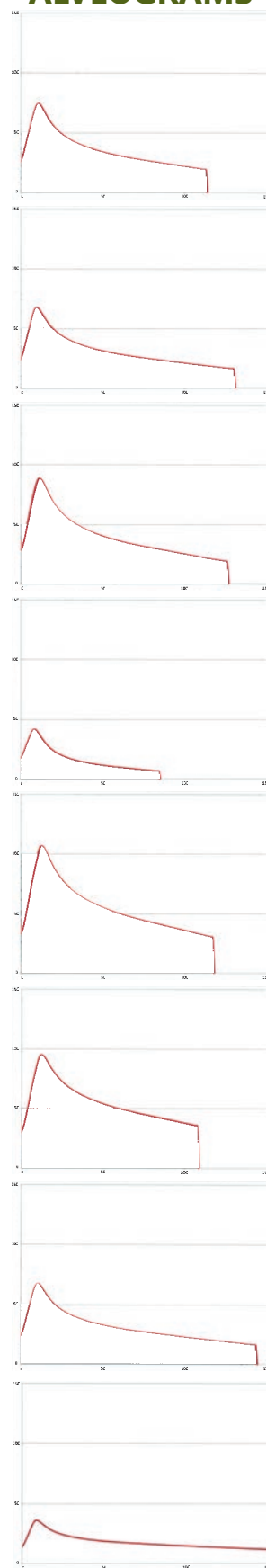
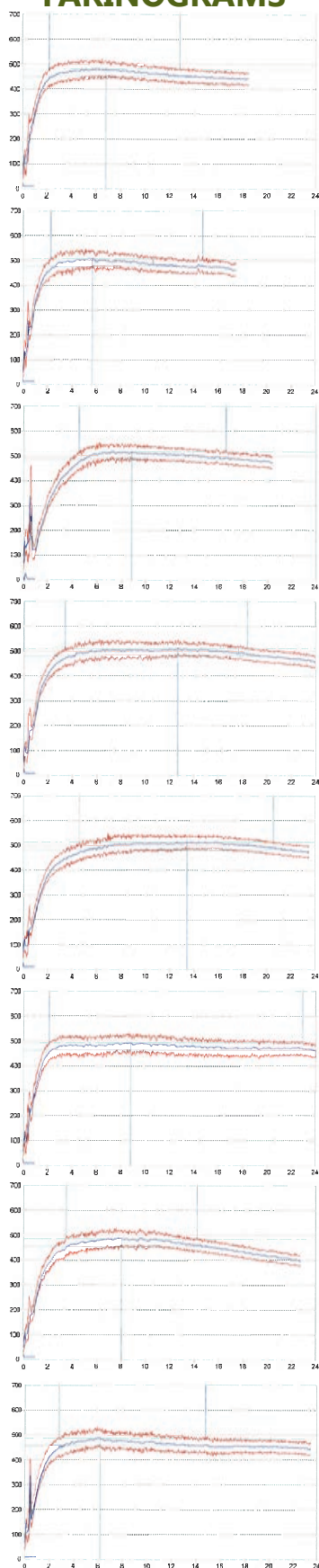
Overall, this year's HW samples have acceptable noodle quality when the wheat protein is below 13.5%. It is recommended to use about 60% extraction flour to further improve noodle color with this year's HW crop.

Steamed Bread Evaluation: HW flours were evaluated for Asian steamed breads in comparison with a control flour. Results show that most samples are acceptable for steamed breads except the PNW very high-protein and California medium-protein composites, the specific volumes and total product scores of which are low. Blending 20-30% of SW flour with HW flour would improve overall steamed bread quality.

Summary: HW 2014 production is estimated slightly lower than last year. This year's samples show good quality performance in milling, dough rheological properties and end products, including pan breads, Asian noodles and steamed breads. For Asian noodle applications, it is recommended to use 60% extraction patent flour to improve noodle color while maintaining good noodle texture. In the manufacturing of steamed breads, it is recommended that very-high or high protein HW flour be blended with soft white flour to avoid shrinkage and improve product quality.

EXTENSOGRAMS

NORTHERN PLAINS HIGH



Hard White	Pacific Northwest			California		Southern Plains		Northern Plains
	Low	Medium	Very High	Medium	Very High	Medium	High	High
Wheat Grade Data:								
Test Weight (lb/bu)	62.2	61.7	59.0	64.8	62.2	61.5	62.1	61.3
(kg/hl)	81.8	81.1	77.6	85.1	81.8	80.9	81.7	80.6
Damaged Kernels (%)	0.0	0.0	0.0	0.1	0.0	0.6	0.4	0.0
Foreign Material (%)	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.2
Shrunken & Broken (%)	0.7	0.8	1.9	0.4	0.8	0.5	0.5	0.3
Total Defects (%)	0.7	0.9	2.0	0.6	0.9	1.1	0.9	0.5
Grade	1 HW	1 HW	2 HW	1 HW	1 HW	1 HW	1 HW	1 HW
Wheat Non-Grade Data:								
Dockage (%)	0.5	1.0	0.6	0.1	0.4	0.3	0.4	0.3
Moisture (%)	10.6	11.0	9.9	8.3	9.0	10.6	11.4	11.8
Protein (%) 12%/0% moisture basis	11.4/13.0	12.4/14.1	15.8/18.0	12.4/14.1	14.3/16.2	12.1/13.7	13.3/15.1	12.9/14.7
Ash (%) 14%/0% moisture basis	1.51/1.75	1.56/1.81	1.47/1.71	1.51/1.76	1.65/1.92	1.48/1.72	1.41/1.64	1.56/1.81
1000 Kernel Weight (g)	33.7	33.2	25.1	36.0	29.9	28.9	27.8	29.3
Kernel Size (%) lg/md/sm	82/18/0	77/22/1	43/55/2	89/11/0	76/23/1	70/30/0	57/43/0	77/23/0
Single Kernel: Hardness	66.2	65.4	67.9	73.0	74.4	67.7	62.5	58.9
Weight (mg)	37.4	39.0	28.9	41.0	35.8	33.0	30.8	31.3
Diameter (mm)	2.75	2.77	2.46	2.99	2.75	2.69	2.61	2.64
Sedimentation (cc)	34.0	35.0	53.6	39.6	41.7	39.1	42.0	48.5
Falling Number (sec)	395	394	403	339	407	424	403	420
Flour Data:								
Lab Mill Extraction (%)	63.9	63.9	64.9	64.1	62.7	68.4	63.6	62.4
Color: L*	91.7	91.9	91.2	91.6	91.5	91.5	91.8	91.7
a*	-2.0	-2.0	-2.0	-2.0	-2.0	-2.5	-2.3	-2.1
b*	7.4	7.3	8.3	7.3	7.8	8.9	7.9	7.6
Protein (%) 14%/0% moisture basis	10.5/12.2	11.0/12.8	15.3/17.8	11.7/13.6	13.3/15.4	11.2/13.0	12.0/14.0	11.7/13.7
Ash (%) 14%/0% moisture basis	0.49/0.58	0.49/0.57	0.47/0.55	0.41/0.47	0.46/0.53	0.46/0.54	0.45/0.52	0.40/0.46
Wet Gluten (%)	25.2	32.9	45.7	33.0	37.0	27.6	33.4	33.0
Gluten Index	97	86	70	92	92	96	86	96
Falling Number (sec)	408	400	424	421	453	435	486	370
Amylograph Viscosity 65 g (BU)	910	893	1103	690	812	790	990	882
Starch Damage (%)	6.7	6.7	5.2	6.5	7.1	6.4	5.9	5.4
Solvent Retention Capacity (%)								
Water/50% Sucrose	64/109	64/114	65/120	65/116	69/122	59/119	68/116	60/110
5% Lactic Acid/5% Na ₂ CO ₃	138/89	142/90	150/90	144/93	144/95	159/89	155/84	159/73
Dough Properties:								
Farinograph:								
Peak Time (min)	6.8	5.7	8.9	12.7	13.5	8.8	8.0	6.2
Stability (min)	10.7	12.5	12.1	15.0	16.0	20.8	10.8	12.0
Absorption (%)	60.5	61.6	67.6	64.9	66.3	61.7	62.3	59.2
Alveograph: P (mm)	82	74	97	113	117	105	74	40
L (mm)	113	131	126	94	118	108	143	186
P/L Ratio	0.73	0.56	0.77	1.20	0.99	0.97	0.52	0.22
W (10 ⁻⁴ joules)	265	263	332	337	425	390	290	204
Extensograph: Resistance (BU)	377/624	383/726	307/536	361/706	464/860	551/861	323/510	395/867
(45/135 min) Extensibility (cm)	20.3/15.9	18.4/13.9	24.5/20.0	18.8/15.6	20.1/16.4	20.0/13.9	17.1/15.3	24.0/14.6
Area (sq cm)	98/121	89/120	94/134	82/133	120/170	130/136	70/95	112/148
Baking Evaluation:								
Bake Absorption (%)	66.7	67.6	72.5	70.6	72.3	68.2	69.2	64.8
Crumb Grain and Texture	7.8	7.0	7.0	6.8	7.0	7.8	7.0	8.0
Loaf Volume (cc)	794	784	831	834	871	829	836	904

2014 Protein Range: Low, less than 11.5%; Medium, 11.5 to 12.5%; High, 12.6 to 13.5%; Very High, greater than 13.5%.

Hard White	Pacific Northwest			California		Southern Plains		Northern Plains
	Low	Medium	Very High	Medium	Very High	Medium	High	High
Chinese Raw Noodle-Making Quality:								
Color at 0/24 hour: L*	84.1/72.1	84.1/72.3	80.7/66.8	83.7/73.6	80.7/69.0	84.0/71.2	81.7/68.1	80.0/69.6
a*	0.4/1.0	0.4/1.0	0.8/1.8	0.1/0.6	0.5/1.1	-0.1/0.5	0.1/1.0	0.5/1.2
b*	16.5/20.1	16.6/20.0	20.2/23.2	16.9/21.4	20.3/23.4	16.7/23.1	18.6/24.3	19.9/22.9
Change in L* (0-24 hr)	12.0	11.8	13.9	10.1	11.6	12.8	13.5	10.4
Cooking Yield (5 min, %)	117	110	111	112	112	111	116	122
Sensory Color Stability Score	6.0	6.5	5.0	7.0	6.0	6.0	6.0	6.0
Instrumental Texture:								
Firmness (g)	1234	1286	1414	1193	1333	1284	1305	1215
Springiness (%)	93.9	94.5	94.1	93.9	93.6	92.8	93.6	93.6
Cohesiveness	0.62	0.62	0.64	0.65	0.65	0.63	0.65	0.61
Chewiness (g)	719	756	853	732	805	752	799	687
Chinese Wet Noodle-Making Quality:								
Uncooked Color at 0/24 hour: L*	80.3/67.2	78.9/66.1	75.8/61.3	80.8/69.1	78.2/64.8	79.8/67.0	78.8/64.6	77.3/66.5
a*	-1.6/-0.2	-1.6/-0.3	-1.4/-0.2	-1.5/-0.8	-1.6/-0.6	-1.8/-0.4	-1.6/-0.1	-1.0/0.3
b*	20.4/22.6	20.9/20.9	23.4/21.1	20.0/21.7	22.2/22.2	20.9/22.6	20.8/23.2	21.7/22.7
Change in L* (0-24 hr)	13.1	12.8	14.5	11.7	13.4	12.8	14.2	10.8
Parboiled Color at 0/24 hour: L*	76.7/77.3	77.5/78.2	76.5/76.8	77.7/78.8	76.3/76.6	76.4/76.6	77.0/77.4	75.9/76.2
a*	-1.9/-2.7	-2.0/-2.6	-1.2/-2.2	-2.5/-2.8	-1.7/-2.5	-2.1/-2.8	-2.3/-2.7	-2.0/-2.1
b*	28.7/27.1	27.4/25.7	27.3/25.4	26.4/25.3	27.4/25.9	30.4/29.0	28.8/27.6	26.0/25.3
Cooking Yield (1.5 min, %)	62	61	61	62	62	61	59	58
Uncooked Color Stability Score	6.3	6.3	5.5	6.7	6.0	6.3	6.0	6.0
Parboiled Color Stability Score	6.3	6.7	6.3	7.0	6.5	6.0	6.0	6.0
Instrumental Texture:								
Firmness (g)	899	950	1149	929	947	942	909	1087
Springiness (%)	94.2	93.0	96.2	95.0	94.1	89.6	88.8	95.0
Cohesiveness	0.58	0.57	0.60	0.57	0.59	0.53	0.58	0.57
Chewiness (g)	488	502	665	506	524	449	470	583
Asian-Type Steamed Bread Evaluation:								
Specific Volume (ml/g)	2.8	2.8	2.2	2.4	3.1	3.0	3.2	3.4
Total Score	66.0	64.3	58.9	63.0	69.2	70.7	68.1	68.7

2014 Protein Range: Low, less than 11.5%; Medium, 11.5 to 12.5%; High, 12.6 to 13.5%; Very High, greater than 13.5%.

ABOUT HARD WHITE WHEAT

Medium to high protein content, hard endosperm, white bran. Used in Asian noodles, whole wheat or high extraction flour applications, pan breads and flat breads.



NORTHERN GREAT PLAINS

Weather and Harvest: Planting was delayed until mid-May, about three weeks later than normal due to a longer, colder winter than average and excess soil moisture. Progress remained slow and planting was completed in the last half of June. Final planted area fell below initial expectations.

Crop emergence was slow due to cool soils but early growing conditions were favorable. Ample soil moisture and cool temperatures promoted excellent yield potential, although crop maturity was delayed. Excess soil moisture and relatively high humidity throughout the growing season heightened disease pressures, which had a broader than normal impact.

Harvest began in mid-August, about two weeks later than normal and remained slow into mid-September due to periods of above-average rain and delayed crop maturity. The most significant harvest progress was made in late September, and harvest was not complete until the last half of October.

Survey Methods: Fewer samples than targeted were collected because of the harvest delays and the survey does not represent the final 15% that remained to be harvested. State offices of the National Agricultural Statistics Service collected 185 samples (136 from North Dakota and 49 from Montana) from producers in the field, from farm bins or at local elevators. Analysis was conducted by the Durum Quality Lab, North Dakota State University, Fargo, North Dakota.

Wheat and Grade Data: The 2014 crop size is similar to 2013 but a challenging growing and harvest season affected quality. The average grade is No. 2 Amber Durum (AD), down from No. 1 Hard Amber Durum (HAD) in 2013 and the 5-year average. Quality is more variable than normal but functional performance is very similar to 2013.

While more than 60% of samples graded No. 2 or better, a larger than normal share had less than the 75% vitreous kernel (HVAC) content required for HAD. Average test weight is 59 lbs/bu (76.8 kg/hl), down from last year and the 5-year average; 28% of samples are above 60 lb/bu (78.1 kg/hl) compared with 83% in 2013. Average of damaged kernels is 0.8%, up from 0.2% in 2013 and slightly higher than the 5-year average. The average DON value is 2.1 ppm, up from 1.0 ppm in 2013 and the five-year average of 0.7 ppm. Parts of the crop with significantly higher DON levels will be used for feed.

Average protein is 13.2% (12% moisture basis), up from 12.8% in 2013, but slightly below the 5-year average. Cool

temperatures and very high yields kept protein below average. The lower protein and harvest rains led to lower and more variable HVAC, which averages 74%, down from 85% in 2013 and the 5-year average. Although 65% of the crop is above the HAD threshold of 75% HVAC, compared with 81% in 2013, only one quarter is above 90% HVAC, down from two thirds last year. About 15% is below 60% HVAC, compared to just 3% in 2013.

The average falling number value is 276 sec, below 2013 and the 5-year average of more than 370 sec. One-half of the crop is between 200 and 300 sec, with another third above 300 sec.

Semolina and Processing Data: Overall yield, based on a Buhler Laboratory Mill, is 70.4%, similar to 2013, with slightly lower semolina extraction of 64.5% compared to 65.2%. Average ash content is slightly higher than 2013 and the 5-year average but speck counts are similar. The wet gluten average is 32.8% compared with 34.8% in 2013, and the gluten index fell to 45.1%, compared with 55.1% in 2013.

Semolina mixing properties are similar to 2013 and the 5-year average. Semolina has a lower a* color score compared with 2013, but cooked spaghetti color scores are slightly better than 2013. Cooking qualities are similar or slightly improved compared with 2013, but below the 5-year averages.

Summary: Buyers will find a wide range of values in northern durum due to challenges from adverse weather. Variability in key parameters, such as vitreous kernels, falling number, protein and DON, will require buyers evaluate the importance of each factor for their end-use needs. Premium contract specifications will command higher prices but good value can be obtained from large portions of the crop with diligent contract specifications and communication with sellers.

DESERT DURUM®

Desert Durum®, a trademark of the Arizona Grain Research and Promotion Council and the California Wheat Commission, applies only to durum produced under irrigation in Arizona and California. Desert Durum® is often delivered “identity preserved” to domestic and export markets, which allows buyers to purchase varieties having intrinsic qualities specific to their needs. Annual production requirements can be contracted ahead with grain merchandisers who provide certified seed of contracted varieties to experienced growers. Handlers can store grain by varietal identity for season-long shipment on the buyers’ preferred delivery schedules.

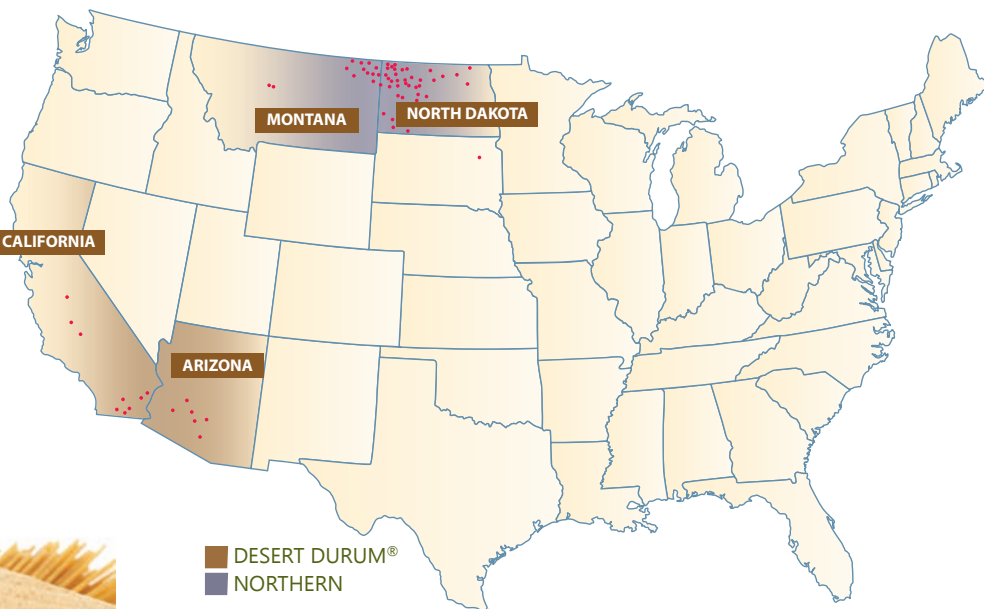
Total 2014 Desert Durum® harvested acreage was lower than in 2013, but yields were generally higher, resulting in similar total production. The new crop exhibited consistently large kernel size and low moisture, traits that contribute to high extraction rates. Overall, quality characteristics met expectations. In summary, the 2014 Desert Durum® crop will deliver the valuable milling, semolina, and pasta quality traits that customers have learned to expect and appreciate.

ABOUT DURUM WHEAT

Durum is the hardest of all wheats, high protein content, yellow endosperm, white bran. Used to make pasta, couscous, and some Mediterranean breads.

EXPORT CARGO SURVEY

The durum export cargo data represents 5 individual subplot samples provided by USDA's Federal Grain Inspection Service for crop year 2013 (collected from October 2013 through June 2014) and 17 samples for 2012. Grade data are the actual official grades on the individual subplots. Processing analysis was conducted by North Dakota State University.

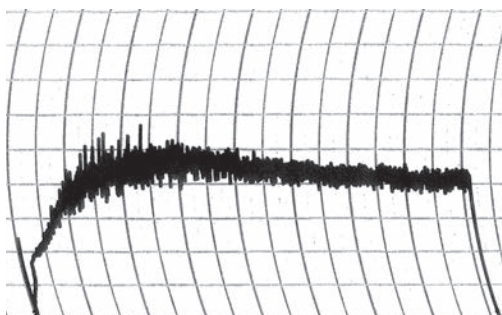


FOUR STATES SURVEYED

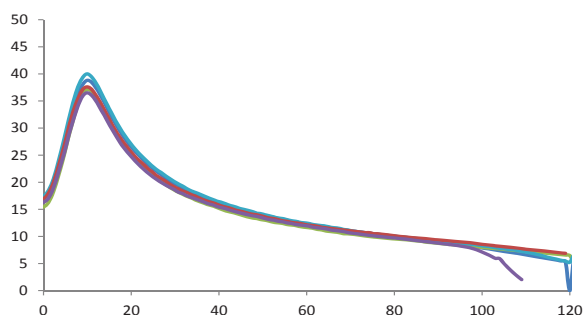
Arizona • California • Montana • North Dakota



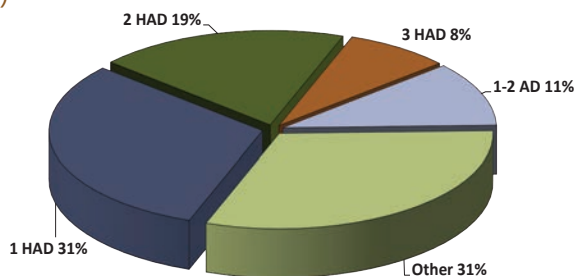
NORTHERN DURUM REGIONAL AVERAGE



MIXOGRAM
(SCORE = 5.5)



ALVEOGRAM



NORTHERN DURUM GRADE DISTRIBUTION

Durum	Harvest Data						Export Cargo Data			
	Northern Durum			Desert Durum®			Northern Durum		Desert Durum®	
	2014	2013	5-Year Avg	2014	2013	5-Year Avg	2013	2012	2013	2012
Wheat Grade Data:										
Test Weight (lb/bu)	59.0	60.7	60.5	63.2	62.8	62.7	60.9	60.5	62.1	61.7
(kg/hl)	76.8	79.0	78.8	82.3	81.7	81.6	79.3	78.8	80.9	80.4
Damaged Kernels (%)	0.8	0.2	0.5	0.2	0.2	0.3	1.9	1.2	0.1	0.5
Foreign Material (%)	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.1	0.2	0.1
Shrunken and Broken (%)	0.9	0.8	1.0	0.4	0.6	0.5	1.3	1.8	1.1	1.2
Total Defects (%)	1.7	1.0	1.5	0.6	0.8	0.8	3.5	3.1	1.4	1.8
Contrasting Classes (%)	0.0	0.2	0.2	0.0	0.0	0.0	1.0	0.8	0.0	0.1
Vitreous Kernels (%)	74	85	85	97	97	96	75	81	99	94
Grade	2 AD	1 HAD	1 HAD	1 HAD	1 HAD	1 HAD	2 AD	2 HAD	1 HAD	1 HAD
Wheat Non-Grade Data:										
Dockage (%)	0.7	0.9	1.1	0.3	0.5	0.3	0.5	0.5	0.7	0.5
Moisture (%)	12.4	12.1	11.5	6.4	6.3	6.5	12.7	10.9	7.4	6.8
Protein (%) 12%/0% moisture basis	13.2/15.0	12.8/14.6	13.6/15.5	13.3/15.1	13.2/15.0	13.4/15.2	13.6/15.4	14.3/16.3	13.5/15.4	13.2/15.0
Ash (%) 14%/0% moisture basis	1.64/1.91	1.57/1.83	1.57/1.83	1.72/1.84	1.79/2.09	1.73/2.01	1.61/1.87	1.62/1.88	1.67/1.94	1.65/1.92
1000 Kernel Weight (g)	38.0	44.4	40.1	47.8	46.4	49.3	39.2	36.4	46.4	44.6
Kernel Size (%) lg/md/sm	52/46/2	59/37/4	51/44/5	91/9/0	88/12/0	90/10/0	36/60/5	37/57/6	71/27/1	67/30/3
Falling Number (sec)	276	375	378	402	488		458	451	2057	1506
Sedimentation (cc)	60	46	46	64						
DON (ppm)	2.1	1.0	0.7				0.7			
Semolina Data:										
Lab Mill Extraction (%)	70.4	70.3	71.1	71.0	77.6	75.9	69.7	68.8	72.5	71.8
Semolina Extraction (%)	64.5	65.2	65.0	62.0	62.1	62.3	62.6	62.8	65.6	66.2
Ash (%) 14%/0% moisture basis	0.74/0.86	0.66/0.77	0.65/0.76	0.81/0.95	0.93/1.08	0.87/1.02	0.57/0.67	0.68/0.79	0.63/0.73	0.71/0.82
Specks (no/10 sq in)	26	26	29	21	22	9	25	25	23	24
Protein (%) 14%/0% moisture basis	12.5/14.5	11.7/13.6	12.5/14.5	12.3/14.4	12.3/14.3	12.3/14.3	12.4/14.4	13.1/15.2	12.4/14.4	12.0/13.9
Wet Gluten (%)	32.8	34.8	35.5	33.2	34.6	32.9				
Gluten Index	45	55	57	76	88	88	58	56	95	90
Mixograph Classification	5.5	5.5	5.5				6.0	5.7	8.0	7.4
Alveograph: P (mm)	45	52	47	114	111	92				
L (mm)	120	106	108	60	60	60				
P/L Ratio	0.39	0.50	0.45	1.90	1.91	1.53				
W (10 ⁻⁴ joules)	135	134	126	247	233	191				
Color: L*	84.9	84.6	84.6	88.7	87.3	87.7	85.1	84.9	84.3	84.9
a*	-4.0	-3.2	-2.9	-2.1	-1.7		-3.2	-2.8	-2.9	-2.7
b*	27.9	27.7	28.3	26.1	25.6	25.8	27.0	27.6	25.6	25.6
Spaghetti Processing Data:										
Color Score	8.8	8.6	9.0	9.1	8.4	8.5	8.3	8.8	8.5	9.0
Cooked Weight (gm)	31.9	31.3	31.5	29.3	29.7	29.9	31.9	32.6	31.3	31.9
Cooking Loss (%)	6.8	6.7	6.2	5.8	7.0	7.5	7.3	5.8	7.2	6.2
Cooked Firmness (g cm)	4.2	4.0	4.8	6.3	7.7	7.6	4.6	4.6	5.1	5.1
Sample Count:							2	6	3	11

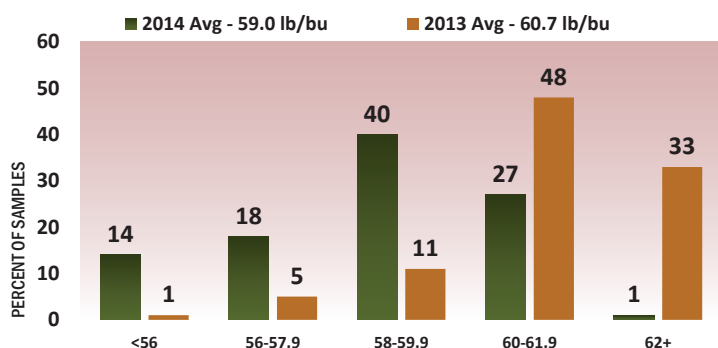
NOTE: Fewer northern durum samples than targeted were collected because of harvest delays. The northern durum survey does not represent the final 15% remaining to be harvested.

NORTHERN DURUM DISTRIBUTIONS



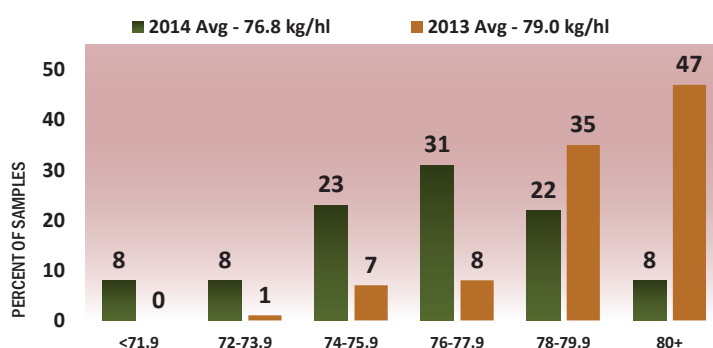
TEST WEIGHT

Pounds/Bushel



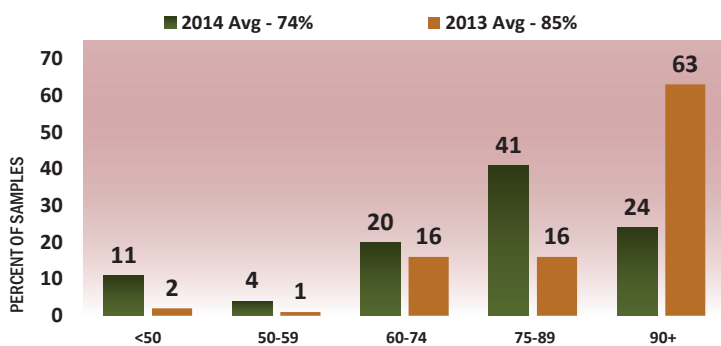
HECTOLITER WEIGHT

Kilograms/Hectoliter



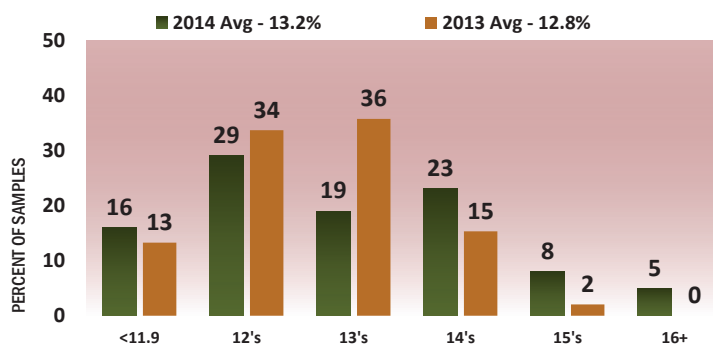
VITREOUS KERNELS

Percent



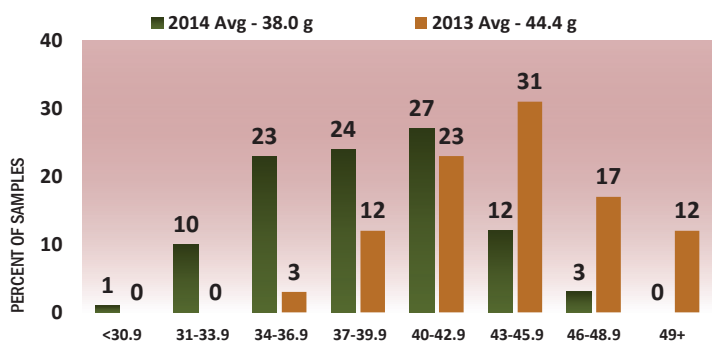
PROTEIN (12% MB)

Percent



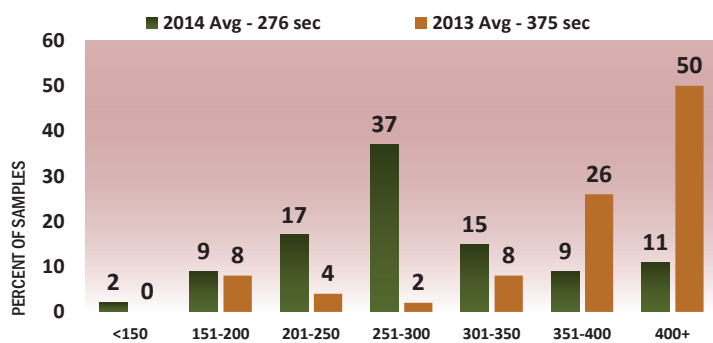
1000 KERNEL WEIGHT

Grams



FALLING NUMBER

Seconds



Durum Production

for the major producing states (million metric tons)

	2014	2013	2012	2011	2010
Arizona	0.2	0.2	0.3	0.2	0.3
California	0.1	0.1	0.4	0.3	0.3
Montana	0.4	0.4	0.4	0.3	0.5
North Dakota	0.8	0.8	1.2	0.5	1.8
Total Durum Production	1.6	1.6	2.3	1.4	2.9

Based on USDA crop estimates of September 30, 2014.

HARVEST SURVEY

Weather and Harvest: The Pacific Northwest had limited to adequate soil moisture at planting. Most of the area received adequate rainfall during the late winter and early spring, but conditions were warm and dry in later spring. Conditions were hot and dry from the the beginning of grain filling to the end of kernel development and during harvest. Rain fell in some areas, particularly southeastern Idaho, during harvest.

Survey and Analysis Methods: A total of 373 soft white (SW) and 91 white club (WC) survey samples were collected from state and private grain inspection agencies and commercial wheat handling operations. USDA's Federal Grain Inspection Service (FGIS) graded the samples and measured protein content. For further testing, three composite samples were made according to protein content (Low <9.0%, Medium 9.0-10.5%, and High >10.5%) and one composite of all WC samples. Wheat and flour quality testing and data analyses were conducted by the Wheat Marketing Center, Portland, Oregon, using the methods in the Analysis Methods section of this booklet. The wheat commissions of Idaho, Oregon, and Washington, U.S. Wheat Associates, Inc., and many areas of wheat industry supported this program.

Wheat and Grade Data: The average SW test weight of 60.6 lb/bu (79.7 kg/hl) is less than last year's 61.1 lb/bu (80.4 kg/hl); WC test weight of 61.7 lb/bu (81.1 kg/hl) is above 2013's 61.1 lb/bu (80.4 kg/hl). Other grade factors for SW and WC are similar to last year and 5-year averages. SW and WC dockage averages are less than last year and the 5-year averages. Average SW moisture content of 9.2% is similar to last year while the WC average declined to 8.7% from 9.2% last year.

Average SW wheat protein (12% mb) of 10.9% is higher than 2013's 10.3% and the 5-year average of 9.9%. WC protein of 11.1% is also higher than last year's 10.5% and the 5-year average of 10.0%. SW wheat ash content (14% mb) of 1.32% is less than last year and the 5-year average, and WC ash content (14% mb) of 1.25% is the same as last year and less than the 5-year average. SW and WC thousand kernel weights are lower than last year and 5-year averages. Both SW and WC kernel diameters are smaller than 2013 and 5-year averages. Falling number values (14% mb) are 353 sec for SW and 336 sec for WC, both similar to 2013 and higher than the 5-year averages.

Flour, Dough and Baking Data: Buhler Laboratory Mill flour extraction for SW at 75.7% is similar to last year but higher than the 5-year average, while WC is lower at 75.9% than last year's 76.7%. Flour protein contents (14% mb) are 10.2% and 10.1% for SW and WC, respectively. Flour ash contents (14% mb) for both SW and WC are higher than last year and 5-year averages. Flour falling number values are 369 sec for SW and 368 sec for WC. Amylograph peak viscosity values are 523 BU for SW and 435 BU for WC. Starch damage



THREE STATES SURVEYED

Idaho • Oregon • Washington

values are higher for SW and WC than last year and 5-year averages. Farinograph peak and stability times show that SW has stronger gluten properties with higher water absorption than last year. WC farinograph shows higher water absorption and slightly shorter stability time than last year and 5-year averages. The SW alveograph L value is longer than last year and the 5-year average, while the WC L value is shorter than last year but similar to the 5-year average. Extensograph extensibilities for SW and WC are longer than last year and the 5-year averages. SW and WC sponge cake volumes and scores are lower than 2013 and the 5-year averages. SW cookie diameter is smaller than last year and the 5-year average, while WC cookie diameter is similar to last year and the 5-year average. SW and WC cookie spread factors are less than last year and 5-year averages.

Chinese Southern-Type Steamed Bread: Each flour is made into southern-type steamed bread and compared with a control flour. Specific volumes are higher for SW and WC than last year and 5-year averages. Total scores are slightly lower than 2013 but higher than the 5-year average for SW and lower than the 5-year average for WC.

Summary: The 2014 crop has the typical high quality expected of SW for soft wheat products with high test weight, slightly higher than average protein, and excellent milling and processing characteristics.

EXPORT CARGO SURVEY

The PNW SW export cargo data show the results of analyses of individual subplot samples including 88 drawn from the 2012 crop and 60 from the 2013 crop (August 2013 through May 2014). Representative samples are selected from official FGIS samples. Grade data are the actual grades on the individual subplots. WMC conducted milling and processing analyses.

Pacific Northwest Soft White Wheat Production

in major producing states (million metric tons)

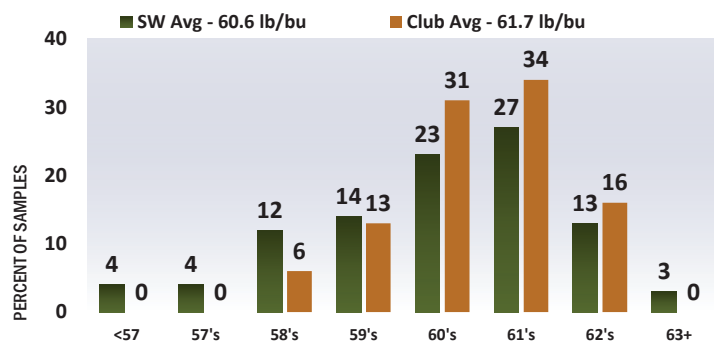
	2014		2013		2012		2011		2010	
	SW	CLUB	SW	CLUB	SW	CLUB	SW	CLUB	SW	CLUB
Washington	2.2	0.2	2.9	0.3	2.5	0.4	3.1	0.4	2.8	0.3
Oregon	1.1	0.0	1.3	0.0	1.4	0.0	1.8	0.0	1.5	0.0
Idaho	1.6	0.0	1.7	0.0	1.5	0.0	1.8	0.1	1.6	0.1
Three-State Total	4.9	0.2	5.9	0.3	5.4	0.5	6.7	0.5	5.9	0.4
Three-State Total Soft White Wheat	5.1		6.2		5.9		7.2		6.3	
Total US Soft White Wheat	5.5		6.7		6.5		7.9		6.9	

Based on USDA crop estimates of September 30, 2014.



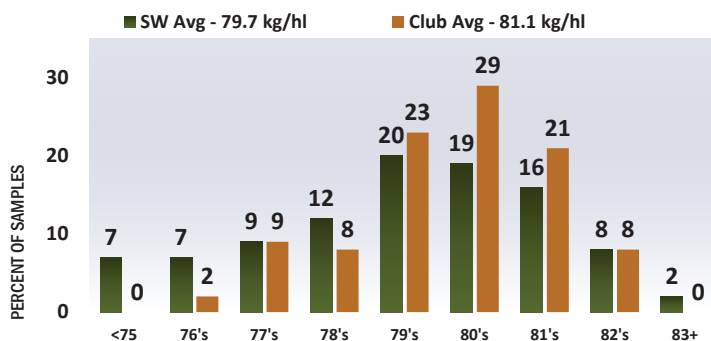
TEST WEIGHT

Pounds/Bushel



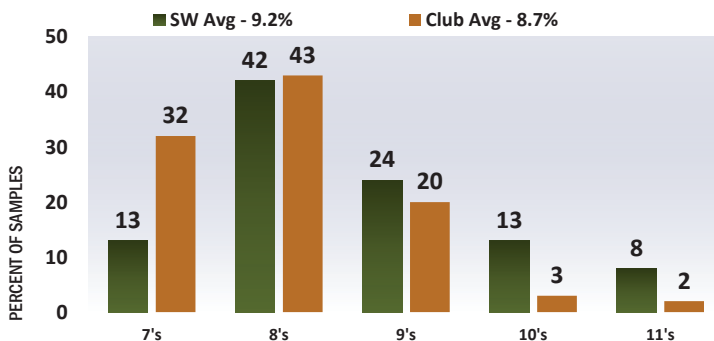
HECTOLITER WEIGHT

Kilograms/Hectoliter



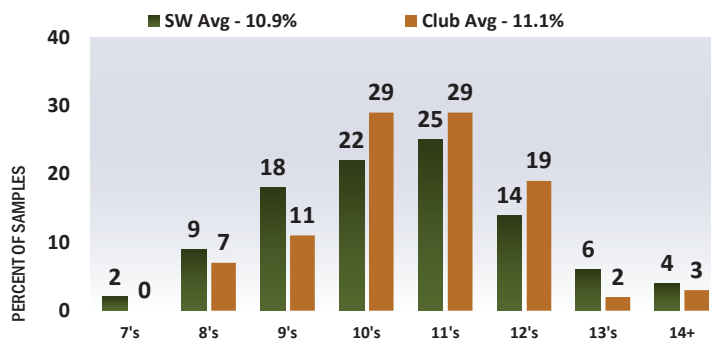
WHEAT MOISTURE

Percent



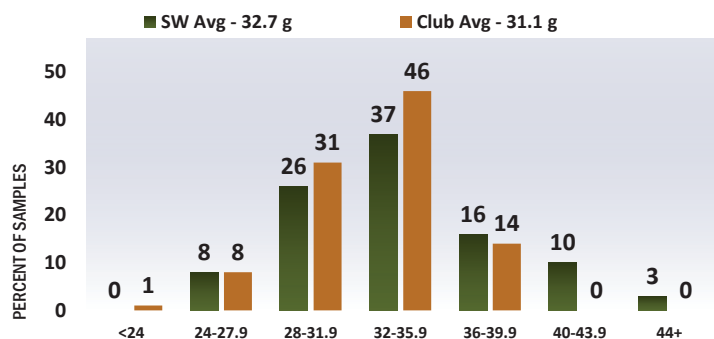
PROTEIN (12% MB)

Percent



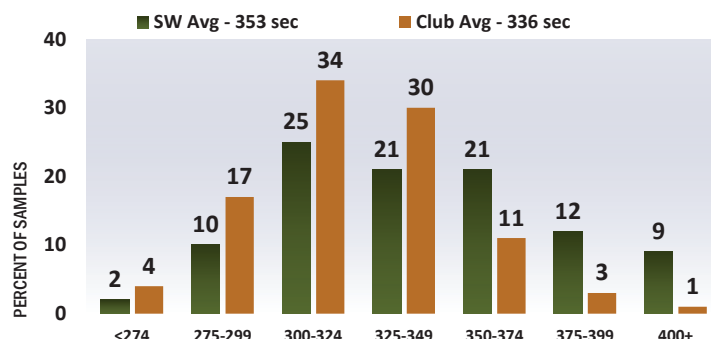
1000 KERNEL WEIGHT

Grams



FALLING NUMBER

Seconds

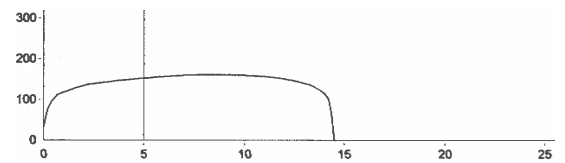
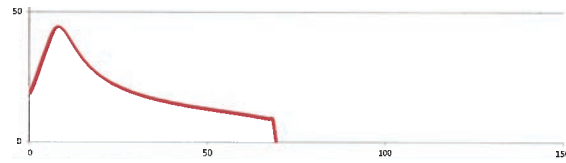
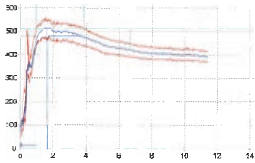


FARINOGRAMS

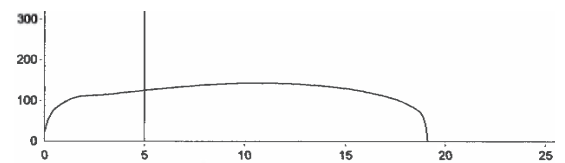
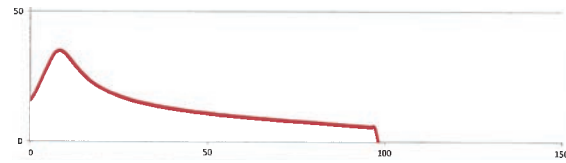
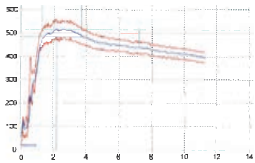
ALVEOGRAMS

EXTENSOGRAMS

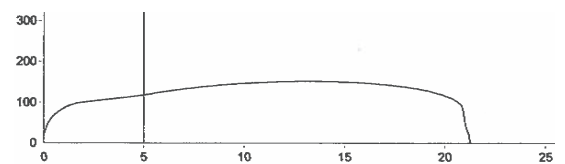
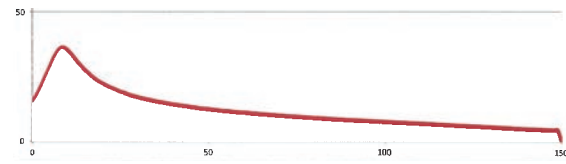
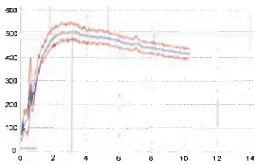
LOW PROTEIN



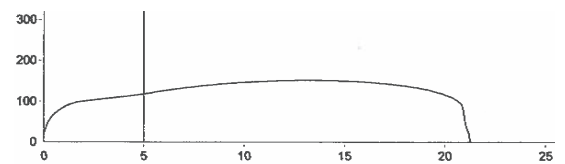
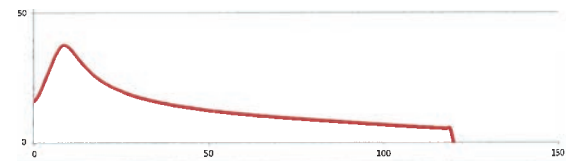
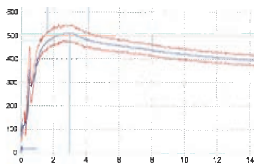
MEDIUM PROTEIN



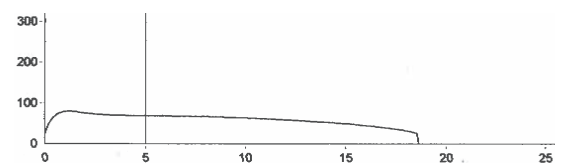
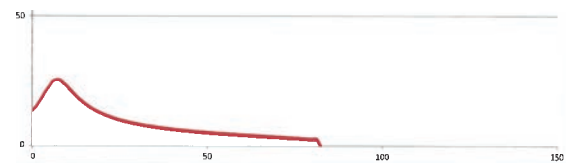
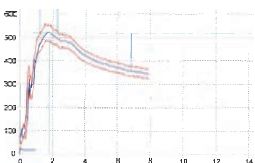
HIGH PROTEIN



AVERAGE PROTEIN



CLUB



PNW SOFT WHITE | HARVEST DATA

Soft White	2014					2013		5-Year Average	
	Soft White By Protein				Club				
	Low	Med	High	Overall	Average	SW	Club	SW	Club
Wheat Grade Data:									
Test Weight (lb/bu)	60.7	61.0	60.3	60.6	61.7	61.1	61.1	60.5	60.3
(kg/hl)	79.8	80.2	79.3	79.7	81.1	80.4	80.4	79.6	79.3
Damaged Kernels (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Foreign Material (%)	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1
Shrunken & Broken (%)	0.6	0.5	0.9	0.7	1.1	0.6	0.8	0.7	0.9
Total Defects (%)	0.7	0.5	1.0	0.8	1.2	0.6	0.9	0.8	1.0
Grade	1 SW	1 SW	1 SW	1 SW	1 WC	1 SW	1 WC	1 SW	1 WC
Wheat Non-Grade Data:									
Dockage (%)	0.8	0.4	0.4	0.4	0.2	0.5	0.6	0.6	0.8
Moisture (%)	9.9	9.4	9.0	9.2	8.7	9.1	9.2	9.4	9.1
Protein (%) 12%/0% moisture basis	8.4/9.5	9.8/11.1	11.9/13.5	10.9/12.4	11.1/12.6	10.3/11.7	10.5/11.9	9.9/11.2	10.0/11.4
Ash (%) 14%/0% moisture basis	1.32/1.53	1.35/1.57	1.31/1.52	1.32/1.53	1.25/1.45	1.36/1.58	1.25/1.45	1.36/1.58	1.27/1.48
1000 Kernel Weight (g)	36.0	35.1	30.9	32.7	31.1	36.6	34.7	35.4	33.0
Kernel Size (%) lg/md/sm	88/12/0	85/15/0	75/24/1	79/20/1	74/25/1	87/13/0	86/14/0	84/15/1	80/19/1
Single Kernel: Hardness	23.2	29.6	27.1	27.4	33.3	32.5	32.1	34.0	32.8
Weight (mg)	39.1	37.7	35.8	36.7	31.9	39.0	37.2	38.5	35.9
Diameter (mm)	2.78	2.74	2.66	2.70	2.51	2.80	2.66	2.79	2.66
Sedimentation (cc)	10.7	12.8	21.4	17.7	10.7	14.9	11.2	16.3	11.7
Falling Number (sec)	311	321	376	353	336	349	344	327	317
Flour Data:									
Lab Mill Extraction (%)	75.2	76.3	75.5	75.7	75.9	75.9	76.7	73.7	74.4
Color: L*	92.5	92.3	92.0	92.2	92.1	92.3	91.3	92.1	91.9
a*	-2.6	-2.5	-2.3	-2.4	-2.3	-2.4	-2.3	-2.5	-2.4
b*	8.2	8.4	8.0	8.1	7.8	7.8	7.3	8.1	7.6
Protein (%) 14%/0% moisture basis	7.5/8.7	8.9/10.3	11.3/13.1	10.2/11.9	10.1/11.7	9.1/10.6	9.4/10.9	8.5/9.9	8.8/10.2
Ash (%) 14%/0% moisture basis	0.54/0.63	0.55/0.64	0.53/0.62	0.54/0.63	0.55/0.64	0.49/0.57	0.45/0.52	0.49/0.57	0.47/0.55
Wet Gluten (%)	19.9	24.7	32.4	28.7	30.2	24.4	24.3	21.6	18.4
Gluten Index	67	55	48	52	28	66	45	67	52
Falling Number (sec)	356	380	365	369	368	365	356	357	350
Amylograph Viscosity 65 g (BU)	508	507	533	523	435	529	450	471	469
Starch Damage (%) (14% mb)	5.2	5.1	4.9	5.0	4.4	4.3	3.7	4.6	4.0
Solvent Retention Capacity (%)									
Water/50% Sucrose	58/106	56/110	56/114	56/112	54/99	57/107	54/107	55/100	52/94
5% Lactic Acid/5% Na ₂ CO ₃	99/81	105/81	119/87	113/85	83/75	98/79	84/78	97/82	81/75
Dough Properties:									
Farinograph: Peak Time (min)	1.7	2.2	3.1	3.0	1.8	1.5	1.5	1.6	1.5
Stability (min)	2.9	2.4	3.6	2.5	1.1	2.2	1.5	3.1	1.8
Absorption (%)	53.0	54.7	55.8	55.3	53.8	53.3	52.6	53.6	52.5
Alveograph: P (mm)	48	38	40	41	28	38	31	42	33
L (mm)	69	98	149	119	82	91	91	108	86
P/L Ratio	0.70	0.39	0.27	0.34	0.34	0.42	0.34	0.40	0.44
W (10 ⁻⁴ joules)	90	89	119	108	48	83	56	101	56
Extensograph: Resistance (BU)	161	143	169	152	80	184	97	184	101
(45 min) Extensibility (cm)	14.6	19.1	21.6	21.3	18.6	17.4	18.2	16.3	16.8
Area (sq cm)	37	42	55	48	20	49	28	45	25
Baking Evaluation:									
Sponge Cake: Volume (cc)	1266	1201	1177	1194	1192	1232	1217	1208	1222
Score	54	43	35	39	44	48	50	50	51
Cookie: Diameter (cm)	8.6	8.5	8.3	8.4	8.8	8.8	8.9	8.6	8.9
Spread Factor (width/height)	10.6	9.3	8.7	9.1	10.2	10.6	11.1	9.8	11.4
Pan Bread Bake Absorbtion (%) ¹			60.3						
Crumb Grain and Texture (1-10) ¹			5.0						
Loaf Volume (cc) ¹			710						
Chinese Southern-Type Steamed Bread Evaluation:									
Specific Volume (ml/g)	2.2	2.3	2.6	2.5	2.7	2.0	2.2	2.0	2.2
Total Score	66.8	67.1	69.9	68.7	64.8	69.3	65.6	67.6	66.4
% of Area Production:	11	30	59	100	100				

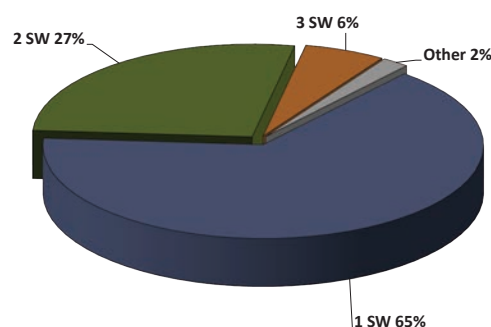
2014 Protein Range: Low, less than 9.0%; Medium, 9.0 - 10.5%; High, Greater than 10.5%

¹Bread Bake for High Protein SW only

Soft White	2013	2012
Wheat Grade Data:		
Test Weight (lb/bu)	61.6	62.0
(kg/hl)	81.1	81.5
Damaged Kernels (%)	0.2	0.1
Foreign Material (%)	0.1	0.1
Shrunken & Broken (%)	0.8	0.9
Total Defects (%)	1.0	1.0
Grade	1 SW	1 SW
Wheat Non-Grade Data:		
Dockage (%)	0.3	0.3
Moisture (%)	9.0	9.0
Protein (%) 12%/0% moisture basis	10.2/11.5	9.8/11.1
Ash (%) 14%/0% moisture basis	1.34/1.56	1.34/1.56
1000 Kernel Weight (g)	37.7	37.2
Kernel Size (%) lg/md/sm	85/14/0	85/14/1
Single Kernel: Hardness		36.6
Weight (mg)		37.6
Diameter (mm)		2.76
Sedimentation (cc)	15.2	14.2
Falling Number (sec)	347	350
Flour Data:		
Lab Mill Extraction (%)	73.9	73.8
Color: L*	92.3	92.3
a*	-2.3	-2.3
b*	7.5	7.6
Protein (%) 14%/0% moisture basis	8.7/10.2	8.5/9.8
Ash (%) 14%/0% moisture basis	0.43/0.50	0.42/0.49
Wet Gluten (%)	23.8	21.3
Gluten Index	68	74
Falling Number (sec)	361	376
Amylograph Viscosity 65 g (BU)	432	535
Starch Damage (%) (14% mb)		
Solvent Retention Capacity (%)		
Water/50% Sucrose		
5% Lactic Acid/5% Na ₂ CO ₃		
Dough Properties:		
Farinograph: Peak Time (min)	1.9	1.5
Stability (min)	2.8	2.0
Absorption (%)	53.9	52.0
Alveograph: P (mm)	43	38
L (mm)	109	102
P/L Ratio	0.40	0.37
W (10 ⁻⁴ joules)	106	90
Extensograph: Resistance (BU)		
(45 min) Extensibility (cm)		
Area (sq cm)		
Baking Evaluation:		
Sponge Cake: Volume (cc)	1201	1175
Score	42	45
Cookie: Diameter (cm)	8.6	8.7
Spread Factor (width/height)		
Pan Bread Bake Absorption (%) ¹		
Crumb Grain and Texture (1-10) ¹		
Loaf Volume (cc) ¹		
Chinese Southern-Type Steamed Bread Evaluation:		
Specific Volume (ml/g)		
Total Score		
Sample Count:	60	88



SW GRADE DISTRIBUTION



ABOUT SOFT WHITE WHEAT

Low protein, low moisture wheat. Soft endosperm, white bran, weak gluten. Used in pastries, cakes, biscuits, crackers, flat breads, Asian-style noodles and snack foods. Can also be used for blending.



HARVEST SURVEY

Weather and Harvest: Soft red winter wheat (SRW) is widely grown in eastern United States. The area seeded in fall 2013 was about 8.5 million acres (3.4 million hectares), down from 10.0 million acres (4.0 million hectares) in 2012 but similar to the 5-year average. Yield is down from the 2013 record, but well above the previous 5-year average. SRW 2014 production of 12.5 MMT is down nearly 3 MMT from 2013 but is about 1 MMT larger than the previous 5-year average. While conditions were generally fair to excellent through harvest, excessive rain in many areas during both flowering and harvest adversely affected quality in many areas.

Survey Methods: Great Plains Analytical Laboratory, Kansas City, Missouri, conducted sample collection and analysis. For 2014, 527 samples were collected from elevators in 18 reporting areas across nine states. Samples were collected at two different times reflecting early and late harvest. Test weight, moisture, protein, thousand kernel weight, wheat ash and falling number were determined on individual samples, while the remaining tests were on 36 composite samples. The results were weighted by 5-year average production for the 18 reporting areas and combined into “Composite Average,” “East Coast” and “Gulf Port” values. Gulf Port states include Arkansas, Illinois, Indiana, Kentucky, Missouri, and Ohio and account for about 80% of production in the states surveyed. East Coast states include Maryland, North Carolina and Virginia and represent the remaining 20% of production in the states surveyed. The states surveyed typically account for 60%-65% of total SRW production.

Wheat and Grade Data: The overall average grade is U.S. No. 2, though test weight just barely meets the No. 2 requirement. Average protein is slightly lower than last year and the 5-year average. Average dockage and total defects are both below last year and the 5-year averages, indicating the crop has relatively few visual defects. However, falling numbers are below the 5-year average, though somewhat better than the very low 2013 values. The samples from Gulf Port states show the adverse effects of excessive moisture while the East Coast states largely avoided these conditions.

ABOUT SOFT RED WINTER WHEAT

Low protein content, soft endosperm, red bran, weak gluten. Used in pastries, cakes, cookies, crackers, pretzels, and flat breads. Can also be used for blending.

NINE OF SIXTEEN STATES SURVEYED

Arkansas • Illinois • Indiana • Kentucky • Maryland
Missouri • North Carolina • Ohio • Virginia

The overall average test weight of 58.0 lb/bu (76.3 kg/hl) is below 2013 and the 5-year average. The Gulf Port average test weight is below the 5-year average, while the East Coast average is 1.5 lb/bu (2.0 kg/hl) above 2013 and similar to the 5-year average. Overall, Gulf Ports and East Coast average total defects are all below their respective 5-year averages.

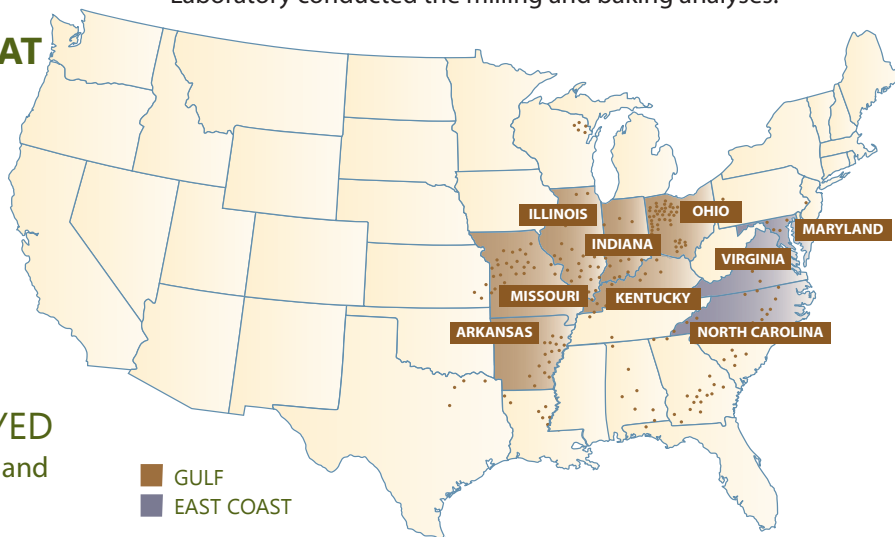
While wheat protein of 9.8% is slightly below the 5-year average of 10.1%, overall sedimentation and wet gluten averages are similar to the respective 5-year averages. Wheat falling number of 304 seconds for the Gulf Ports states is similar to 2013's low value and well below the 5-year average. In contrast, the East Coast states average FN of 340 is well above the 5-year average. The DON average for the six Gulf Port states is 2.5 ppm, well above 2013 and the 5-year average, while the average of 0.6 ppm for the three East Coast states is below 2013 and the 5-year average.

Flour and Baking Data: Buhler laboratory mill flour extraction and flour ash are similar to the 5-year averages for both East Coast and Gulf Port states, suggesting the crop has typical SRW milling characteristics. Dough properties suggest the crop is somewhat weaker than recent crops. Farinograph peak, stability and absorption values, especially for the Gulf Ports states, are somewhat lower than the 5-year averages. Alveograph P, L and W values for both Gulf Ports and East Coast states are somewhat lower than 5-year averages. However, cookie spread ratios and loaf volumes are all higher than last year and the respective 5-year averages.

Summary: The 2014 SRW crop has variable quality. The wet growing season and harvest rains affected the six Gulf Port states, reducing test weights and falling numbers and increasing DON values. Appropriate contract specifications can help buyers ensure that purchases meet expectations.

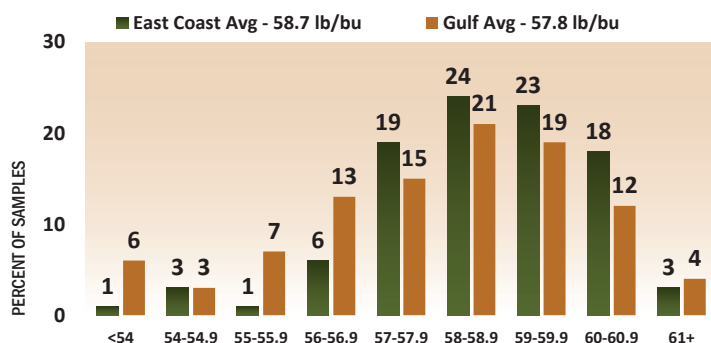
EXPORT CARGO SURVEY

Export data represents 155 subplot samples for crop years 2014 and 2013 from Gulf of Mexico and East Coast ports. The Federal Grain Inspection Service selected the samples and reported grades on the subplots. Great Plains Analytical Laboratory conducted the milling and baking analyses.

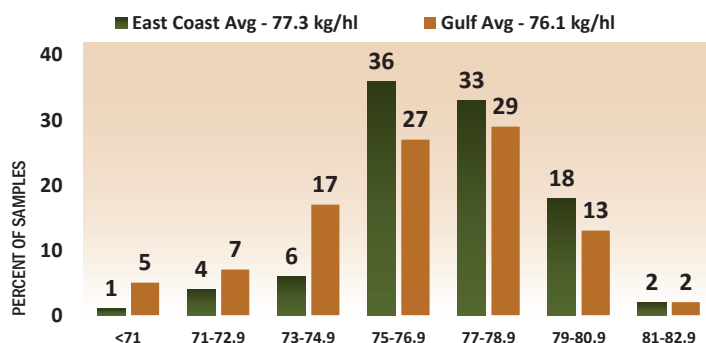




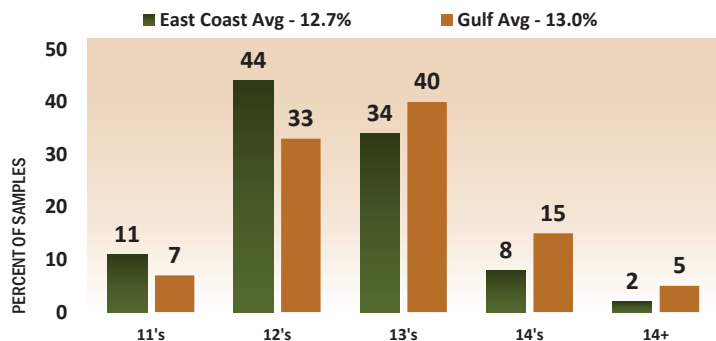
TEST WEIGHT | Pounds/Bushel



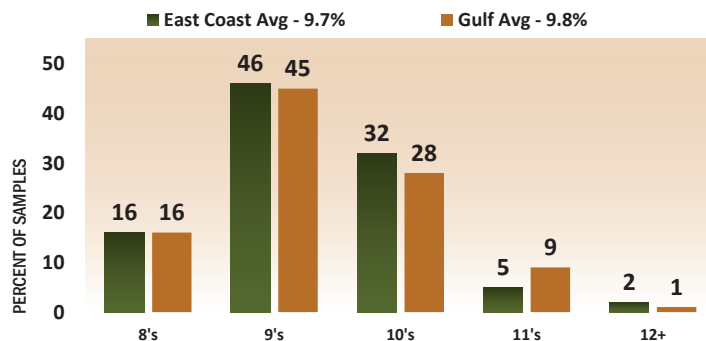
HECTOLITER WEIGHT | Kilograms/Hectoliter



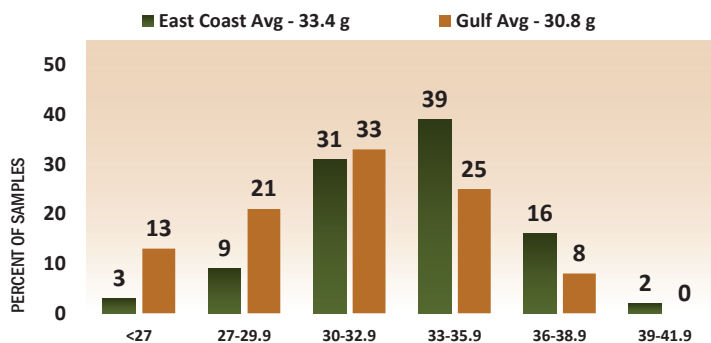
WHEAT MOISTURE | Percent



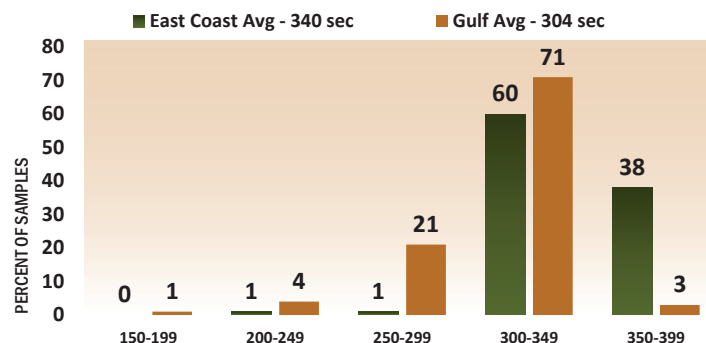
PROTEIN (12% MB) | Percent



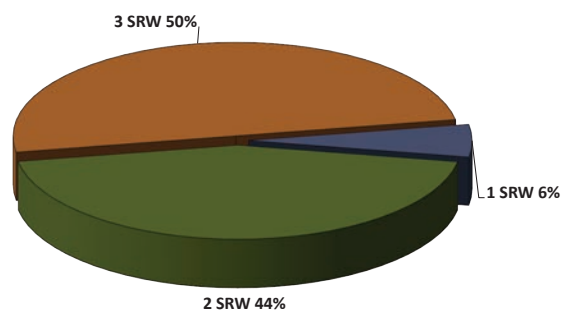
1000 KERNEL WEIGHT | Grams



FALLING NUMBER | Seconds



GRADE DISTRIBUTION*



*Based on 36 composite samples.

SOFT RED WINTER | HARVEST DATA

Soft Red Winter	Composite Average			East Coast			Gulf Ports		
	2014	2013	5-Year Avg	2014	2013	5-Year Avg	2014	2013	5-Year Avg
Wheat Grade Data:									
Test Weight (lb/bu)	58.0	58.4	58.6	58.7	57.2	58.9	57.8	58.7	58.5
(kg/hl)	76.3	76.8	77.1	77.3	75.3	77.6	76.1	77.3	77.0
Damaged Kernels (%)	1.0	2.1	1.5	0.5	3.7	1.8	1.1	1.7	1.4
Foreign Material (%)	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2
Shrunken & Broken (%)	0.6	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.5
Total Defects (%)	1.8	2.8	2.2	1.1	4.3	2.4	2.0	2.3	2.2
Grade	2 SRW	2 SRW	2 SRW	2 SRW	3 SRW	2 SRW	3 SRW	2 SRW	2 SRW
Wheat Non-Grade Data:									
Dockage (%)	0.4	0.5	0.7	0.4	0.5	0.9	0.4	0.5	0.7
Moisture (%)	13.0	13.4	12.9	12.7	13.4	13.0	13.0	13.4	12.9
Protein (%) 12%/0% moisture basis	9.8/11.1	9.9/11.3	10.1/11.4	9.7/11.1	10.0/11.4	10.5/11.9	9.8/11.1	9.9/11.3	10.0/11.3
Ash (%) 14%/0% moisture basis	1.52/1.77	1.49/1.73	1.53/1.77	1.51/1.76	1.48/1.72	1.50/1.74	1.52/1.77	1.50/1.74	1.54/1.79
1000 Kernel Weight (g)	31.3	33.6	32.5	33.4	34.5	33.8	30.8	33.3	32.2
Kernel Size (%) lg/md/sm	84/16/0	85/14/1	82/17/1	87/13/0	87/12/1	83/16/1	84/16/0	85/14/1	83/16/1
Single Kernel: Hardness	22.5	16.4	23.0	20.3	13.4	23.1	22.9	17.1	23.0
Weight (mg)	31.1	34.2	32.3	32.1	35.3	33.3	30.9	34.0	32.1
Diameter (mm)	2.57	2.65	2.49	2.59	2.65	2.51	2.57	2.65	2.49
Sedimentation (cc)	12.2	11.4	12.2	12.5	11.5	14.4	12.2	11.4	11.7
Falling Number (sec)	311	294	322	340	262	314	304	302	324
DON (ppm)	2.2	1.4	1.3	0.6	2.2	1.0	2.5	1.2	1.4
Flour Data:									
Lab Mill Extraction (%)	70.5	70.2	70.4	70.7	69.8	69.9	70.4	70.4	70.6
Color: L*	91.3	93.4	93.3	92.7	93.3	93.2	91.0	93.4	93.3
a*	-2.9	-2.8	-3.0	-3.0	-2.8	-3.0	-2.9	-2.8	-3.0
b*	8.2	7.8	8.1	8.7	8.0	8.1	8.1	7.8	8.1
Protein (%) 14%/0% moisture basis	8.3/9.6	8.3/9.7	8.4/9.8	8.2/9.6	8.4/9.8	8.8/10.2	8.3/9.6	8.2/9.6	8.3/9.7
Ash (%) 14%/0% moisture basis	0.43/0.50	0.42/0.49	0.44/0.51	0.42/0.49	0.43/0.50	0.44/0.51	0.43/0.50	0.42/0.48	0.44/0.51
Wet Gluten (%)	22.2	20.7	22.2	21.3	21.6	23.4	22.5	20.4	22.0
Gluten Index	80	88	79	79	84	80	80	90	79
Falling Number (sec)	322	278	326	341	263	316	318	282	328
Amylograph Viscosity 65 g (BU)	497	302	558	553	235	500	485	319	571
Starch Damage (%)	4.7	4.4	4.5	4.4	4.4	4.5	4.7	4.4	4.5
Solvent Retention Capacity (%)									
Water/50% Sucrose	54/103	55/105	56/108	56/107	54/105	57/109	54/103	54/102	56/105
5% Lactic Acid/5% Na ₂ CO ₃	111/77	114/79	114/82	109/79	115/81	117/83	112/78	113/79	112/82
Dough Properties:									
Farinograph:									
Peak Time (min)	1.3	1.3	1.6	1.4	1.2	1.8	1.3	1.3	1.5
Stability (min)	2.4	2.8	2.8	2.7	2.5	2.8	2.3	2.8	2.8
Absorption (%)	52.0	53.2	52.5	52.9	53.2	53.0	51.8	53.2	52.3
Alveograph: P (mm)	32	35	38	35	34	39	32	35	37
L (mm)	79	94	89	75	96	96	80	93	87
P/L Ratio	0.41	0.37	0.42	0.46	0.35	0.41	0.39	0.38	0.43
W (10 ⁻⁴ joules)	72	85	86	75	83	95	71	85	84
Baking Evaluation:									
Crumb Grain	4.8	5.1	5.2	4.9	4.9	5.4	4.8	5.2	5.2
Crumb Texture	4.9	4.5	5.1	4.9	4.6	5.4	4.9	4.4	5.0
Loaf Volume (cc)	724	695	715	729	722	727	723	688	712
Cookie Spread Ratio	9.6	9.2	9.1	9.4	9.0	8.6	9.6	9.2	9.1
% of Area Sampled:	100%			19%			81%		

East Coast - Maryland, Virginia and North Carolina; Gulf Ports - Arkansas, Illinois, Indiana, Kentucky, Missouri and Ohio

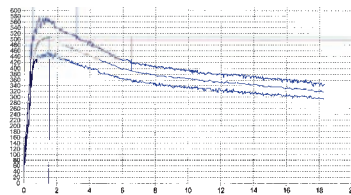
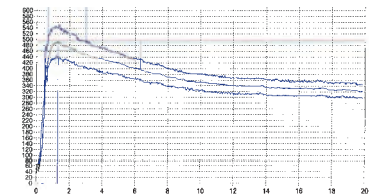
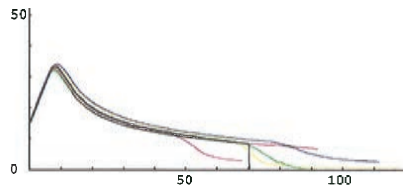
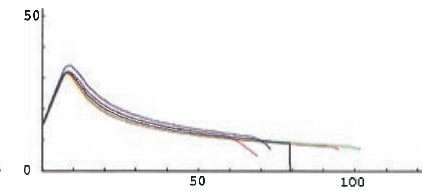
Soft Red Winter	2014	2013
Wheat Grade Data:		
Test Weight (lb/bu)	58.5	59.4
(kg/hl)	77.0	78.2
Damaged Kernels (%)	2.7	1.4
Foreign Material (%)	0.1	0.1
Shrunken & Broken (%)	0.8	0.8
Total Defects (%)	3.7	2.3
Grade	2 SRW	2 SRW
Wheat Non-Grade Data:		
Dockage (%)	0.6	0.7
Moisture (%)	12.3	12.6
Protein (%) 12%/0% moisture basis	9.8/11.1	10.1/11.4
Ash (%) 14%/0% moisture basis	1.43/1.67	1.50/1.74
1000 Kernel Weight (g)	30.6	31.1
Kernel Size (%) lg/md/sm	81/18/1	83/16/1
Single Kernel: Hardness		
Weight (mg)		
Diameter (mm)		
Sedimentation (cc)	11.4	11.9
Falling Number (sec)	288	324
DON (ppm)		
Flour Data:		
Lab Mill Extraction (%)	71.1	70.7
Color: L*	92.9	92.3
a*	-3.1	-2.9
b*	8.7	8.4
Protein (%) 14%/0% moisture basis	8.3/9.7	8.4/9.8
Ash (%) 14%/0% moisture basis	0.44/0.51	0.44/0.51
Wet Gluten (%)	22.1	21.5
Gluten Index	85	82
Falling Number (sec)	297	332
Amylograph Viscosity 65 g (BU)	346	515
Starch Damage (%)		
Solvent Retention Capacity (%)		
Water/50% Sucrose		
5% Lactic Acid/5% Na ₂ CO ₃		
Dough Properties:		
Farinograph:		
Peak Time (min)	1.2	1.3
Stability (min)	2.3	3.2
Absorption (%)	52.1	52.6
Alveograph: P (mm)		
L (mm)	35	39
P/L Ratio	78	80
W (10 ⁻⁴ joules)	0.45	0.49
	83	93
Baking Evaluation:		
Crumb Grain	4.9	5.3
Crumb Texture	4.8	5.3
Loaf Volume (cc)	724	718
Cookie Spread Ratio	9.7	8.4
Sample Count:	44	111

Soft Red Winter Production

in major producing states (million metric tons)

	2014	2013	2012	2011	2010
Alabama	0.4	0.5	0.3	0.4	0.2
Arkansas	0.7	1.0	0.7	0.8	0.2
Georgia	0.3	0.6	0.3	0.3	0.1
Illinois	1.2	1.5	1.1	1.3	0.4
Indiana	0.7	0.9	0.5	0.7	0.4
Kentucky	1.0	1.2	0.8	0.8	0.4
Louisiana	0.3	0.4	0.4	0.4	0.1
Maryland	0.5	0.5	0.4	0.3	0.2
Michigan	0.7	0.8	0.7	0.9	0.6
Mississippi	0.3	0.6	0.5	0.6	0.1
Missouri	1.2	1.5	1.0	0.9	0.3
North Carolina	1.2	1.4	1.2	1.1	0.4
Ohio	1.1	1.2	0.8	1.3	1.2
South Carolina	0.3	0.4	0.3	0.3	0.1
Tennessee	0.9	1.1	0.6	0.6	0.3
Virginia	0.5	0.5	0.4	0.5	0.2
16-State Total	11.2	14.2	10.1	11.2	5.5
Total SRW Production	12.4	15.5	11.4	12.5	6.5

Based on USDA crop estimates of September 30, 2014.

FARINOGRAMS**EAST COAST****GULF****ALVEOGRAMS****EAST COAST****GULF**

ANALYSIS METHODS

The harvest and cargo samples for each class are evaluated using the following methods. Flour or semolina produced as described in "Laboratory Milling Extraction" is analyzed to provide flour, semolina and end-use product data.

WHEAT AND GRADE DATA

Grade: Official U.S. Standards for Grain.

Dockage: Official USDA procedure using the Carter Dockage Tester.

Moisture: HRW, SW, HW – Official USDA NIR method; HRS, Durum – AACC 44-11.01 (Motomco Moisture Meter) and AACC 44-15.02 (air oven method); SRW - AACC 44-15.02.

Test Weight: AACC 55-10.01; test weight is mathematically converted to hectoliter weight: for durum - kg/hl = lb/bu x 1.292 + 0.630, for other classes - kg/hl = lb/bu x 1.292 + 1.419.

Protein: HRW, HRS, SW, HW – AACC 39-25.01 (NIR method); all other classes - AACC 46-30.01 (Dumas combustion nitrogen analysis or CNA method).

Single Kernel Characterization: AACC 54-31.01 using Perten SKCS 4100.

Sedimentation: HRS, HRW (Midwestern), SRW, SW, HW - AACC 56-61.02; Durum - AACC 56-70.01.

1000 Kernel Weight: HRS, Durum, SRW - based on a 10-gram sample of clean wheat counted by an electronic counter; SW, HW - based on the average weight of three 100-kernel samples expressed on a 14% moisture basis (mb); HRW – average of SKCS kernel weight times 1000.

Ash: AACC 08-01.01 expressed on a 14% mb.

Falling Number: AACC 56-81.03; average value is a simple mean of sample results.

Vitreous Kernels: HRS and durum only - percentage by weight of vitreous kernels hand-picked from a 15-gram sample of clean wheat.

Kernel Size Distribution: Cereal Foods World (Cereal Science Today) 5:(3), 71 (1960). Wheat is sifted with a RoTap sifter using Tyler No. 7 (2.82 mm) and No. 9 (2.00 mm) screens. Kernels remaining on the No. 7 screen are "Large," passing through the No. 7 screen but not the No. 9 are "Medium," and passing through the No. 9 screen are "Small."

FLOUR DATA

Laboratory Milling Extraction: Samples are cleaned and tempered according to AACC 26-10.02. All samples other than California (CA) HRW are milled with standardized mill settings on a Buhler laboratory mill using these methods: SW – AACC 26-31.01 with bran dusting flour by Buhler MLU-303 and shorts sifting flour using 119 micron sieve; HRW (Midwestern), SRW, HRS and HW - AACC 26-21.02. CA HRW is milled on a Brabender® Quadrumat Senior mill using the Brabender® procedure. All extraction rates are calculated against total products on an "as is" moisture basis.

Ash: AACC 08-01.01, reported on 14% mb.

Color: HRW, SRW - Minolta method using Minolta Chroma Meter CR-110; HRS, SW, HW - CR-410 with Granular-

Materials Attachment CR-A50. CIE 1976 L*a*b* color system: L* indicates white-black, a* - red-green, and b* - yellow-blue.

Protein: HRW, HRS - AACC 39-10.01 (NIR method); all other classes - AACC 46-30.01 (Dumas CNA method).

Wet Gluten and Gluten Index: HRS, SRW, HW, HRW (Midwestern) - AACC 38-12.02; SW - AACC 38-12.02 (water reduced from 4.8 to 4.2 ml); HRW (CA) - ICC-137 (Glutomatic method).

Falling Number: AACC 56-81.03; average value is a simple mean of sample results.

Farinograph: AACC 54-21.02 with 50-g bowl. Absorption is reported on 14% mb. Classification (HRS only) incorporates peak time, mixing tolerance, and general curve characteristics rated on a scale of 1-8. Higher numbers indicate stronger protein flours.

(See farinogram reference at www.uswheat.org/fg)

Alveograph: Durum - AACC 54-30.02 modified; other classes - AACC 54-30.02.

Amylograph: HRS (100 g) - AACC 22-10.01; HRW, HRS (65 g), SRW, SW, HW - AACC 22-10.01 modified to use 65 g flour (14% mb) and 450 ml distilled water with paddle (HRS) or pins (other classes).

Extensograph: AACC 54-10.01, modified 45-min and 135-min rest for HRS, HRW, HW; 45-min rest for SW.

Starch Damage: SRW – AACC 76-30.02; all other classes – AACC 76-33.01 (SDmatic method)

Solvent Retention Capacity (SRC): AACC 56-11.02.

SEMOLINA DATA

Laboratory Milling Extraction: Midwestern samples are milled using a modified Buhler laboratory mill with identical settings and equipped with Miag laboratory purifiers, as described by Vasiljevic and Banasik 1980: Quality Testing Methods for Durum Wheat and its Products, pp. 64-72, Dept. of Cereal Chemistry and Technology, NDSU, Fargo, ND. Roll gaps are modified to (in mm): B1-0.762; B2-0.305; B3-0.254; R1-0.102; B4-0.076; B5-0.038. Extraction rates are calculated against total products on an "as is" moisture basis. Procedure is derived from AACC 26-41.02 based on research showing improved correlation between laboratory and commercially milled semolina quality. Pacific Southwest samples are milled on a Modified Chopin CD2 mill.

Ash: AACC 08-01.01 on 14.0% mb.

Color: Minolta Method using Minolta Chroma Meter CR-310.

Protein: AACC 46-30.01 (Dumas CNA method).

Wet Gluten and Gluten Index: AACC 38-12.02 (Glutomatic procedure).

Specks: Sample is pressed under a 3-inch x 4-inch glass plate, and the specks within a one-inch square marked on the plate are counted. Average of three determinations is expressed as specks per 10 square inches.

Mixograph: Ten grams of semolina are mixed in a 10-g bowl with 5.8 ml of distilled water to give maximum dough consistency. A classification incorporating peak height and

general curve characteristics is assigned based on comparison with eight reference mixograms; the higher the classification number, the stronger the curve type.

END-USE PRODUCT DATA

HRW: AACC 10-10.03 (pup loaf method). 100 g flour at 14% mb with optimized water absorption is mixed to optimum development with other ingredients (6% sugar, 3% shortening, 1.5% salt, 1.0% instant dry yeast, 50 ppm ascorbic acid, and 0.25% mated barley flour) in a 100-g pin mixer with head speed of 100-125 rpm. The dough is fermented for 60 min with two punches, then molded, panned, and proofed for 60 min before baking at 425 F for 18 min. Loaf volume is measured immediately after baking by rapeseed displacement. Crumb grain and texture are evaluated on a scale of 0 to 6, which for this booklet is mathematically converted to a scale of 1-10. CA HRW - AACC 10-10.03 producing two loaves per batch using active dry yeast, Doh Tone, 45 ppm ascorbic acid and 120-min fermentation. Loaf volume is measured immediately after baking. Grain and texture are scored on a scale of 1-10 with higher numbers indicating preferred quality.

SRW: AACC 10-10.03 producing two loaves per batch using dry yeast and ascorbic acid. After mixing, the dough is divided into two equal portions, fermented for 160 min, molded and panned in "pup loaf" pans before proofing and baking. Loaf volume is measured immediately after baking by rapeseed displacement. SRW Cookie Spread Ratio - AACC 10-50.05.

HRS: AACC 10-09.01 (long fermentation method), modified: 15 SKB units fungal amylase/100 g flour; 1% instant dry yeast; 10 ppm ammonium phosphate; 2% added shortening. Dough is mechanically punched, molded, and baked in "Shogren-type" pans. Scoring is based on a scale of 1-10 with higher numbers indicating preferred quality attributes.

SW: Cookie diameter - AACC 10-52.02. Sponge cake volume* and score - Japanese standard method described by Nagao in Cereal Chemistry 53:977-988, 1976. Sponge cake control flour is western white. SW High Protein - AACC 10-10.03 with 180-min fermentation for bread.*

Durum: Pasta is made using the laboratory procedure described by Walsh, Ebeling, and Dick, Cereal Foods World: 16: (11) 385 (1971). Water (adjusted to optimum hydration based on P-value from Alveograph test) is added to semolina and mixed in a Hobart mixing bowl 5 min. Semolina-water mixture is extruded using a DeMaco laboratory pasta extruder. Spaghetti is dried using modified Buhler low-temperature drying cycle as described by Debbouz, Pitz, Moore, and D'Appolonia, Cereal Chemistry: 72 (1):128-131. Color scores are determined by the procedure described by Walsh, Macaroni Journal 52: (4) 20 (1970), using a Minolta Color Difference Meter (Model: CR 310). Higher values (scale 1-12) are preferred. Cooked weight, cooking loss and firmness are determined by AACC 16-50.01.

HW Baking: AACC 10-10.03 with 180-min fermentation.*

HW Noodle: Two noodle types are prepared from each HW flour: Chinese raw noodles and Chinese wet noodles. Raw noodle formula: flour 100%, salt 1.2%, and distilled water 28%; wet noodle formula: flour 100%, salt 2%, K₂CO₃ 0.45%, Na₂CO₃ 0.45%, and distilled water 32%. Noodle sheet color is measured by stacking three dough sheets and taking two readings from each side of two dough sheets (a total of eight readings) using a Minolta CR-310 Chroma Meter; the mean value is reported. For wet noodles, noodle sheet color is measured on both uncooked and parboiled (for 1.5 min) sheets. Cooking yield is percent of weight gain after cooking for 5 min for raw noodles and 1.5 min for wet noodles, rinsing in 26°-27° C water and draining. Sensory noodle color stability score is a total score of noodle color rated at 2 and 24 hours against a control sample (an assigned score of 7) and is reported based on a scale of 1-10; higher scores indicate better color stability. Noodle texture is determined on five strands of cooked noodles (2.5 x 1.2 mm for raw noodles, W x T; 1.7 x 1.6 mm for wet noodles, W x T) using a Stable Micro Systems TA.XT2 Texture Analyzer. Firmness indicates noodle bite; springiness indicates the degree of recovery after first bite; cohesiveness is a measure of noodle structure disruption during first bite; and chewiness is a product of firmness, cohesiveness and springiness (firmness x cohesiveness x springiness) and thus is a single parameter that incorporates the three textural parameters. Higher textural parameter values are generally more desirable for Chinese-style noodles.

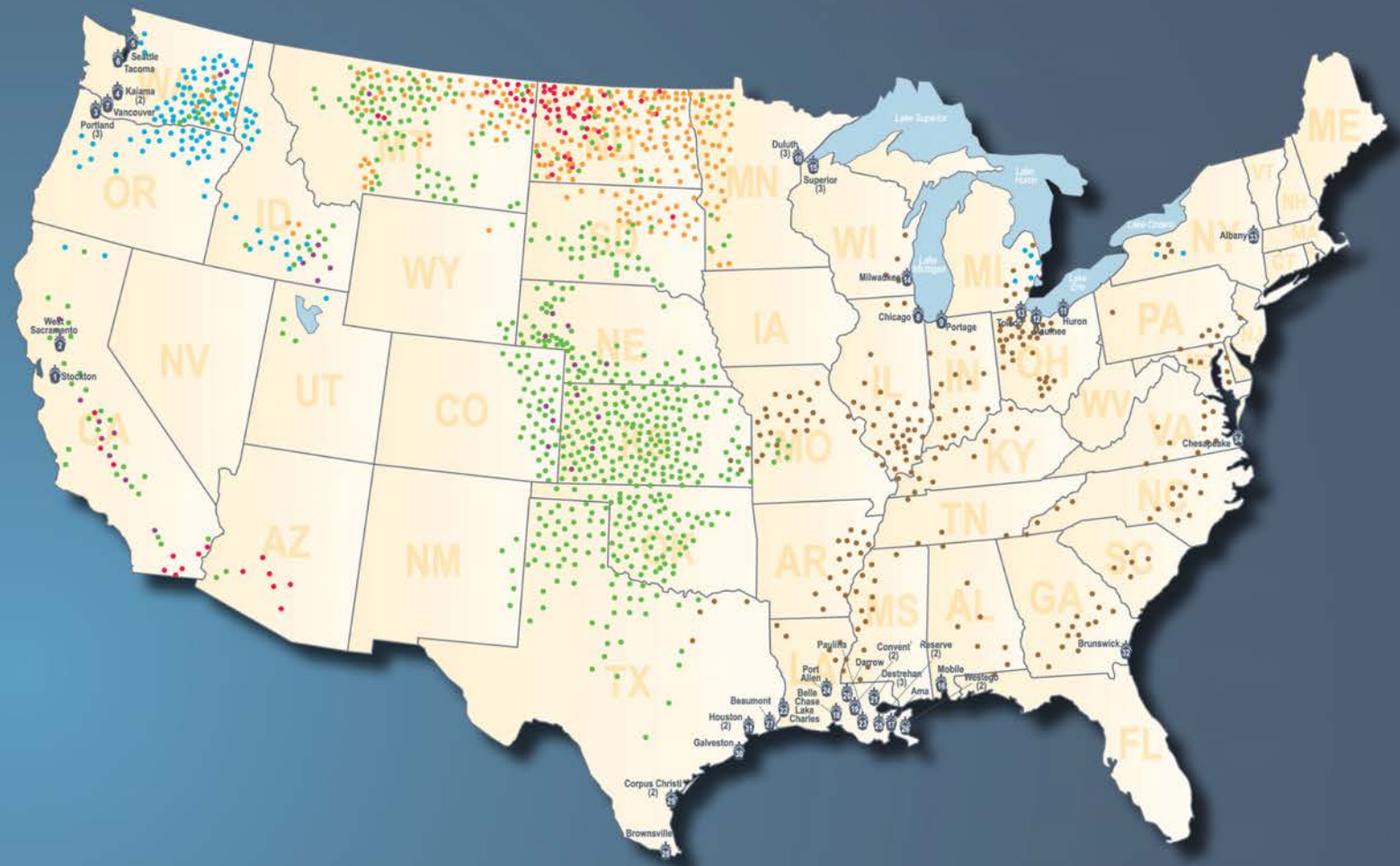
Chinese Steamed Bread: Two types of steamed breads are prepared: Chinese southern-type steamed breads from each of the SW and club wheat flours and Asian-type steamed breads from each of the HW flours. Chinese southern-type formula: flour 100%, sugar 15%, shortening 4%, baking powder 1.2%, instant yeast 0.8%, nonfat dry milk powder 3% and water 39-43%; Asian-type formula: flour 100%, instant yeast 1.5%, sugar 12%, shortening 2%, and water 42.5-45%. Yeast is dissolved in water before use. All steamed breads are prepared using no-time dough methods (WMC protocols). The total product score comprises volume*, external characteristics, internal characteristics, eating quality and flavor. Each property is rated compared with a control sample. The control flour is scored 70.

*Finished Product Volume for SW sponge cake, steamed bread, and bread and HW bread and steamed bread: Laser light using a Tex Vol Instrument (BVM-L370).

Wheat Grades and Grade Requirements Table

Grading Factors	Grades U.S. Nos.				
	1	2	3	4	5
	Minimum limits:				
Test Weight (lbs/bu)					
Hard Red Spring or White Club	58.0	57.0	55.0	53.0	50.0
All other classes and subclasses	60.0	58.0	56.0	54.0	51.0
Test Weight (kg/hl)					
Hard Red Spring or White Club	76.4	75.1	72.5	69.9	66.0
Durum	78.2	75.6	73.0	70.4	66.5
All other classes and subclasses	78.9	76.4	73.8	71.2	67.3
	Maximum percent limits:				
Defects					
Damaged kernels:					
- Heat (part of total)	0.2	0.2	0.5	1.0	3.0
- Total	2.0	4.0	7.0	10.0	15.0
Foreign material	0.4	0.7	1.3	3.0	5.0
Shrunken and broken kernels	3.0	5.0	8.0	12.0	20.0
Total ¹	3.0	5.0	8.0	12.0	20.0
Wheat of Other Classes ²					
Contrasting classes	1.0	2.0	3.0	10.0	10.0
Total ³	3.0	5.0	10.0	10.0	10.0
Stones	0.1	0.1	0.1	0.1	0.1
	Maximum count limits (all grades):				
Other material (1000 gram sample)					
Animal filth			1		
Castor beans			1		
Crotalaria seeds			2		
Glass			0		
Stones			3		
Unknown foreign substance			3		
Total ⁴			4		
Insect-damaged kernels					
in 100 grams			31		
U.S. Sample grade:					
Wheat that:					
(a) Does not meet the requirements for U.S. Nos. 1, 2, 3, 4, 5; or					
(b) Has a musty, sour or commercially objectionable foreign odor (except smut or garlic odor); or					
(c) Is heating or of distinctly low quality.					
Notes:					
1. Includes damaged kernels (total), foreign material, and shrunken and broken kernels.					
2. Unclassed wheat of any grade may contain not more than 10.0% of wheat of other classes.					
3. Includes contrasting classes.					
4. Includes any combination of animal filth, castor beans, crotalaria seeds, glass, stones, or unknown foreign substance.					
Wheat Equivalents:			Metric Equivalents:		
1 bushel =	60 pounds (27.2 kg)	1 pound =	0.4536 kg		
36.74 bushels =	1 metric ton	1 metric ton (MT) =	2204.6 lbs		
37.33 bushels =	1 long ton	1 short ton (2000 lbs) =	0.9072 MT, or 907.2 kg		
33.33 bushels =	1 short ton	1 long ton (2240 lbs) =	1.0160 MT, or 1016.0 kg		
3.67 bushels =	1 quintal	1 metric ton =	10 quintals		
tons/ha =	0.06725 bu/acre	1 hectare =	2.47 acres		
durum kg/hl =	lbs/bu x 1.292 + 0.630	1 acre =	0.40 hectare		
other wheat kg/hl =	lbs/bu x 1.292 + 1.419	1 hundredweight =	100 pounds or 45.36 kg		

U.S. wheat...the world's most reliable choice



HARD RED WINTER



Medium to high protein, medium hard endosperm, red bran, medium gluten content and mellow gluten. Used in pan breads, Asian noodles, hard rolls, flatbreads and general-purpose flour.



HARD RED SPRING



Highest protein content, hard endosperm, red bran, strong gluten, high water absorption. Used in pan breads, hearth breads, rolls, croissants, bagels, hamburger buns, pizza crust and for blending.



SOFT RED WINTER



Low protein content, soft endosperm, red bran, weak gluten. Used in pastries, cakes, cookies, crackers, pretzels, and flat breads. Can also be used for blending.



SOFT WHITE



Low protein, low moisture wheat. Soft endosperm, white bran, weak gluten. Used in pastries, cakes, biscuits, crackers, flat breads, Asian-style noodles and snack foods.



HARD WHITE



Medium to high protein content, hard endosperm, white bran. Used in Asian noodles, whole wheat or high extraction flour applications, pan breads and flat breads.



DURUM



Hardest of all wheats, high protein content, yellow endosperm, white bran. Used to make pasta, couscous and some Mediterranean breads.



**U.S. WHEAT
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CAPE TOWN	(27 21) 418-3710	(27 21) 419-0400	InfoCapeTown@uswheat.org
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