2008 Hard Red Winter

WHEAT

Quality Report

Regional

Regional

2008 Wheat Quality Survey

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Nebraska Wheat Board
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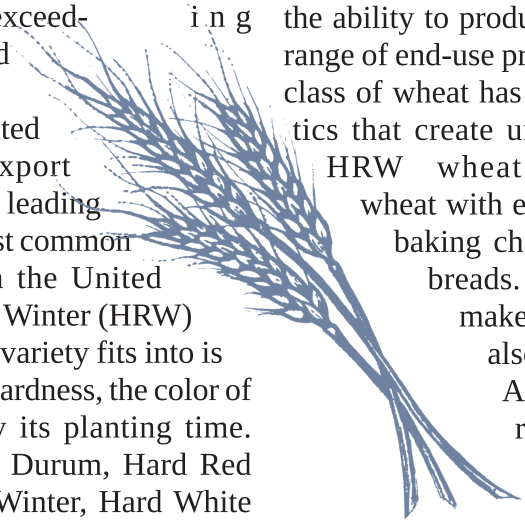
Oklahoma Wheat Commission
www.wheat.state.ok.us
South Dakota Wheat Commission
www.sdwheat.org
Texas Wheat Producers Board and Associatior
www.texaswheat.org
Wyoming Wheat Growers Association
www.wyomingwheat.com

Plains Grains Inc., Grains, Inc., a non-profit, private quality based marketing initiative

Hard Red Winter Wheat

Feeding the World

Wheat is one of the oldest and most widely used food crops in the nation and it supplies approximately 20 percent of food calories for the world's population.Whole grains contain protective antioxidants in amounts near or exceeding those in fruits and vegetables



Wheat is the United State's leading export crop and the fourth leading field crop. The most common class produced in the United States is Hard Red Winter (HRW) wheat. The class a variety fits into is determined by its hardness, the color of its kernels and by its planting time. Other classes are: Durum, Hard Red Spring, Soft Red Winter, Hard White and Soft White.

Almost 50 percent of the U.S.'s total wheat production is exported. Approximately one-third of the HRW produced is exported. Nigeria is the number one importer of U.S. HRW, with a little over 75 percent of its total imports coming from the U.S.

Wheat flour is the major ingredient in many favorite foods found across the globe. More foods are made from wheat than any other cereal grain. Wheat has the ability to produce a widely diverse range of end-use products because each class of wheat has distinct characteristics that create unique functionality. HRW wheat is a versatile wheat with excellent milling and baking characteristics for pan breads. Principally used to make bread flour, HRW is also a choice wheat for Asian noodles, hard rolls, flat breads and as a blending improver.

Hard Red Winter wheat accounts for about 40 percent of total U.S. wheat production and is grown primarily in the Great Plains states of Colorado, Kansas, Nebraska, Oklahoma, Texas, Montana, South Dakota and Wyoming.

Regional

Plains Grains, Inc.

Plains Grains, Inc., a non-profit, private quality based marketing initiative, was formed in 2004 through the Oklahoma Wheat Commission, the Oklahoma Department of Agriculture, Food and Forestry, the Oklahoma State University Division of Agricultural Sciences and Natural Resources.

PGI was designed to bridge the gap between wheat producers, grain companies and foreign and domestic flour millers to benefit all segments of the wheat industry.

PGI facilitates the appropriate wheat quality tracking needed to provide millers with the quality information they need to purchase U.S. wheat. While state data is important, it is critical to Plains Grains marketing goals to have quality data for the entire HRW wheat production area. Each state may be able to produce the quality needed by foreign buyers, but it will take multiple states to achieve the critical mass needed to meet the quantity needs. By working together as a region we can meet both quality and quantity demands.

In 2004, PGI's crop quality survey included the Oklahoma HRW wheat crop. Designed as a regional marketing entity, PGI then brought five other HRW wheat producing states on board for the crop quality survey in 2005. Due to the welcome reception and success of PGI in the foreign marketplace, the entire Great Plains HRW wheat production region subscribed to the PGI crop quality survey in 2006.

PGI PLAINS GRAINS INC.

www.plainsgrains.org

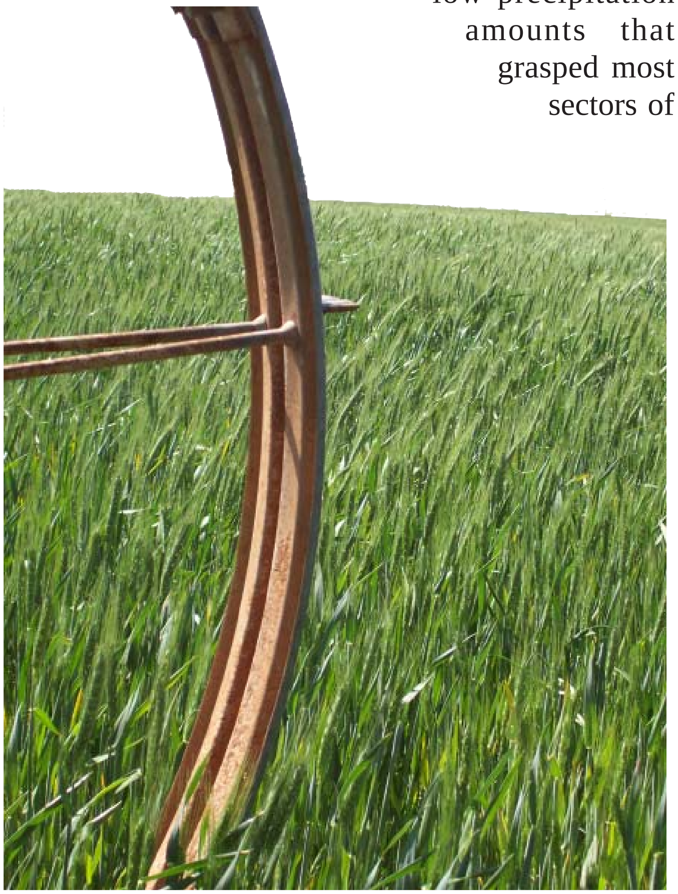
Hard Red Winter Wheat

Crop Production and Review

Texas

PLANTING: Planting for the 2008 crop began within the first week of September when a little moisture moved through Texas and the land was in fair to good condition; however, most planting ceased in mid-October due to lack of moisture and poor emergence rates. By Nov. 23, 93 percent of the crop was planted but only 70 percent of it was emerged, 18 percentage points behind the previous year.

HARVEST: Harvest started with low precipitation amounts that grasped most sectors of the state. Harvest of the 2008 HRW wheat crop started in the lower plains at the beginning of June and statewide crop conditions were deemed mostly poor. Harvest progressed faster than the previous year and concluded around July 13, with the exception of some late seeded land in the northern high plains. *(National Agricultural Statistics Service, Texas Field Office)*



Oklahoma

PLANTING: Planting started slowly around Sept. 2, 2007 when moisture from Hurricane Erin slowed the progress even more. By Sept. 17, only 12 percent of the crop was in the ground, 11 points behind the five-year average. Then, when approximately 90 percent of the crop was in the ground reports were surfacing that lack of moisture was causing emerged plants to turn yellow.

HARVEST: The 2008 crop harvest started within the last two weeks of May with reports of kernel damage due to lack of moisture. During the same period, tornadoes, rain and hail moved into Oklahoma, followed by temperatures over 100 degrees. The warm weather sped up harvest in southwest Oklahoma.

However, with over half the crop still in the fields, thunderstorms halted harvest. By the end of June harvest stood at 93 percent complete and producers were all ready at work on next year's crop. *(National Agricultural Statistics Service, Oklahoma Field Office)*

Regional Crop Production and Review

Kansas

PLANTING: The wheat crop progressed very slowly in 2008. Planting and emergence were delayed by dry conditions and cool temperatures that persisted throughout most of the growing season.

Warmer temperatures at the end of May helped move along wheat development, but frequent rains delayed ripening and harvest in many parts of the state. As of July 7, only 79 percent of the wheat crop had been harvested.

HARVEST: Unfortunately, rainy weather began in mid-June as harvest was beginning. The remainder of the state, though drier than normal throughout May, also saw wetter conditions in June, with excessive moisture posing a particular problem in the east central and southeastern divisions.

For the eastern two-thirds of the state, problems encountered included ice in December, cooler-than-normal conditions throughout the season, and wetter-than-normal conditions during the harvest period. Cooler conditions did mean that freezing temperatures in April did not produce nearly as much damage as occurred in 2007. Hail was a significant factor this year. Hail reports for May through June 2007 totaled 588; for the same period in 2008, hail reports totaled 897. *(2007 Kansas Performance Tests with Winter Wheat Varieties)*

Wyoming

PLANTING: The 2008 crop progressed ahead of normal, from the planting that was complete by mid-September to the emergence rates of late September. The 08 crop was in good condition going into the winter months of November and December, with over half the crop rated in good to excellent condition.

HARVEST: Harvest started the second week in July, but progressed slowly as crop maturity was delayed because of their overall lack of moisture. Those first months of summer saw high temperatures and little precipitation. Wheat harvest was complete within the first two weeks of August, slightly behind last year and about five percent behind the five-year average.

2008/2009 CROP: Cold nights and warm days in mid-September, combined with little rains had planting the 08/09 crop behind last year, but still ahead of the average. By Sept. 29, almost all winter wheat was planted with 74 percent emerged. *(National Agricultural Statistics Service, Wyoming Field Office)*

Hard Red Winter Wheat

Crop Production and Review

Colorado

PLANTING: After enduring higher than normal temperatures for 11 consecutive weeks, planting of the 2008 crop was going by Sept. 10. Much needed rain moved into the area within the week, causing planting to deviate slightly from the normal pace. Winter wheat was 96 percent seeded and 71 percent emerged by Oct. 15, 2007. The crop was rated in mostly good condition.

The 2008 harvest started during the last days of June. Harvest was complete by the last week in July, first weekend in August.

HARVEST: Winter wheat production was estimated at 57 million bushels, 39.4 percent lower than last year's bumper crop. The area seeded last fall for this year's crop was estimated at 2.15 million acres. The area harvested for grain was estimated at 1.90 million acres, down from 2.35 million acres harvested last year. The average yield per acre for this year's crop was 30 bushels, 10 bushels below last year.

Seeding for the 2009 crop was complete by Oct. 17, 2008 and was 87 percent emerged with the crop in mostly good condition.*(National Agricultural Statistics Service, Colorado Field Office)*

Nebraska

HARVEST: The final 2008 estimate for Nebraska wheat production totaled 73.5 million bushels, 13 percent below last year's crop but 20 percent above two years ago, according to the USDA's National Agricultural Statistics Service, Nebraska Field Office. Average yield in Nebraska is estimated at 44 bushels per acre, unchanged from the August forecast but 1 bushel above last year. Area harvested for grain, at 1.67 million, is 30,000 acres below the August forecast and 290,000 less than last year.*(National Agricultural Statistics Service, Nebraska Field Office)*

South Dakota

PLANTING: Planting the 2008 crop started during the first week of September, aided by cooler than normal temperatures. Producers took advantage of the cool weather and planting progressed ahead of the norm. Tractors were out of the fields by mid-October, a pace well above past years. Winter wheat planted for 2008 totaled 1.90 million acres, up from 1.55 million in 2005 the year of the last state wheat variety survey.

HARVEST: Harvest had started by July 18, but some farmers saw crop loss from a hail storm that crossed the state during the weekend of July 19- 20. Continued precipitation kept some producers out of their fields in the following weeks, but harvest progressed right at the average for the state. Winter wheat harvest is nearly complete by Aug. 18, with 97 percent of the crop out of the fields.

2008/2009 CROP: Seeding the 08/09 crop started a few weeks later than last year with some producers concerned about the lack of soil moisture. By Sept. 8, 2008, only 10 percent of the crop was in the ground, which is behind the five-year average of 18 percent. *(National Agricultural Statistics Service, South Dakota Field Office)*

Regional

National Wheat Overview

Wheat Major Classes

The six major classes of U.S. wheat are Hard Red Winter, Hard Red Spring, Soft Red Winter, Soft White, Hard White and Durum. Each class has a somewhat different end use and production tends to be region-specific. This region is mostly limited to production of Hard Red Winter and Hard White wheat classes, therefore the data in this publication will focus on the quality of those classes for the 2008 crop year.

Hard Red Winter (HRW) wheat accounts for about 40 percent of total U.S. wheat production, dominates the U.S wheat export market and is grown primarily in the Great Plains, stretching from the Mississippi River to the Pacific Ocean and from Canada to Mexico.

This fall seeded wheat is a versatile wheat with moderatly high protein content and excellent milling and baking characteristicsD. Principally used to make bread flour, HRW is also a choice wheat for Asian noodles, hard rolls, flat breads and is commonly used as an improver for blending.

Hard White (HW) is the newest class of wheat, used for the same basic products as HRW wheat, can provide higher milling extraction and requires less sweetener in whole-wheat products due to its milder, sweeter flavor.

HW, which is closely related to Red wheats, receives enthusiastic reviews when used for Asian noodles, hard rolls, bulgar, tortillas, whole wheat or high extraction applications, pan breads or flat breads.

Hard Red Winter Wheat

2008 Wheat Outlook

The 2008 winter wheat production is estimated at 1.87 million bushels, down slightly from the final forecast but up 23 percent from last year. The U.S. yield is 47.2 bushels per acre, up .6 bushels from August and up five bushels from last year's final yield. Area harvested for grain is estimated at 29.6 million acres, down two percent from the last forecast but up 10 percent from the previous year. Hard Red Winter harvested acreage is up about one percent from the previous year.

Hard Red Winter wheat planted acreage is down from last year due to dry conditions at planting time in the Great Plains States.

Although fewer acres of wheat were planted in Kansas and Oklahoma, producers saw good harvest conditions compared with last year's flood and freeze damaged crops that resulted in an increase in harvested acres in those states this year. Oklahoma's production is up 70 percent from 2007 and Kansas' production is up 25 percent. Colorado and Texas experience drought situations that reduced production 39 percent and 30 percent, respectively. Overall, HRW production totals 1 billion bushels, up eight percent from last year 962 million bushels.

The NASS Crop Production Report stated that HRW harvest was behind normal in all the producing states, except Oklahoma and Texas. Kansas experienced heavy rains in June that slowed the progression of harvest, which was 36 percent complete on June 29. Crop development in Nebraska was put behind normal due to heavy rains and cold June temperatures. Disease problems were concerns in Nebraska and Kansas because of the heavy, continual rainfall. Montana crop development was behind the five-year average and last year.

The U.S. is the world's largest wheat exporter.

Harvest in Colorado, Kansas, Nebraska, Oklahoma and Texas was 95 percent complete by July 28.

Producers began seeding winter wheat early in August and had 11 percent of the crop in the ground by Sept. 14. That was five points behind the five-year average. By Sept. 28, planting the crop was 42 percent complete. Emergence was 14 percent by Sept. 28, still four points behind the average.

Projected domestic use is up 228 million bushels to 1,294 million bushels, mostly due to a sharp increase in feed and residual use from the remarkably low level of the 200/08 marketing year. Projected exports for 2008/09, at 1,000 million bushels, are down 264 million bushels from the previous marketing year.

Some data in this segment is derived from the Wheat Outlook issued by the Economic Research Service through the U.S.D.A. For the most current version, visit www.ers.usda.gov. Other data was derived from the National Agricultural Statistical Services Small Grain Summary issued June 30, 2008.

Regional

Hard Red Winter Wheat

Production Charts

State	2001	2002	2003	2004	2005	2006	2007	2008	03-'07 Average
Hard Winter Wheat Production (1,000 bu.)									
Colorado	66,000	36,300	77,000	45,900	52,800	39,900	87,750	55,900	60,670
Kansas	328,000	270,600	480,000	314,500	380,000	291,200	288,000	356,000	350,740
Nebraska	59,200	50,160	83,720	61,050	68,640	61,200	86,000	73,500	72,122
Oklahoma	122,100	103,600	179,400	164,500	128,000	81,600	116,100	166,500	133,920
South Dakota	11,840	20,100	61,940	56,250	65,560	41,400	81,000	104,000	61,230
Texas	108,800	78,300	96,600	108,500	96,000	33,600	144,000	99,000	95,740
Wyoming	2,880	2,375	3,915	3,510	4,350	N/A	N/A	4,286	4,015
Regional Total	698,820	561,435	982,575	754,210	795,350	548,900	802,850	859,186	776,777

*** Data derived from Crop Production report issued by USDA NASS updated August 30, 2008.*

State	2001	2002	2003	2004	2005	2006	2007	2008	03-'07 Average
Hard Winter Wheat Harvested Acres (1,000 Acres)									
Colorado	2,000	1,650	2,200	1,700	2,200	1,900	2,250	1,936	2,050
Kansas	8,200	8,200	10,000	8,500	9,500	9,100	9,000	8,900	9,220
Nebraska	1,600	1,520	1,820	1,650	1,760	1,700	2,000	1,670	1,786
Oklahoma	3,700	3,700	4,600	4,700	4,000	3,400	4,300	4,500	4,200
South Dakota	370	670	1,430	1,250	1,490	1,150	1,800	3,420	1,424
Texas	3,200	2,700	3,450	3,500	3,000	1,400	4,000	3,300	3,070
Wyoming	120	125	145	135	145	N/A	N/A	146	142
Regional Total	19,190	18,565	23,645	21,435	22,095	18,650	23,350	23,872	21,892

*** Data derived from Crop Production report issued by USDA NASS updated August 30, 2008.*

State	2001	2002	2003	2004	2005	2006	2007	2008	03-'07 Average
Hard Winter Wheat Yield (bu/ac)									
Colorado	33	22	35	27	24	21	39	31	29
Kansas	40	33	48	37	40	32	32	40	38
Nebraska	37	33	46	37	39	36	42	44	40
Oklahoma	33	28	39	35	32	24	27	37	31
South Dakota	32	30	43	45	44	36	45	50	43
Texas	34	29	28	31	32	24	36	30	30
Wyoming	24	19	27	26	30	N/A	N/A	29	17
Regional Total	33	28	38	35	36	29	37	37	35

*** Data derived from Crop Production report issued by USDA NASS updated August 30, 2008.*

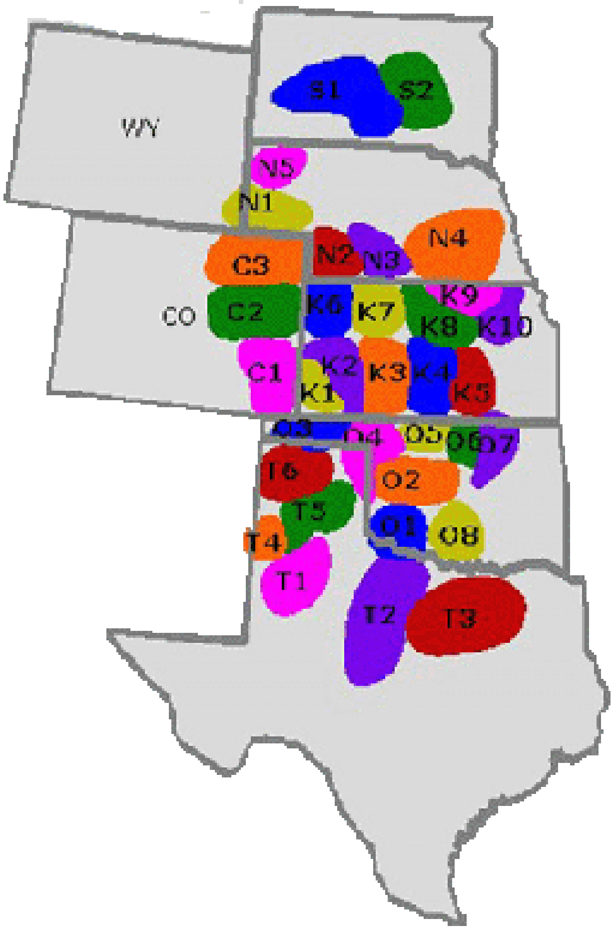
Hard Red Winter Wheat

Survey Methodology

Plains Grains Inc. (PGI) is an Oklahoma-based regional wheat marketing entity that has designed a wheat quality survey to provide end-use quality information to the U.S. wheat buyer. PGI facilitates collection and testing of wheat samples at harvest in order to provide data that specifically describes the quality of U.S. wheat.

PGI facilitates quality testing on a "grainshed" basis. Grainsheds are defined by identifying key loading facilities and outlining the production region which contributes to that facility's grain supply. By defining the production areas in this manner, PGI's survey is able to more accurately represent and deter mine the quality of wheat that will come from a specific regional terminal, thereby giving buyers a truer picture of the product available to compose a shipment of HRW wheat.

The quality of wheat originating from a grainshed is determined by pulling samples from country and terminal elevators located within each defined grainshed. These samples are then immediately sent to the USDA, ARS Hard Winter Wheat Quality Lab in Manhattan, Kan., where they are analyzed and tested for more than 25 quality parameters. Though much of the testing is done at the ARS lab, the Kansas State University Wheat Quality Lab performs a few of the tests and the official grade is determined at the Federal Grain Inspection Service office in Topeka, Kan.



Regional

Wheat Grading Characteristics

The Federal Grain Inspection Service (FGIS) of the USDA Grain Inspection, Packers and Stockyards Administration (GIPSA) sets the standard for U.S. grain grades and grade requirements. U.S. grain grades are reflective of the general quality and condition of a representative sample of U.S. wheat. These grades are based on characteristics such as test weight and include limits on damaged kernels, foreign material, shrunken and broken kernels, and wheat of contrasting classes. Each determination is made on the basis of the grain free of dockage. Grades issued under U.S. standards represent a sum of these factors.

OFFICIAL U.S. GRADES AND GRADE REQUIREMENTS

Grading Factors	Grades				
	No.1	No. 2	No. 3	No. 4	No. 5
HARD RED WINTER - MINIMUM TEST WEIGHTS					
LB/BU	60.0	58.0	56.0	54.0	51.0
MAXIMUM PERCENT LIMITS OF:					
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*	3.0	5.0	8.0	12.0	20.0
WHEAT OF OTHER CLASSES**					
Contrasting Classes	1.0	2.0	3.0	10.0	10.0
Total***	3.0	5.0	10.0	10.0	10.0
Stones	0.1	0.1	0.1	0.1	0.1
MAXIMUM COUNT LIMITS OF:					
OTHER MATERIAL (1,000 gram sample):					
Animal Filth	1	1	1	1	1
Castor Beans	1	1	1	1	1
Crotalaria Seeds	2	2	2	2	2
Glass	0	0	0	0	0
Stones	3	3	3	3	3
Unknown Foreign Substance	3	3	3	3	3
Total****	4	4	4	4	4
INSECT-DAMAGED KERNELS (in 100 grams)	31	31	31	31	31

Note: U.S. Sample grade is wheat that:
(a) Does not meet the requirements for U.S. Nos. 1, 2, 3, 4, or 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.

* Includes damaged kernels (total), foreign material, and shrunken and broken kernels.
**Unclassed wheat of any grade may contain not more than 10.0 percent of wheat of other classes.
***Includes contrasting classes.
****Includes any combination of animal filth, castor beans, crotalaria seeds, glass, stones or unknown foreign substance.

Hard Red Winter Wheat

Wheat Grading Data

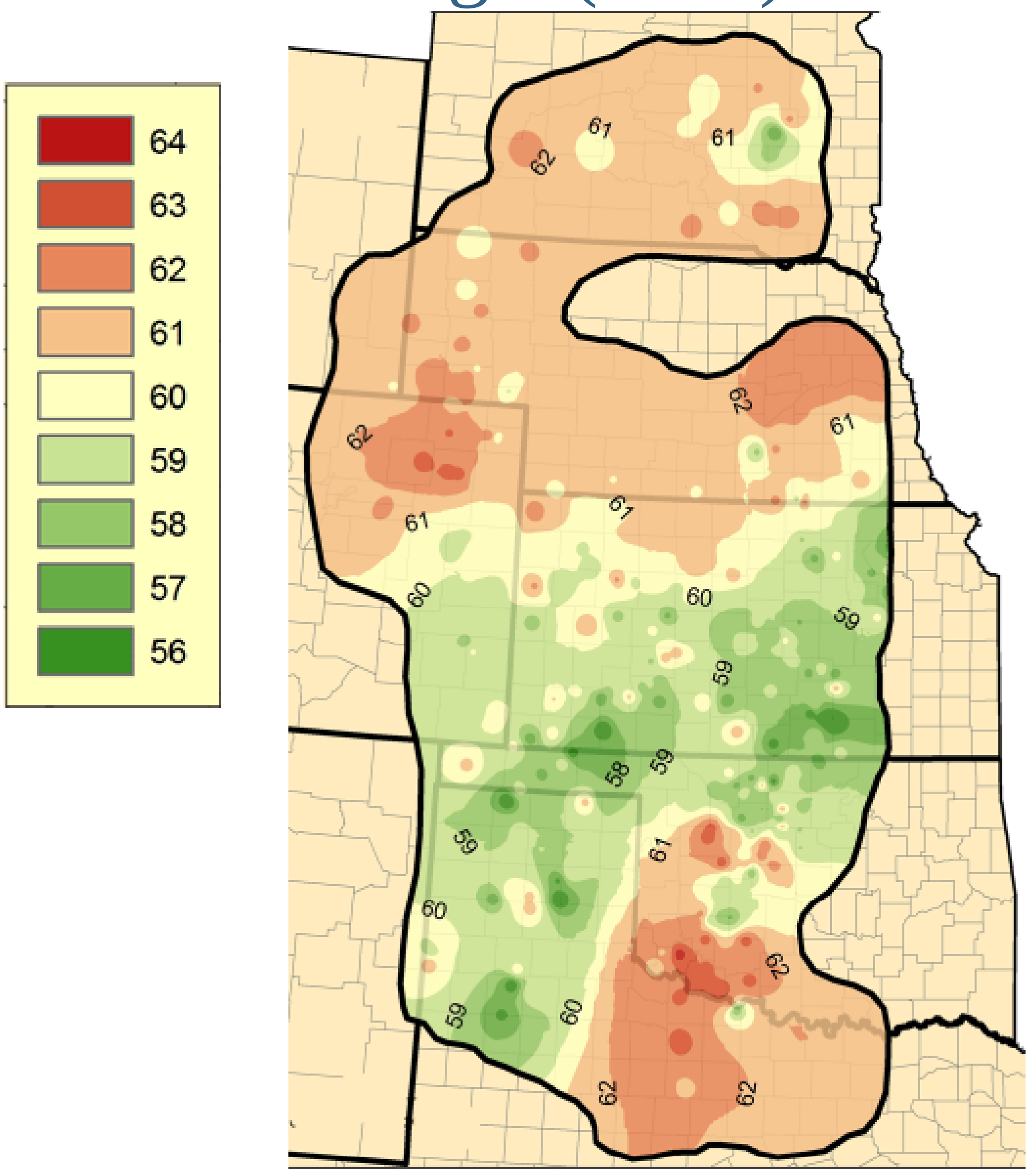
Each determination of heat-damaged kernels, damaged kernels, foreign material, wheat of other classes, contrasting classes, and subclasses is made on the basis of the grain when free from dockage and shrunken and broken kernels.

Defects are damaged kernels, foreign materials, and shrunken and broken kernels. The sum of these three factors may not exceed the limit for the factor defects for each numerical grade.

Dockage is all matter other than wheat that can be removed from the original sample by use of an approved device according to procedures prescribed in FGIS instructions. .

Foreign material is all matter other than wheat that remains in the sample after the removal of dockage and shrunken and broken kernels.

Test Weight (lb/bu)



Regional

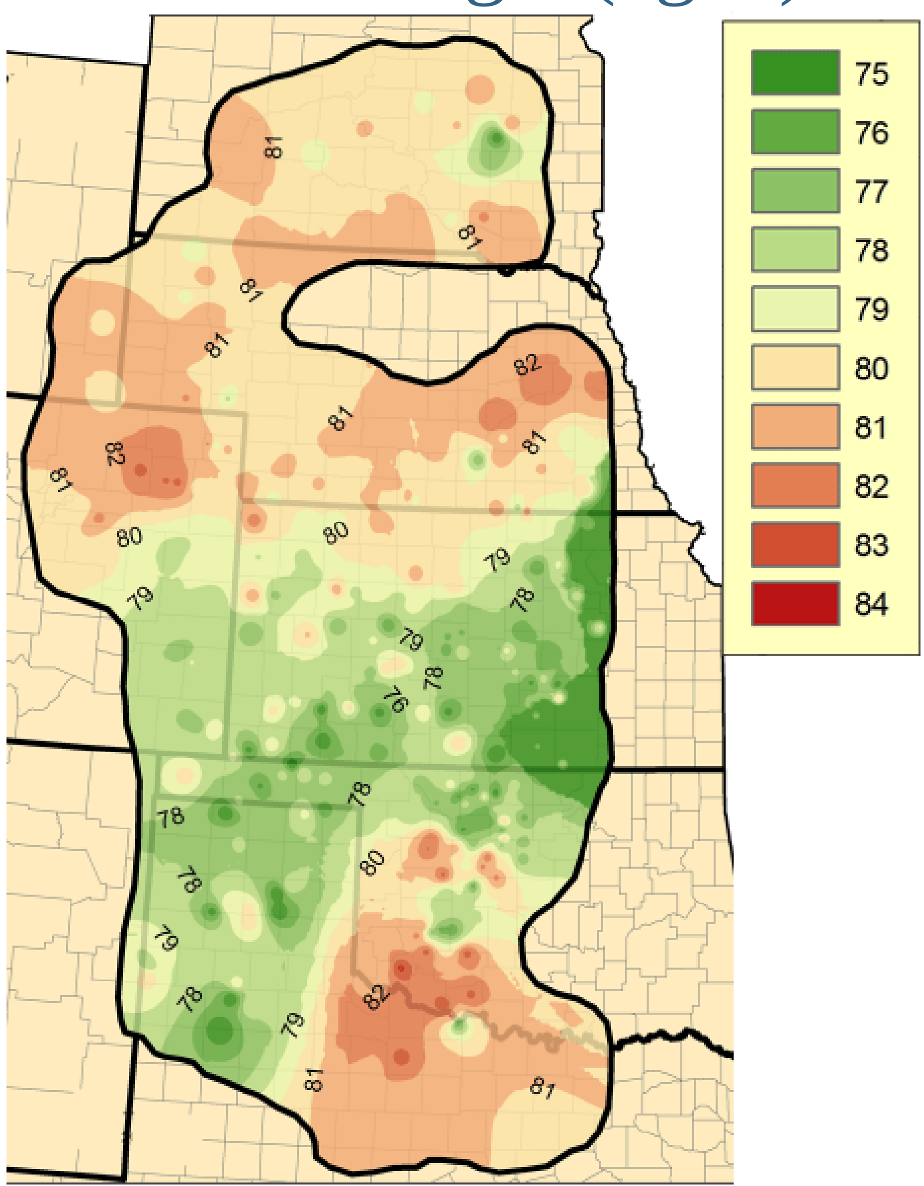
Wheat Grading Data

Each determination of heat-damaged kernels, damaged kernels, foreign ma terial, wheat of other classes, contrasting classes, and subclasses is made on the basis of the grain when free from dockage and shrunken and broken kernels.

Shrunken and broken kernels are all matter that passes through a 0.064 x 3/8-inch oblong-hole sieve after sieving according to procedures prescribed in the FGIS instructions.

Damaged kernels are kernels, pieces of wheat kernels, and other grains that are badly ground-damaged, badly weather-damaged, diseased, frost-damaged, germ-damaged, heat-damaged, insect-bored, mold-damaged, sprout-damaged, or otherwise materially damaged.

Test Weight (kg/hl)



Hard Red Winter Wheat

Wheat Grading Data

Wheat Grade Data	Test Weight		Damaged Kernels Total	Shrunken / Broken Kernels	Wheat of Other Class	Grade
	LBS/BU	KG/HL	%	%	%	US #
Texas						
T1	58.3	76.7	0.2	1.6	0.0	1
T2	61.9	81.4	0.4	1.4	0.0	1
T3	62.0	81.5	0.0	0.9	0.0	1
T4	60.9	80.1	0.2	1.0	0.0	1
T5	58.6	77.1	0.1	1.3	0.0	1
T6	58..3	76.7	0.0	1.5	0.0	1
Oklahoma						
O1	61.9	81.4	0.5	0.8	0.0	1
O2	61.0	80.2	0.3	0.9	0.0	1
O3	58.7	77.3	0.8	1.9	0.0	1
O4	59.1	77.7	0.4	1.1	0.0	1
O5	59.5	78.3	0.6	1.1	0.0	1
O6	58.9	77.5	0.4	1.1	0.0	1
O7	58.4	76.8	0.5	0.8	0.0	1
O8	NA	NA	NA	NA	NA	NA
Kansas						
K1	58.8	77.4	0.1	2.2	0.0	1
K2	59.3	78.0	0.1	0.9	0.0	1
K3	60.0	78.9	0.1	1.4	0.0	1
K4	58.2	76.6	0.4	1.0	0.0	1
K5	57.8	76.1	1.6	1.4	0.0	2
K6	NA	NA	0.2	0.8	0.0	NA
K7	61.0	80.2	0.2	0.9	0.0	1
K8	NA	NA	0.4	1.1	0.0	NA
K9	59.8	78.7	1.4	1.1	0.0	1
K10	57.8	76.1	4.0	1.6	0.0	N/A
Colorado						
C1	59.7	78.5	0.0	0.9	0.0	1
C2	60.6	79.7	0.0	0.8	0.0	1
C3	62.0	80.4	0.1	1.1	0.0	1
Nebraska						
N1	61.7	81.1	0.2	0.8	0.0	1
N2	61.1	80.3	0.1	0.6	0.0	1
N3	61.1	80.3	0.2	0.9	0.0	1
N4	61.6	81.0	0.6	0.7	0.0	1
N5	61.5	80.9	0.1	1.3	0.0	1
Wyoming						
W1	60.6	79.7	0.1	1.0	0.0	1
South Dakota						
S1	61.6	81.0	0.7	0.7	0.0	1
S2	61.3	80.6	0.5	0.7	0.0	1

2008 Wheat Quality Survey

Regional

Kernel Quality Data

Kernel Data	Kernel Distribution Small	Kernel Distribution Medium	Kernel Distribution Large	SKCS Kernel Weight	SKCS Kernel Diameter	SKCS Kernel Moisture	SKCS Kernel Hardness
	%	%	%	gm	mm	%	index #
Texas							
T1	3	56	41	26.9	2.12	10.4	76
T2	1	40	59	30.7	2.31	11.2	79
T3	1	24	75	34.3	2.47	12.2	68
T4	1	36	63	31.5	2.35	12.7	75
T5	2	53	46	26.3	2.10	11.5	75
T6	2	49	49	27.2	2.11	11.6	72
Oklahoma							
O1	1	39	60	30.0	2.30	11.4	75
O2	1	31	69	32.0	2.40	12.8	67
O3	2	53	45	26.0	2.10	11.5	72
O4	2	52	46	26.7	2.20	12.9	74
O5	1	41	57	30.1	2.30	13.3	64
O6	2	35	63	33.2	2.50	12.8	57
O7	1	27	72	30.0	2.30	13.2	53
O8	NA	NA	NA	NA	NA	NA	NA
Kansas							
K1	3	51	46	28.4	2.19	10.8	68
K2	1	48	51	28.2	2.16	11.3	64
K3	2	50	47	27.3	2.11	10.7	65
K4	1	40	59	27.9	2.22	11.7	53
K5	2	37	60	28.1	2.22	11.8	54
K6	1	40	60	29.1	2.23	12.5	67
K7	1	34	64	29.2	2.25	11.2	66
K8	1	33	65	28.8	2.26	10.9	59
K9	1	33	66	30.4	2.34	11.6	56
K10	2	41	57	26.0	2.11	12.6	61
Colorado							
C1	1	44	56	32.0	2.29	13.0	56
C2	0	45	55	29.9	2.23	13.3	59
C3	1	40	59	28.5	2.16	10.7	67
Nebraska							
N1	1	48	51	29.0	2.16	10.7	72
N2	1	31	68	31.5	2.35	11.9	62
N3	1	27	72	31.0	2.34	11.4	60
N4	1	34	65	34.7	2.51	12.2	61
N5	1	41	58	31.2	2.20	12.8	67
Wyoming							
W1	2	68	30	25.3	1.99	10.5	75
South Dakota							
SD1	0	27	73	32.1	2.35	12.6	63
SD2	0	23	77	33.9	2.43	13.2	59

Other Wheat Characteristics

In addition to the U.S. grade factors, there are other characteristics at work to determine the value of the wheat. Examples include dockage, wheat moisture, wheat protein content, thousand-kernel weight (TKW), and falling number.

Moisture content is an indicator of grain condition and storability. Wheat or flour with low moisture content is more stable during storage. Moisture content is often standardized (12 or 14 percent moisture basis) for other tests that are affected by moisture content.

Protein content relates to many important processing properties, such as water absorption and gluten strength, and to finished product attributes such as texture and appearance. Higher protein dough usually absorbs more water and takes longer to mix. HRW wheat generally has a medium to high protein content, making it most suitable for all-purpose flour and chewy-texture breads.

Ash content also indicates milling performance and how well the flour separates from the bran. Millers need to know the overall mineral content of the wheat to achieve desired or specified ash levels in flour. Ash content can affect flour color. White flour has low ash content, which is often a high priority among millers.

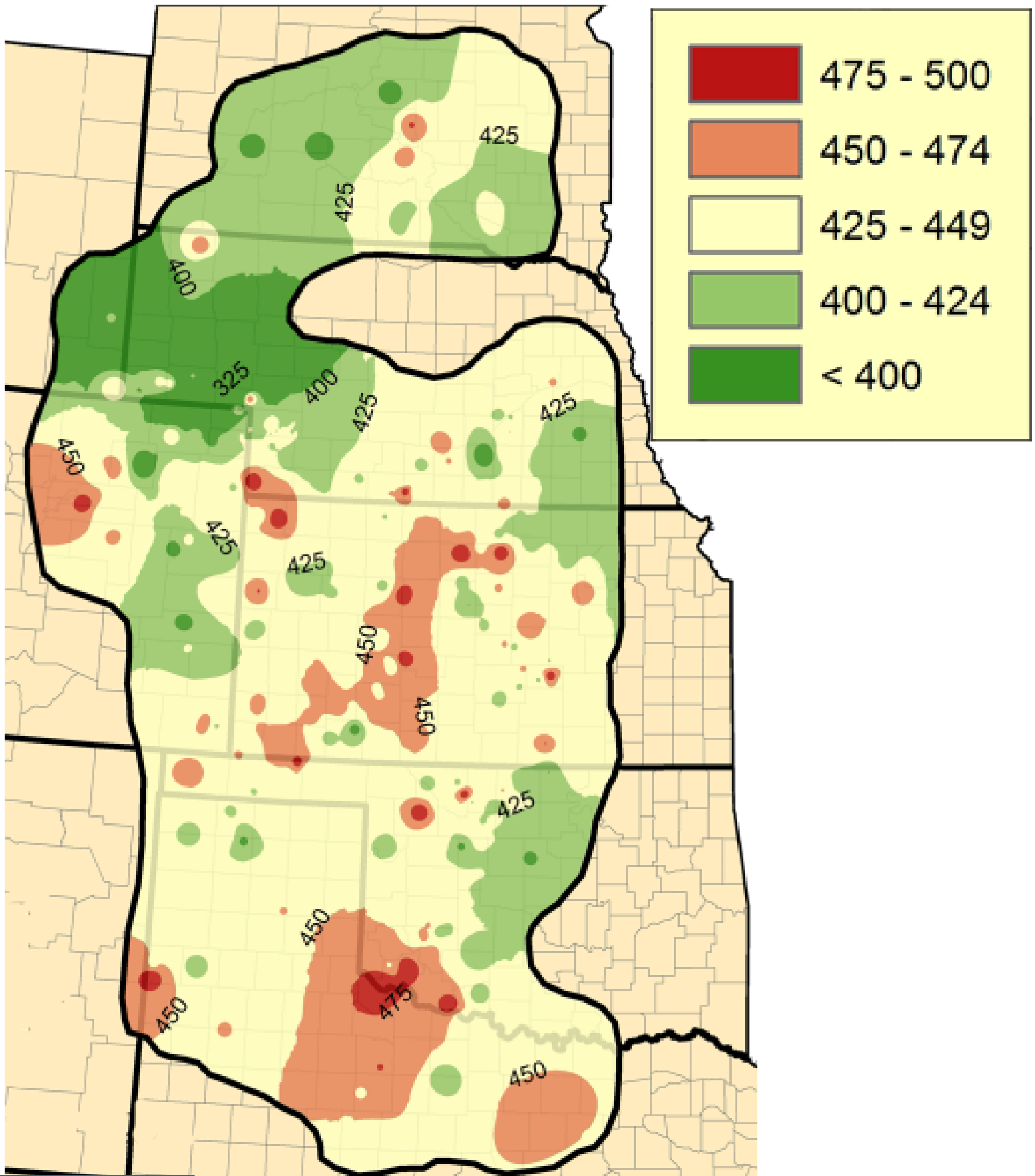
Thousand-kernel weight and kernel diameter provide measurements of kernel size and density important for milling quality. Simply put, it measures the mass of the wheat kernel. Millers tend to prefer larger berries, or at least berries with a consistent size. wheat with a higher TKW can be expected to have a greater potential flour extraction.

Falling number is an index of enzyme activity in wheat or flour and is expressed in seconds. Falling numbers above 300 are desirable, as they indicate little enzyme activity and a sound quality product. Falling numbers below 300 are indicative of more substantial enzyme activity and sprout damage.

Zeleny Sedimentation tests provides information on the protein quantity and the quality of ground wheat and flour samples. During the sedimentation test gluten proteins of ground wheat or flour swells and precipitate as a sediment

Regional

Falling Number (seconds)



Falling number is an index of enzyme activity in wheat or flour and is expressed in seconds.

Hard Red Winter Wheat

Other Wheat Characteristics

Wheat Non-Grade	Dockage	Moisture	Protein 12% mb	Wheat Ash 14% mb	Thousand Kernel Weight	Falling Number
Date	%	%	%	%	g	sec
Texas						
T1	1.0	9.7	13.2	1.74	26.9	446
T2	1.9	10.7	11.6	1.50	30.7	452
T3	1.6	11.3	11.2	1.54	34.3	427
T4	0.7	11.1	13.2	1.61	31.5	446
T5	0.5	10.5	14.3	1.65	26.3	443
T6	1.2	10.6	13.7	1.76	27.2	436
Oklahoma						
O1	0.5	11.2	11.4	1.50	30.0	392
O2	0.3	12.5	11.1	1.50	32.1	423
O3	0.8	10.5	14.1	1.70	26.0	415
O4	0.4	12.4	12.9	1.70	26.7	323
O5	0.6	12.3	12.4	1.70	30.1	452
O6	0.4	12.2	11.7	1.60	33.2	452
O7	0.5	12.9	10.5	1.60	30.0	428
O8	NA	NA	NA	NA	NA	NA
Kansas						
K1	0.1	10.0	13.4	1.61	28.4	443
K2	0.1	10.6	13.4	1.71	28.2	446
K3	0.1	10.0	13.1	1.76	27.3	458
K4	0.3	10.9	11.6	1.66	27.9	436
K5	1.6	10.6	12.2	1.63	28.1	442
K6	0.2	11.6	13.1	1.70	29.1	438
K7	0.2	10.4	12.6	1.66	29.2	453
K8	0.5	9.9	11.9	1.73	28.8	448
K9	0.4	11.1	12.1	1.76	30.4	412
K10	0.8	11.4	12.5	1.87	26.0	419
Colorado						
C1	0.6	12.3	13.4	1.66	32.0	425
C2	0.5	11.8	13.0	1.54	29.9	430
C3	0.5	10.4	11.3	1.56	28.5	423
Nebraska						
N1	0.4	10.8	11.8	1.66	29.0	410
N2	0.4	11.6	11.8	1.78	31.5	439
N3	0.3	10.9	11.3	1.73	31.0	434
N4	0.5	11.6	12.2	1.73	34.7	430
N5	0.7	12.5	11.4	1.71	31.2	415
Wyoming						
W1	0.4	10.7	12.6	1.66	25.3	445
South Dakota						
SD1	1.3	12.3	11.6	1.73	32.1	419
SD2	0.6	12.4	12.0	1.79	33.9	424

Regional

Flour Characteristics

Flour is analyzed for indicators of milling efficiency and functionality prop erties. These include: flour yield, ash content, falling number and flour protein.

Flour yield is expressed as a percentage and represents the portion of the wheat kernel that can be milled into flour, which is a significant indicator of milling profitability. Millers need to know the mineral content in wheat to achieve the desired ash levels in flour.

Ash content is an indication of how well flour separates from the bran. Flour ash is expressed as a percentage of the initial sample weight, and is usually expressed on a 14 percent moisture basis.

Flour falling number is an index of undesirable enzyme activity that normally occurs when the kernel sprouts or germinates. A high falling number indicates minimal activity, whereas a low falling number indicates more substantial enzyme activity. Too much activity means that too much sugar and too little starch are present in the flour. Starch provides the supporting structure of bread, so high activity results in sticky dough and poor texture in the finished product.

Wet Gluten data provides information regarding quantity and estimates the quality of wheat. Gluten relates to the elasticity and extensibility characteristics of flour dough.

Wet Gluten Index is a measurement that indicates whether the gluten is weak, normal or strong. A weak gluten would be represented by a gluten index of 0 and the strongest gluten index is 100.

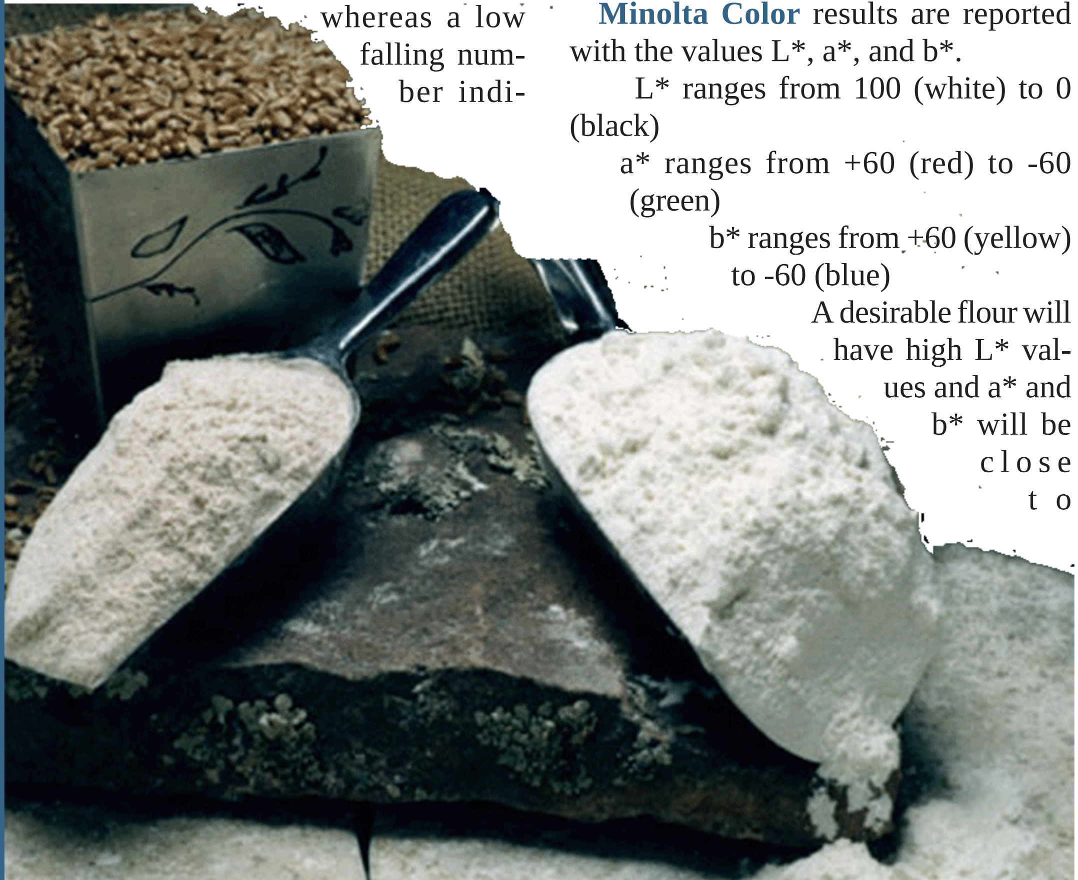
Minolta Color results are reported with the values L*, a*, and b*.

L* ranges from 100 (white) to 0 (black)

a* ranges from +60 (red) to -60 (green)

b* ranges from +60 (yellow) to -60 (blue)

A desirable flour will have high L* values and a* and b* will be close to



Hard Red Winter Wheat

Flour Data

Flour Data	Flour Yield	Flour Moisture	Protein 14% mb	Ash 14% mb	Falling Number	Wet Gluten	Gluten Index
	%	%	%	%	sec	%	%
Texas							
T1	70.6	13.6	12.3	0.61	455	32.9	81.2
T2	77.4	13.2	10.7	0.60	457	27.6	95.7
T3	76.3	13.0	9.8	0.49	402	25.0	94.1
T4	77.2	12.3	11.6	0.67	505	32.7	76.2
T5	72.1	13.1	13.2	0.63	463	37.3	74.8
T6	72.3	13.1	12.3	0.58	459	32.6	79.6
Oklahoma							
O1	76.2	13.3	9.7	0.54	419	23.0	96.4
O2	74.4	13.1	9.3	0.62	442	22.3	97.4
O3	72.7	14.0	12.9	0.62	470	NA	NA
O4	74.4	12.8	12.0	0.58	462	31.6	89.7
O5	74.5	12.6	10.8	0.62	462	NA	NA
O6	73.6	13.5	10.0	0.56	434	24.8	91.4
O7	74.1	13.3	9.1	0.56	408	NA	NA
O8	NA	NA	NA	NA	NA	NA	NA
Kansas							
K1	74.4	13.1	12.4	0.56	428	33.9	84.0
K2	73.6	14.0	12.2	0.56	431	32.8	90.7
K3	74.5	13.3	11.9	0.56	444	31.4	93.6
K4	75.3	13.8	10.3	0.56	397	25.5	98.2
K5	75.0	13.8	10.8	0.55	434	27.5	97.0
K6	72.1	13.4	11.6	0.57	460	31.9	90.3
K7	74.8	13.3	11.2	0.55	435	31.0	91.0
K8	72.6	13.6	10.7	0.52	428	27.5	97.8
K9	76.1	13.2	10.6	0.57	395	28.5	93.3
K10	73.9	14.4	11.0	0.55	400	28.1	96.4
Colorado							
C1	74.3	12.8	12.0	0.61	467	34.5	85.1
C2	74.6	12.7	11.7	0.61	432	33.0	87.4
C3	74.6	12.9	10.2	0.57	431	27.4	94.6
Nebraska							
N1	73.9	13.5	10.6	0.55	428	28.0	93.9
N2	73.1	13.7	10.1	0.55	445	26.8	96.7
N3	75.9	13.3	9.9	0.58	444	26.4	95.9
N4	75.6	14.3	10.6	0.54	426	28.4	95.7
N5	74.4	13.5	10.1	0.57	401	25.1	96.8
Wyoming							
W1	73.5	13.2	11.6	0.60	441	29.8	94.2
South Dakota							
SD1	76.1	13.1	10.5	0.53	418	27.5	97.1
SD2	76.2	13.3	10.7	0.53	413	27.6	96.8

Regional

Dough Characteristics

The strength and mixing properties of dough help the baker determine the value of the flour they purchase. Flour specifications often require specialized testing to determine how flour will perform during processing.

Farinograph testing is one of the most common flour quality tests in the world. Farinograph results are used to determine dough strength and processing requirements.

Absorption is a measurement of the amount of water required for the flour to be optimally processed into the finished product. Peak time indicates the time it takes for the dough to develop from the moment the water is added until maximum consistency is achieved. This measurement is expressed in minutes.

Stability is an indication of dough strength, as it is a measurement of how long the dough maintains maximum consistency. Stability is also expressed in minutes. Weak gluten flour has a lower water absorption and shorter stability time than strong gluten flour.

Peak time represents dough development time by measuring the length of time from the moment water is added until the dough reaches maximum consistency. This measurement indicates optimum mixing time for the dough under standardized conditions.

Mixing Tolerance Index is the resistance of the dough to breakdown during continued mixing. It is the difference in Brabender Unit (BU) value at the top of the curve at peak time and the value at the top of the curve five minutes after the peak. This indicates tolerance to over-mixing and is expressed as a numerical score based on comparison to a control.

Alveograph testing determines the gluten strength of dough by measuring the force required to blow and break a bubble of dough. The results of the test are used by millers to ensure a more consistent product. “P” relates to the force required to blow the bubble of dough; “L” relates to the extensibility of the dough; “W” is a combination of dough strength and extensibility. Weak gluten flour with low P value and long L value is preferred for cakes, where as strong gluten flour used for breads will have a higher P value.

Mixograph measures the resistance of a dough to mixing with pins. Peak time is the optimum mixing time, and mixing tolerance is the resistance of the dough to breakdown during continued mixing.

Hard Red Winter Wheat

Dough Data

Dough Data	Farinograph				Alveograph			
	Peak Time min	Stability min	Absorption %	MTI bu	P mm	L mm	P/L	W joulesX10^{-4}
Texas								
T1	12.3	11.2	64	22	97	78.0	1.24	260
T2	8.9	8.4	62	36	118	66.0	1.79	278
T3	7.1	6.7	62	44	105	51.0	2.06	205
T4	8.3	6.7	63	41	93	93.0	1.39	199
T5	14.0	12.0	66	26	94	96.0	0.98	302
T6	11.2	9.2	64	29	82	98.0	0.84	238
Oklahoma								
O1	7.5	7.1	61	28	90	72.0	1.25	227
O2	6.6	6.4	60	38	89	69.0	1.29	213
O3	13.0	11.6	62	29	86	106.0	0.81	292
O4	10.2	9.6	57	32	78	88.0	0.89	227
O5	9.6	8.8	61	32	84	91.0	0.92	248
O6	10.0	9.1	58	29	73	83.0	0.88	204
O7	6.1	6.6	57	35	61	88.0	0.69	175
O8	NA	NA	NA	NA	NA	NA	NA	NA
Kansas								
K1	10.4	10.1	63	34	87	96.0	0.91	269
K2	13.1	15.7	60	24	86	107.0	0.80	305
K3	10.6	11.1	60	28	73	109.0	0.67	254
K4	9.1	9.6	56	28	62	97.0	0.64	202
K5	9.7	11.0	57	32	62	108.0	0.57	212
K6	9.6	9.5	62	32	66	108.0	0.61	224
K7	8.7	8.3	61	40	70	124.0	0.56	250
K8	8.6	9.3	58	36	57	112.0	0.51	198
K9	8.2	7.4	59	42	62	120.0	0.52	214
K10	8.9	9.0	57	41	60	103.0	0.58	194
Colorado								
C1	8.7	7.5	61	36	77	104.0	0.74	236
C2	10.1	9.2	63	31	98	90.0	1.09	277
C3	7.9	7.6	60	49	92	76.0	1.21	238
Nebraska								
N1	8.4	8.6	59	39	88	78.0	1.10	240
N2	8.1	8.1	60	36	97	69.0	1.40	236
N3	7.1	6.6	58	44	80	77.0	1.00	200
N4	9.3	9.4	59	33	82	77.0	1.10	219
N5	8.2	8.2	60	18	106	61.0	1.70	241
Wyoming								
W1	11.4	11.2	63	26	102	90.0	1.13	304
SD1	9.7	10.1	61	32	102	77.0	1.32	282
SD2	11.4	12.0	61	30	97	88.0	1.10	307

Regional
Baking Characteristics

Baking tests are the final laboratory testing method in the evaluation of wheat quality. Generally, the amount and type of protein present determines baking performance, though starch quality can also have an influence.

Technicians evaluate loaves for their volume, or size, and the interior appearance of the loaf such as crumb grain and crumb color. Other performance factors include dough absorption, or bake absorption, and the optimum mixing time of the dough.

Baking Absorption is the amount of water added to achieve properly hydrated dough. It is expressed as a percentage, with higher values being better.

Crumb Grain and Texture measures the cell size and shape. It is rated on a scale of one to 10 and higher numbers are preferred.

The harvest samples were evaluated using the methods described below.

Loaf Volume: AACC Method 10-10B producing two loaves per batch using wet compressed yeast and ascorbic acid. After mixing, dough is divided into two equal portions, fermented for 160 minutes, proofed and baked in "pup loaf" pans. Loaf volume is measured immediately after baking by rapeseed displacement.

Hard Red Winter Wheat

Baking Data

Bake Data	Loaf Volume cc	Crumb Grain Score (1-8)	Texture Score (1-8)	Crumb Color (1-8)
Texas				
T1	885	6	5	Dull
T2	645	3	4	Gray
T3	725	3	5	Yellow
T4	655	3	5	Gray
T5	880	5	6	Yellow
T6	875	5	5	Dull
Oklahoma				
O1	620	3	5	Dull
O2	720	1	4	Yellow
O3	905	5	6	Dull
O4	900	5	4	Yellow
O5	810	3	4	Yellow
O6	795	3	4	Yellow
O7	775	4	3	Yellow
O8	NA	NA	NA	NA
Kansas				
K1	870	5	5	Dull
K2	900	5	6	Dull
K3	890	5	5	Dull
K4	835	4	5	Dull
K5	845	6	6	Dull
K6	845	2	5	Dull
K7	860	5	5	Dull
K8	780	3	5	Dull
K9	800	4	5	Dull
K10	895	5	5	Dull
Colorado				
C1	820	3	4	Dull
C2	785	2	5	Dull
C3	760	2	4	Dull
Nebraska				
N1	695	3	4	Dull
N2	785	3	4	Dull
N3	785	3	4	Dull
N4	800	5	5	Dull
N5	700	2	5	Dull
Wyoming				
W1	820	1	4.7	Dull
South Dakota				
SD1	785	4	5	Dull
SD2	830	4	5	Dull

Testing Methods

The harvest samples were evaluated using these methods.

Grade: Official U.S. Standards for Grain.

Dockage: Official USDA procedure using the Carter Dockage Tester.

Test Weight: AACC Method 55-10; the weight Per Winchester Bushel (2150.42 in3) as determined using an approved device, USDA approved. The test weight is mathematically converted to hectoliter weight: kg/hl = lb/bu x 1.292 + 1.419.

Moisture: DJ Gac 2100.

Protein: NIRT method

Ash: AACC Method 08-01 expressed on a 14 percent moisture basis.

1000 Kernel Weight: based on a 40-gram sample of clean wheat counted by an electronic counter.

Falling Number: AACC Method 56-81B. An average value is a simple mean of sample results.

Kernel Size Distribution: Cereal Foods World (Cereal Science Today) 5:71-71, 75 (1960). Wheat is sifted with a RoTap sifter using a Tyler No. 7 screen (2.82 mm) and a Tyler No. 9 Screen (2.00 mm). Kernels retained on the No. 7 screen are classified as “Large.” Kernels passing through the No. 7 screen and retained on the No. 9 screen are “Medium.” Kernels palling through the No. 9 screen are “Small”.

Single Kernel Characterization: AACC Method 55-31 using SKCS Model 4100.

Extraction: Samples cleaned and tempered according to AACC Method 26-10A. All were milled with identical mill settings on a Buhler laboratory mill as follows: AACC Method 26-21A.

Moisture: NIR Protein: NIR Ash: AACC Method 08-01 expressed on a 14 percent moisture basis.

Falling Number: AACC Method 56-81B.

Wet Gluten & Gluten Index: AACC Method 38-12Farinograph: AACC Method 54-21 with 50-gram bowl. Absorption is reported on 14 percent moisture basis.

Alveograph: AACC Method 54-30A.

2008 Hard Red Winter
WHEAT
Quality Report

Regional