U.S. HARD RED SPRING WHEAT

Minnesota • Montana • North Dakota • South Dakota

2009 REGIONAL QUALITY REPORT

THE ARISTOCRAT OF WHEAT

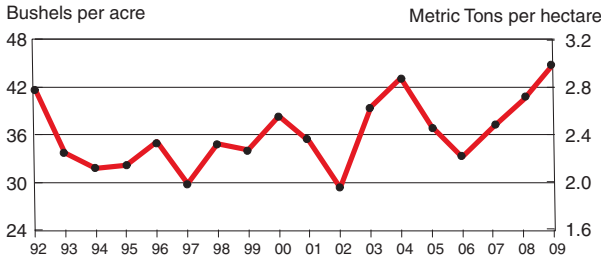
HARD RED SPRING—a specialty wheat grown primarily in the Northern Plains of the United States—stands out as the aristocrat of wheat when it comes to baking bread. The high protein content and superior gluten quality of hard red spring wheat make it ideal for use in some of the world's finest baked goods. Yeast breads, hard rolls and specialty products such as hearth breads, whole grain breads, bagels and pizza crusts look and taste their best when baked with top quality spring wheat flour. Even frozen dough products are better with spring wheat because they can be stored longer than those made with lower protein wheats.

Flour mills in the United States and around the world also use hard red spring wheat extensively as a blending wheat to increase the gluten strength in a batch of flour. Adding hard red spring to lower protein wheat improves dough handling and mixing characteristics as well as water absorption. The resulting flour can be used to make an assortment of bread products, as well as Chinese-type noodles.

2009 OVERVIEW

The 2009 U.S. hard red spring wheat crop is eight percent larger than 2008 and averages a #1 grade with exceptional kernel quality. Yields were high across the four-state area and set a regional record as production was boosted by cooler than normal summer temperatures and timely precipitation helping the crop overcome a very delayed planting season. Grade quality was strengthened by the lack of disease during the growing season and tremendous test weights due to an extended grain fill period, especially across western areas which had dealt with drought in recent years.

U.S. Hard Red Spring Wheat Yield

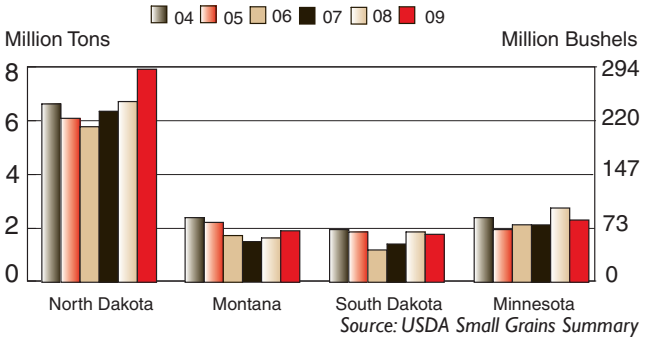


Source: USDA Small Grains Summary

Nearly ninety percent of the crop makes a #1 grade with an average test weight of 61.8 pounds per bushel (81.3 kg/hl) and only 0.2 percent damage. Favorable growing conditions allowed for extended wheat berry fill across the region providing a big improvement in thousand kernel weights, with the average for the region at 34 grams, up from 32.6 last year and 31.1 for a five-year average. The most notable gains came across western parts of the region.

However, growing season conditions which benefited yields, test weight and 1000 kernel weight, were not positive for protein production. Average protein levels in the crop fell to 13.1 percent, more than one percentage point below last year and the more traditional levels

U.S. Hard Red Spring Regional Production



Source: USDA Small Grains Summary

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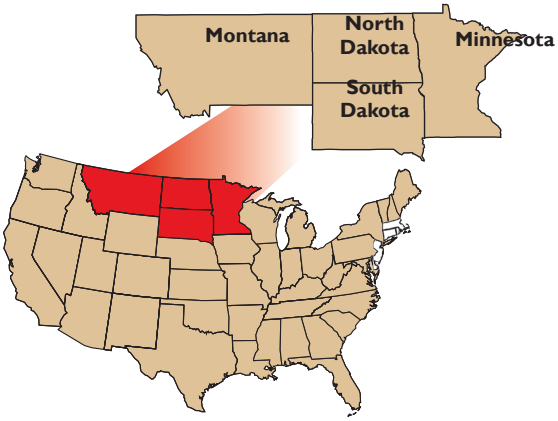


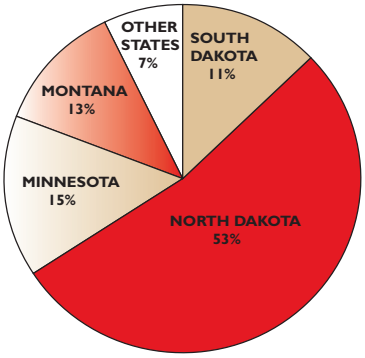
produced in hard red spring wheat. Protein levels do increase from east to west across the region, but both areas are still averaging well below normal. Distribution of protein shows that only one-third of the crop is above 14 percent protein this year, compared to more than sixty percent last year. In the western half of the region, protein distributions reveal that one-half of the crop is above 14 percent protein, whereas in the eastern half of the region only one-fourth of the crop is above 14 percent.

Vitreous kernel content in the 2009 crop is equal to last season with an average of 71 percent. This puts the overall crop in a Northern Spring subclass, but seven of the sixteen crop districts, all in western areas, still average above the Dark Northern Spring subclass which requires a minimum of 75 percent vitreous kernels. The average falling number for the crop is 375 seconds, similar to last year, and fourteen of the sixteen crop districts average above 350 seconds. This indicates that very little loss in crop soundness occurred during the prolonged and delayed harvest period due to slow crop maturity.

PRODUCTION DATA	2008	2009	2004-08 Average
MILLION BUSHELS			
Minnesota	101	84	83.1
Montana	60	71	69.7
North Dakota	246	291	232.2
South Dakota	68	65	60.7
Regional Total	475	511	445.6
U.S. Total	512	551	474.9
MILLION METRIC TONS			
Minnesota	2.74	2.28	2.26
Montana	1.62	1.92	1.90
North Dakota	6.71	7.92	6.32
South Dakota	1.86	1.76	1.65
Regional Total	12.93	13.88	12.13
U.S. Total	13.94	15.0	12.9

Source: USDA • September 2009 Small Grains Summary

Share of 2009
U.S. HRS Production



Milling performance on the 2009 crop, based on a Buhler laboratory mill, shows average flour extraction at 69.1 percent, slightly lower than last year, but similar to the five-year average. Extractions range from a low of 67.4 percent in Montana to a high of 70.6 percent in South Dakota. Regional ash values are lower than 2008 at 0.51 percent. The laboratory milling produced better wheat-to-flour protein recovery compared to both 2008 and the five-year average, a positive for end-users as they adjust to the lower wheat protein content. Paralleling the lower protein levels in the crop, the average wet gluten content is 33.9 percent, down from 35.2 percent last year. However, the gluten index is higher across all four states and averages 95 percent for the region, up from 92 percent last year.

Dough quality tests are revealing a weaker, more extensible dough than is traditionally found in U.S. hard red spring wheat. Average dough stability, as measured on the Farinograph, for the regional crop is slightly below 10 minutes, down about 1 minute from last year and below the five-year average of 16 minutes. Average peak time is 6.3 minutes, shorter than both last year and the five-year average. Contributing factors to the weaker dough mixing properties are lower overall protein content and the below average temperatures during the growing season. Dough mixing properties are fairly consistent across the region this year but stabilities do strengthen from south to north and east to west across the region. Absorption values on the 2009 crop are 66.2 percent, up slightly from the five-year average, but

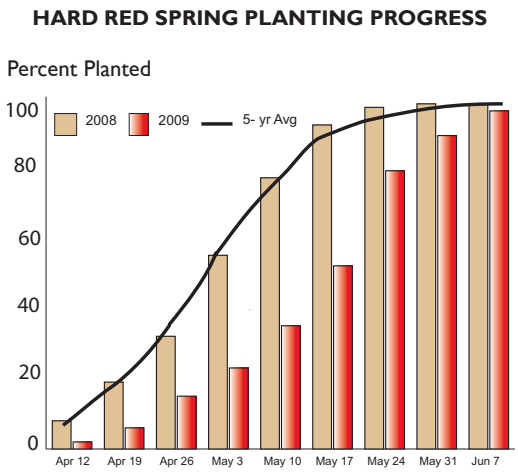
down from 2008. Alveograph tests also show generally weaker dough properties in this year's crop with an average W-value of 382, compared to 406 last year, and average P/L ratio of 0.79 compared to 0.98.

As expected with the lower protein content in the 2009 crop, average loaf volumes are down from both last year and the five-year average, at 925 cubic centimeters. Most districts across the region are showing lower loaf volumes, but there is a fairly strong correlation with protein content this year, especially across western areas. In laboratory bake tests, the crop produced loaves with good crust color and better crumb color than last year but somewhat poorer grain and texture scores. These factors were all rated better than the five-year average however, and dough handling properties at panning were rated at 9.8 on a scale of 1 to 10.

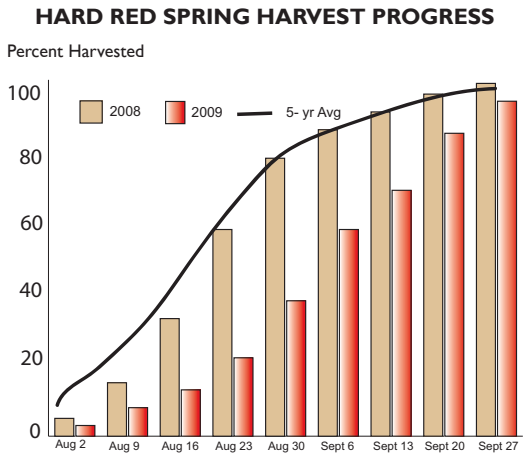
Buyers will certainly appreciate the larger supply, outstanding test weights and exceptional overall grade quality in the 2009 crop. The lower average protein levels, created by the yield friendly growing season, will be the biggest challenge for buyers, especially those demanding high protein levels to meet their end-product needs. Higher than normal protein premiums are likely to remain throughout the season. On the other hand, buyers that can utilize lower protein levels, will find tremendous value in this year's crop which is still producing high absorption and very good bake quality. As with most years, buyers are encouraged to work closely with their suppliers to establish contract specifications that will provide them with the wheat they need at the best value.

SEASONAL CONDITIONS

PLANTING began later than normal due to heavy snowfall, cool conditions and flooding throughout the region. Some fields were not planted due to the adverse weather conditions. Progress remained slow into May and wasn't finished until June, two to four weeks behind average. Subsoil and topsoil moisture levels were much improved over one year ago, especially across western areas. However, some areas in the east suffered from excessive moisture levels.



GROWING conditions were nearly ideal in June and July as temperatures remained cooler than average and precipitation was mostly adequate. The cooler than normal temperatures improved yield potential through-out the season in the late developing crop as heat stress was not an issue this summer. The crop also benefited from limited disease pressure.



HARVEST began well behind average due to the combination of the later planting season and lack of warm, dry weather to push the crop towards maturity. The bulk of the harvest began in mid to late August. The harvest pace was slower than normal because temperatures remained cool and humid conditions delayed crop maturity. Rain showers during early September did delay harvest in areas, but warm, dry conditions prevailed at the end of the month allowing for the majority of the harvest to be complete by the beginning of October.

WHEAT CHARACTERISTICS

Wheat grades, as defined by the Federal Grain Inspection Service (FGIS) of the USDA Grain Inspection, Packers and Stockyards Administration (GIPSA), reflect the general quality and condition of a representative sample. U.S. grades are based on 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 when free from dockage.

SUBCLASSES

Subclass is a separate marketing factor based on the number of kernels with a complete, hard and vitreous endosperm, the portion that makes flour. For hard red spring wheat the subclasses are:

- Dark Northern Spring (DNS)—at least 75 percent or more dark, hard, vitreous kernels;
- Northern Spring (NS)—between 25 and 74 percent dark, hard, vitreous kernels;
- Red Spring (RS)—less than 25 percent dark, hard, vitreous kernels.

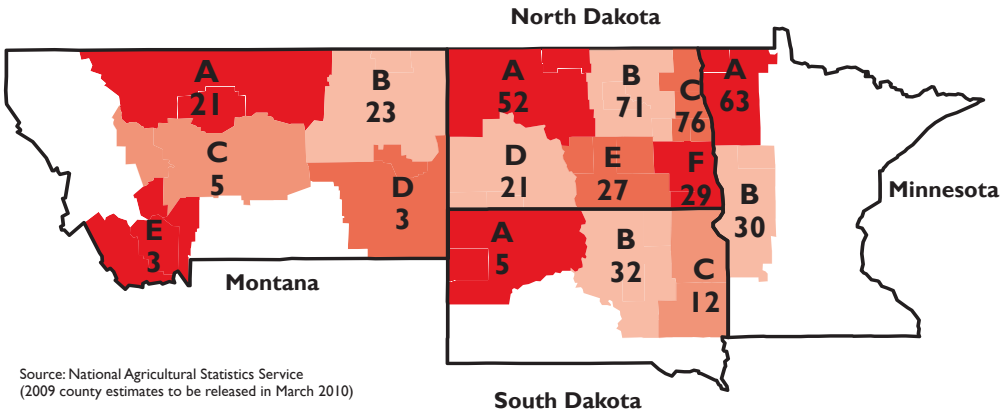
Wheat samples were obtained in Montana, North Dakota, South Dakota and Minnesota in the crop reporting areas identified in color. Samples were gathered during harvest from growers, farm bins and country elevators.

OFFICIAL U.S. GRADES AND GRADE REQUIREMENTS (Revised June 1993)

GRADING FACTORS	U.S. Grades 1	2	3	4	5
HARD RED SPRING - MINIMUM TEST WEIGHTS					
Pounds per bushel	58.0	57.0	55.0	53.0	50.0
Kilograms per hectoliter	76.4	75.1	72.5	69.9	66.0
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/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 OF:					
Other material					
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 substances	3	3	3	3	3
Total [4]	4	4	4	4	4
Insect damaged kernels 100 grams	31	31	31	31	31

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.
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 percent 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.

CROP REPORTING AREAS & 2008 HARD RED SPRING WHEAT PRODUCTION (million bushels)



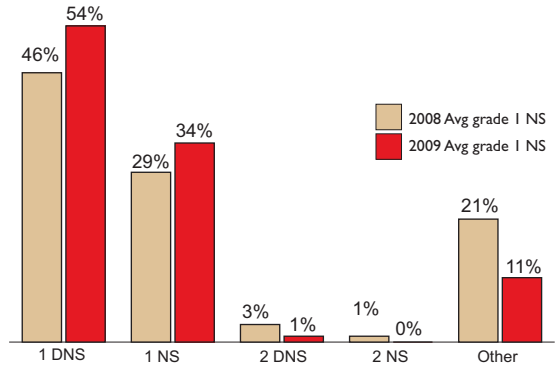
Source: National Agricultural Statistics Service
(2009 county estimates to be released in March 2010)

WHEAT GRADING DATA

OVERALL GRADE

The average grade for the region is 1NS. This grade reflects the average vitreous kernel content of 71 percent. Of the 16 composite samples, seven graded 1DNS, and nine graded 1 NS.

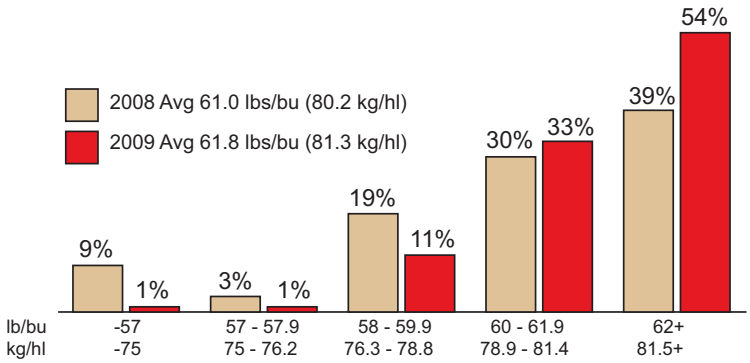
REGIONAL GRADE DISTRIBUTION



Eighty-eight percent of 2009 samples grade No. 1NS or better.

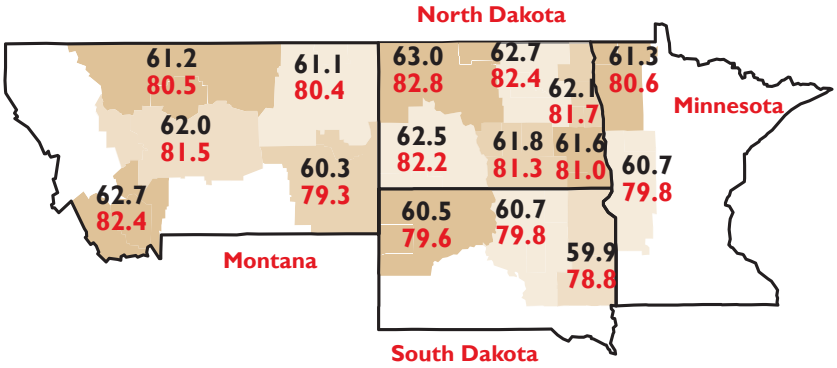
STATE AND CROP REPORTING AREA	TEST WEIGHT LBS/BU	TEST WEIGHT KG/HL	DAMAGE %	FOREIGN MATERIAL %	SHRUNKEN/ BROKEN KERNELS %	TOTAL DEFECTS %	CONTRASTING CLASSES %	U.S. GRADE	VITREOUS KERNELS %
MINNESOTA									
Area A	61.3	80.6	0.4	0.0	0.6	1.0	0.0	1 NS	60
Area B	60.7	79.8	0.4	0.0	0.7	1.1	0.0	1 NS	60
State Avg. 2009	61.1	80.4	0.4	0.0	0.6	1.0	0.0	1 NS	60
State Avg. 2008	62.3	81.9	0.2	0.0	0.6	0.8	0.0	1 NS	61
MONTANA									
Area A	61.2	80.5	0.0	0.0	1.0	1.0	0.0	1DNS	85
Area B	61.1	80.4	0.0	0.0	1.3	1.3	0.0	1DNS	80
Area C	62.0	81.5	0.0	0.0	0.9	0.9	0.0	1DNS	96
Area D	60.3	79.3	0.1	0.0	1.4	1.5	0.0	1 NS	49
Area E	62.7	82.4	0.0	0.0	1.1	1.1	0.0	1DNS	89
State Avg. 2009	61.2	80.5	0.0	0.0	1.2	1.2	0.0	1DNS	82
State Avg. 2008	60.4	79.4	0.0	0.0	1.5	1.5	0.0	1DNS	90
NORTH DAKOTA									
Area A	63.0	82.8	0.1	0.0	0.6	0.7	0.0	1DNS	79
Area B	62.7	82.4	0.2	0.0	0.6	0.8	0.0	1 NS	72
Area C	62.1	81.7	0.0	0.0	0.5	0.5	0.0	1 NS	72
Area D	62.5	82.2	0.1	0.0	1.1	1.2	0.0	1DNS	84
Area E	61.8	81.3	0.2	0.0	0.9	1.1	0.0	1 NS	70
Area F	61.6	81.0	0.7	0.0	0.7	1.4	0.0	1 NS	66
State Avg. 2009	62.5	82.2	0.2	0.0	0.7	0.9	0.0	1 NS	74
State Avg. 2008	61.0	80.2	0.1	0.0	1.4	1.5	0.0	1 NS	74
SOUTH DAKOTA									
Area A	60.5	79.6	0.0	0.0	1.0	1.0	0.0	1DNS	79
Area B	60.7	79.8	0.7	0.0	0.6	1.3	0.0	1 NS	56
Area C	59.9	78.8	0.6	0.0	0.5	1.1	0.0	1 NS	42
State Avg. 2009	60.5	79.5	0.6	0.0	0.6	1.2	0.0	1 NS	54
State Avg. 2008	59.3	78.1	0.1	0.0	1.1	1.2	0.0	1 NS	57
FOUR-STATE REGION									
Avg. 2009	61.8	81.3	0.2	0.0	0.7	1.0	0.0	1 NS	71
Avg. 2008	61.0	80.2	0.1	0.0	1.2	1.3	0.0	1 NS	71
Five-Year Avg	60.8	80.0	0.4	0.0	1.2	1.6	0.0	1 NS	73

REGIONAL TEST WEIGHT DISTRIBUTION



Ninety-eight percent of 2009 samples have a test weight of 58 lb/bu (76.3 kg/hl) or greater. The regional average test weight is 61.8 lb/bu (81.3 kg/hl), higher than 2008 and the five-year average.

REGIONAL TEST WEIGHT BY AREA



Black - pounds per bushel
Red - kilograms per hectoliter

Other basic criteria beyond grading factors used to determine wheat's initial value in the marketing system include protein, moisture, dockage, falling number and ash content.

Protein is probably the most important factor in determining the value of hard red spring wheat since it relates to many processing properties. Prices for hard red spring wheat in the U.S. market are usually quoted for 14.0 percent protein (on a 12.0 percent moisture basis). Price premiums or discounts may be specified for halves, fifths and tenths of a percentage point above and below 14.0 percent, depending upon the crops protein levels and distribution available to the market.

Moisture content is an indicator of grain storability. Wheat with low moisture content is more stable during storage. Moisture content also can be an indicator of profitability in milling.

Dockage is any material easily removed from a wheat sample using standard mechanical means. Dockage removal is the first step in analyzing a sample. All other factors are determined only after dockage is removed.

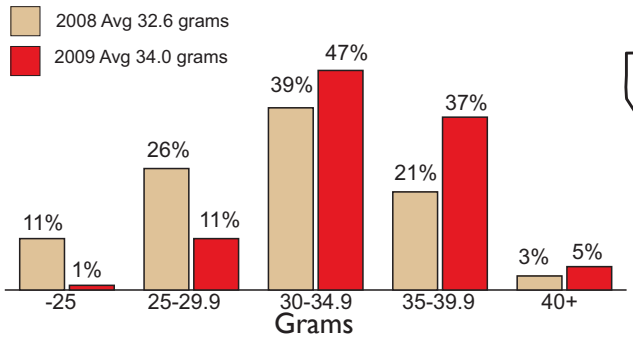
Falling number indicates the soundness of wheat or its alpha-amylase activity. Low falling numbers show high activity associated with sprout damage.

Ash content primarily concentrated in the bran, is an indication of the yield that can be expected in milling white flour.

OTHER KERNEL QUALITY DATA

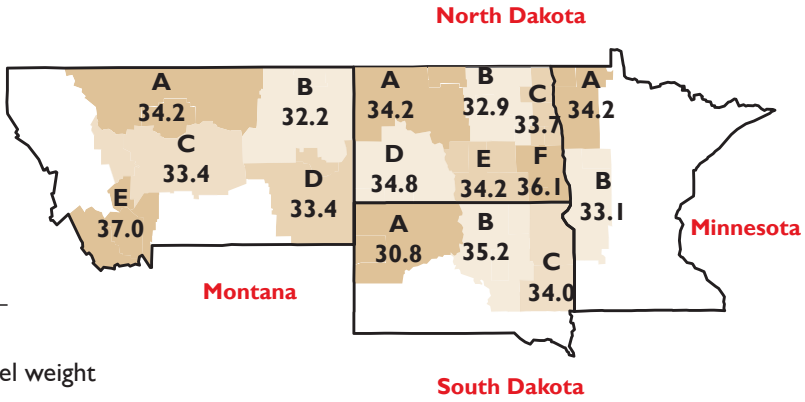
STATE AND CROP REPORTING AREA	Dockage %	Moisture %	1000 Kernel Weight G	Kernel DIST. Medium %	Kernel DIST. Large %	Protein (Dry Matter) %	Protein (12% Moisture) %	Wheat Ash %	Falling Number (SEC)	Zeleny Sedimentation (CC)
MINNESOTA										
Area A	0.6	13.1	34.2	44	54	14.1	12.4	1.50	310	44
Area B	0.8	13.7	33.1	36	61	14.3	12.6	1.60	372	46
State Avg. 2009	0.7	13.3	33.9	42	56	14.1	12.4	1.53	327	45
State Avg. 2008	0.5	13.3	35.3	35	63	15.2	13.4	1.51	363	53
MONTANA										
Area A	0.6	10.9	34.2	55	43	15.3	13.5	1.46	399	65
Area B	0.4	11.7	32.2	49	49	15.8	13.9	1.52	398	66
Area C	0.6	10.2	33.4	46	53	15.5	13.7	1.58	377	61
Area D	0.9	11.5	33.4	51	47	14.9	13.1	1.51	373	58
Area E	0.2	10.7	37.0	39	57	15.4	13.6	1.44	322	61
State Avg. 2009	0.5	11.2	33.3	51	47	15.6	13.7	1.50	393	65
State Avg. 2008	0.7	10.7	31.6	63	33	16.2	14.2	1.41	374	57
NORTH DAKOTA										
Area A	0.9	13.0	34.2	39	60	15.5	13.6	1.43	387	69
Area B	0.7	13.3	32.9	34	65	14.4	12.7	1.51	377	57
Area C	0.5	13.3	33.7	32	67	14.4	12.7	1.53	360	58
Area D	0.5	12.9	34.8	45	53	15.2	13.4	1.49	376	63
Area E	0.9	13.5	34.2	35	63	15.0	13.2	1.50	374	56
Area F	1.0	13.3	36.1	34	64	14.4	12.7	1.48	397	54
State Avg. 2009	0.7	13.2	34.1	36	62	14.8	13.0	1.49	378	60
State Avg. 2008	0.9	12.4	31.9	48	47	16.6	14.7	1.57	381	57
SOUTH DAKOTA										
Area A	1.2	12.5	30.8	52	45	14.9	13.1	1.55	411	62
Area B	1.0	12.4	35.2	35	64	15.8	13.9	1.60	411	52
Area C	0.8	12.4	34.0	33	66	15.8	13.9	1.67	387	61
State Avg. 2009	1.0	12.4	34.5	36	63	15.7	13.8	1.61	405	55
State Avg. 2008	1.0	12.3	32.0	53	43	16.2	14.3	1.62	403	46
FOUR-STATE REGION										
Avg. 2009	0.7	12.8	34.0	39	59	14.9	13.1	1.51	375	58
Avg. 2008	0.8	12.4	32.6	48	48	16.2	14.3	1.55	379	55
Five-Year Avg.	0.9	12.2	31.1	43	49	16.3	14.4	1.59	398	58

REGIONAL 1000 KERNEL WEIGHT DISTRIBUTION

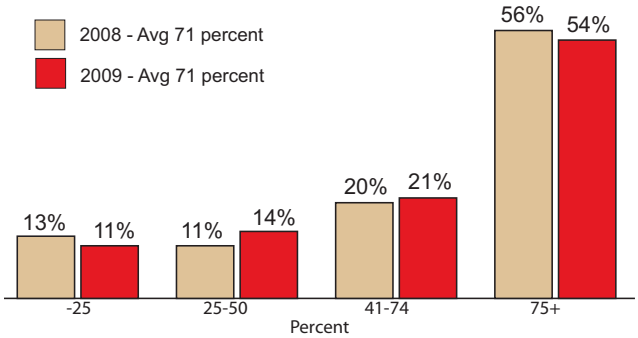


Eighty-nine percent of 2009 samples have a thousand kernel weight of 30 grams or more, significantly higher than 2008.

REGIONAL 1000 KERNEL WEIGHT BY AREA

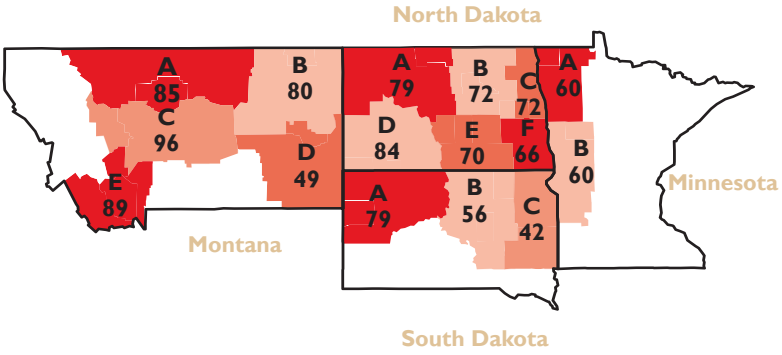


REGIONAL VITREOUS KERNEL DISTRIBUTION

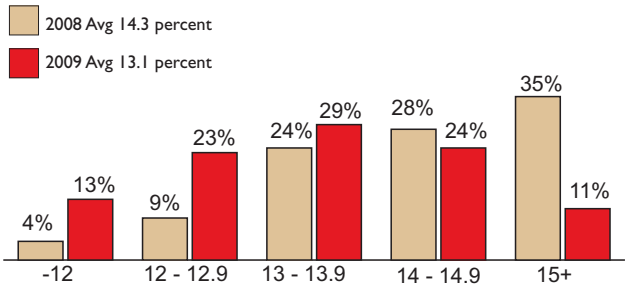


Fifty-four percent of 2009 samples have a dark, hard vitreous kernel count of 75 percent or better.

REGIONAL VITREOUS KERNEL BY AREA
(percent)

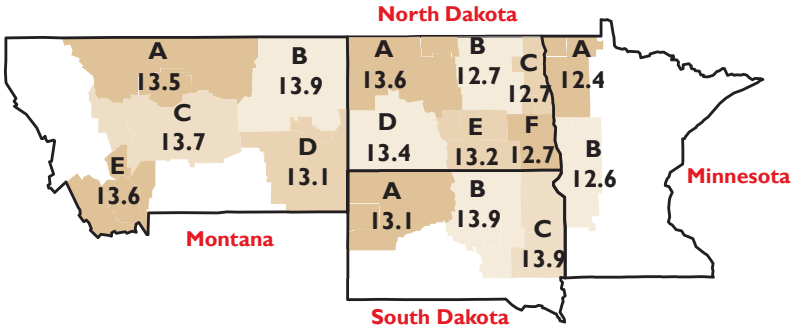


REGIONAL PROTEIN DISTRIBUTION
(12% moisture basis)

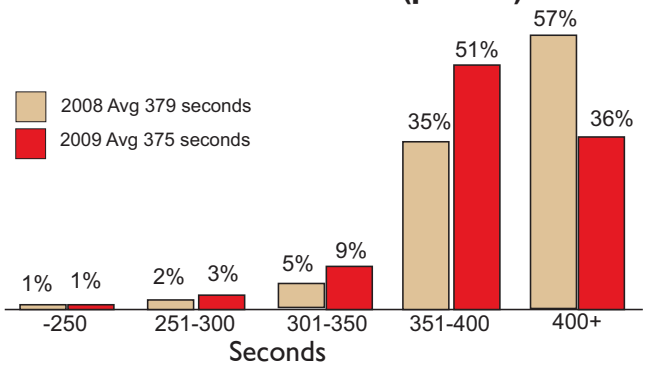


Thirty-five percent of 2009 samples have a protein content of 14.0 percent or greater, down from sixty-three percent last year.

REGIONAL PROTEIN BY AREA
(12% moisture basis - percent)

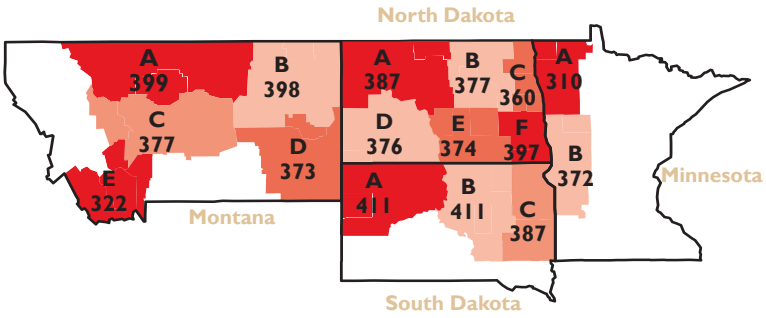


REGIONAL FALLING NUMBER DISTRIBUTION (percent)

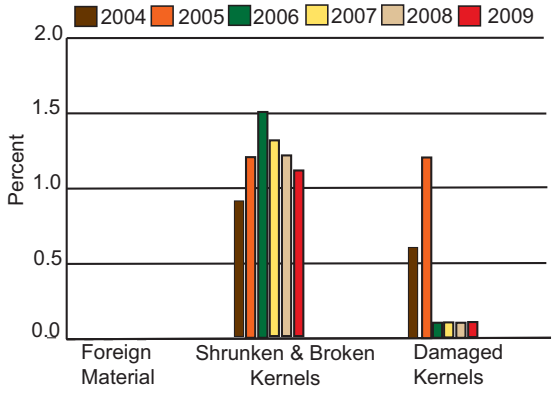


Eighty-seven percent of the 2009 crop has a falling number of 350 seconds or greater.

REGIONAL FALLING NUMBER BY AREA (seconds)

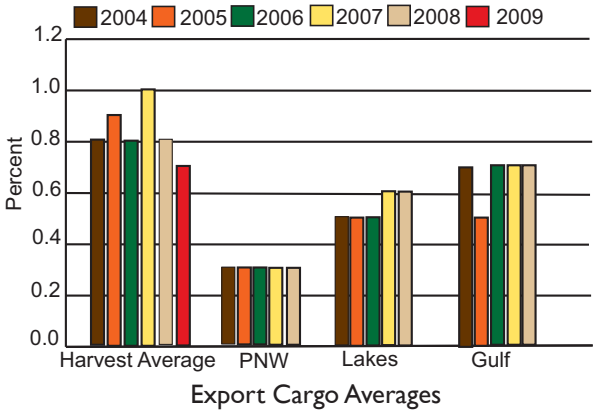


REGIONAL AVERAGE: TOTAL DEFECTS



Average total defects are 1.0 percent, a decrease from 2008.

REGIONAL AVERAGE DOCKAGE



MILLING CHARACTERISTICS

Flour is evaluated for several factors to determine overall milling efficiency, grade, soundness and functional properties.

Extraction, or the proportion of the wheat kernel that can be milled into flour, is important to mill profitability. For purposes of this survey, test milling was conducted with a Buhler laboratory mill. Results are suitable for comparison between crop years, however yields are lower than those obtained in commercial mills.

Another measure of milling efficiency and of flour grade is the ash content, or mineral residue, remaining after incineration of a sample. The lower the ash, the whiter and more refined the flour.

Starch damage measures physical damage to a proportion of the starch granules of flour. The level directly affects water absorption and dough mixing properties.

Wet gluten provides a quantitative measure of the gluten forming proteins in flour that are primarily responsible for its dough mixing and baking properties.

Falling number measures enzyme activity in flour. A fast time indicates high activity, revealing too much sugar and too little starch. Since starch provides bread's supporting structure, too much activity results in sticky dough and poor texture in finished products. Amylograph peak viscosity is another measure of enzyme activity.

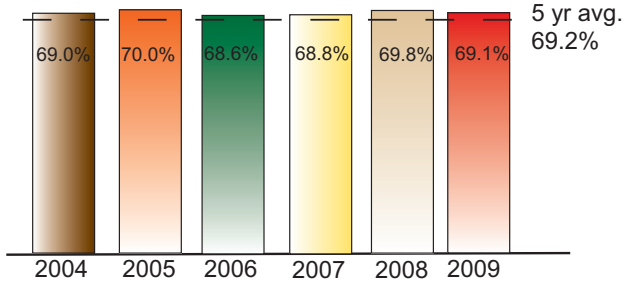
Milling: The 2008 and 2009 crop samples were milled on a new Buhler laboratory mill, any direct comparisons of extraction, flour ash and starch damage data with the five-year average needs to be kept in perspective. In 2009 a collaborative milling test was conducted with the Buhler lab mills at three commercial mills in the U.S. to evaluate mill settings. Some adjustments were made based on this testing and additional in-house testing.

FLOUR QUALITY DATA*

(2008 & 2009 crop milled on new Buhler Laboratory mill)

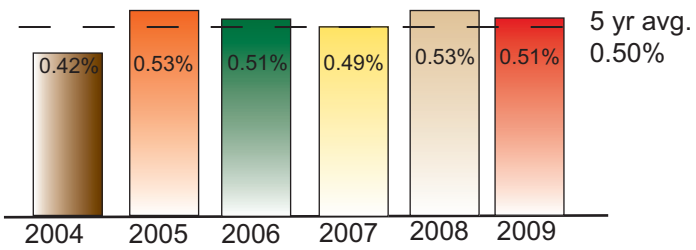
STATE AND CROP REPORTING AREA	Flour Extraction %	Flour Ash %	Flour Protein (14% Moisture) %	Starch Damage %	Wet Gluten %	Gluten Index %	Falling Number SEC	Amylograph Peak Viscosity 65G FL B.U.	Amylograph Peak Viscosity 100G FL B.U.
MINNESOTA									
Area A	69.7	0.50	11.5	8.2	29.6	99	359	420	1500
Area B	69.9	0.53	11.8	8.1	31.8	97	382	490	1800
State Avg. 2009	69.8	0.51	11.6	8.2	30.2	98	365	439	1582
State Avg. 2008	70.3	0.51	12.4	8.3	32.6	93	381	565	1979
MONTANA									
Area A	68.3	0.48	12.8	7.7	35.2	96	430	650	2640
Area B	66.7	0.49	13.1	7.6	40.7	88	422	825	2645
Area C	65.8	0.50	12.8	7.6	37.1	95	437	640	2630
Area D	69.1	0.49	12.1	7.3	32.7	97	417	750	2830
Area E	68.0	0.47	12.9	8.1	37.4	92	387	360	1480
State Avg. 2009	67.4	0.48	13.0	7.7	37.9	92	424	720	2589
State Avg. 2008	69.2	0.49	13.3	7.6	35.9	89	422	718	2809
NORTH DAKOTA									
Area A	67.8	0.50	13.0	8.6	36.1	97	400	710	2340
Area B	69.3	0.51	11.8	8.7	31.4	97	387	620	2135
Area C	69.0	0.53	11.8	8.8	31.7	98	355	440	1395
Area D	69.5	0.51	12.8	8.8	34.9	98	429	675	2395
Area E	69.5	0.51	12.4	7.6	32.7	99	398	620	2155
Area F	69.6	0.49	11.8	8.1	32.1	97	407	510	1840
State Avg. 2009	69.0	0.51	12.3	8.6	33.2	98	394	607	2064
State Avg. 2008	69.6	0.53	13.6	8.2	36.1	93	390	732	2555
SOUTH DAKOTA									
Area A	69.2	0.50	12.3	7.5	33.6	97	447	700	2560
Area B	70.8	0.55	13.0	7.3	37.7	81	416	470	1765
Area C	70.9	0.54	13.0	7.3	37.0	86	422	460	1725
State Avg. 2009	70.6	0.54	12.9	7.3	37.1	84	420	488	1826
State Avg. 2008	70.3	0.57	13.2	8.1	35.6	90	427	695	2810
FOUR-STATE REGION									
Avg. 2009	69.1	0.51	12.3	8.2	33.9	95	397	580	2027
Avg. 2008	69.8	0.53	13.3	8.1	35.2	92	397	689	2501
Five-Year Avg.	69.2	0.50	13.3	7.9	35.2	n/a	413	693	2519

REGIONAL AVERAGE: FLOUR EXTRACTION



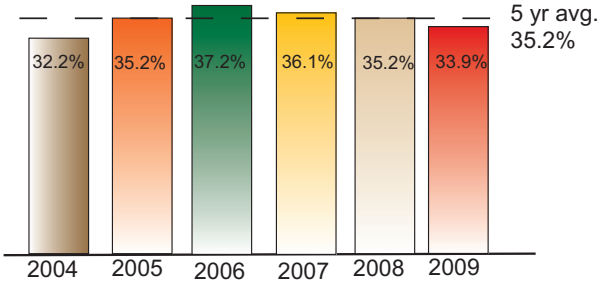
The regional average extraction is 69.1 percent, lower than last year and the five-year average.

REGIONAL AVERAGE: ASH CONTENT



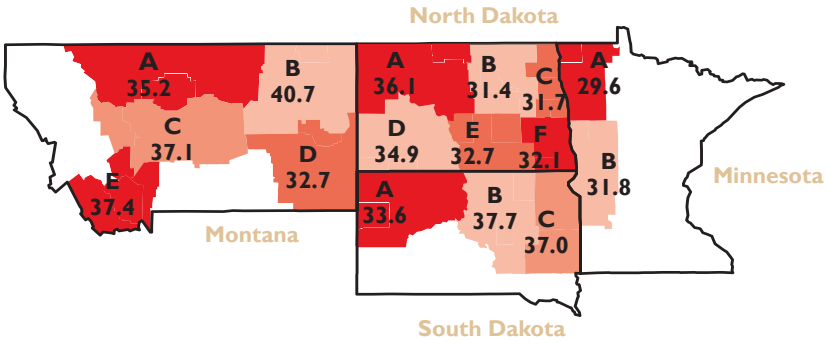
The regional average flour ash is 0.51 percent, lower than last year but slightly higher than the five-year average.

REGIONAL AVERAGE: WET GLUTEN

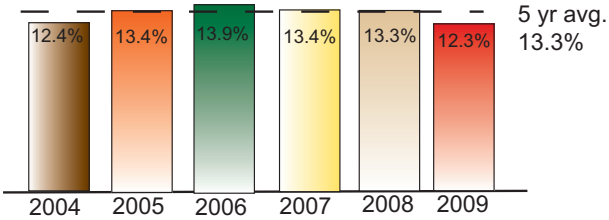


Average wet gluten content for the 2009 crop is 33.9 percent, down from last year reflecting the lower protein content in the crop.

AVERAGE WET GLUTEN BY AREA
(percent)

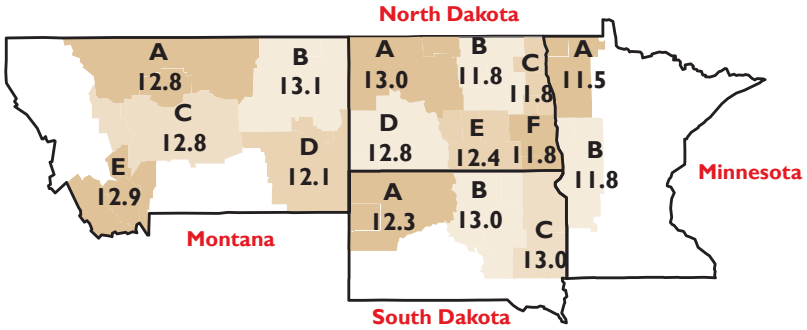


REGIONAL AVERAGE: FLOUR PROTEIN CONTENT

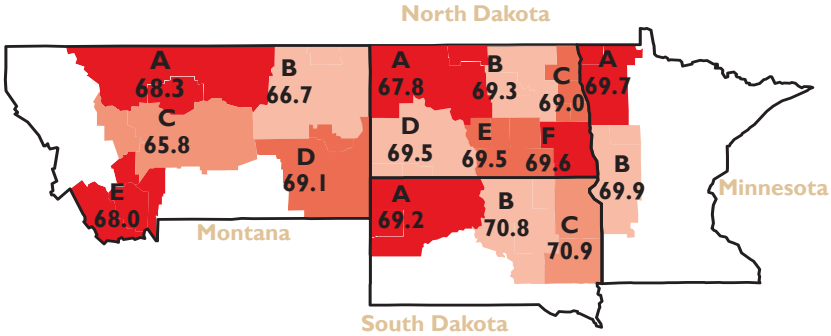


The 2009 crop produced an average flour protein content of12.3 percent, lower than last year and the five-year average.

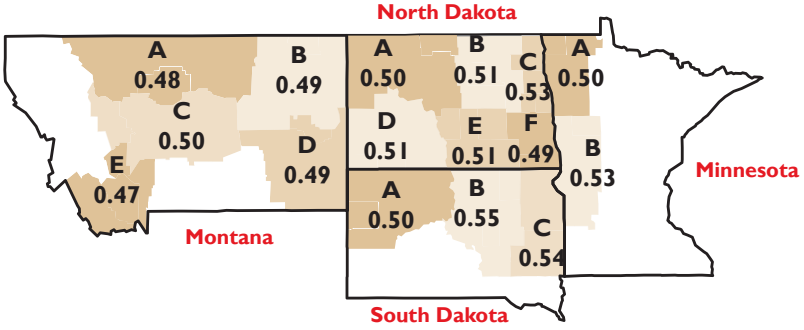
AVERAGE FLOUR PROTEIN BY AREA
(percent)



AVERAGE FLOUR EXTRACTION BY AREA
(percent)



AVERAGE FLOUR ASH BY AREA
(percent)



DOUGH CHARACTERISTICS

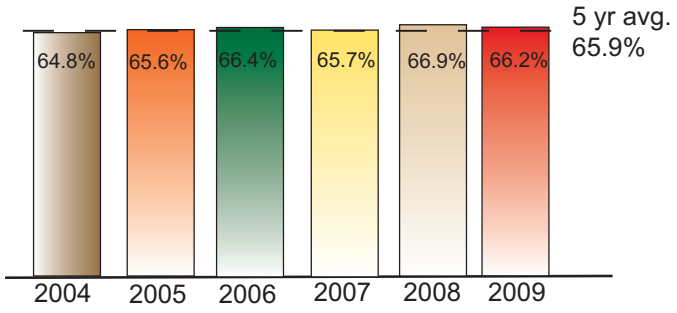
Physical characteristics of dough are evaluated to reveal useful information about variations in flour types, processing requirements and expected end-product quality.

A farinograph traces a curve during the dough mixing process to record variations in gluten development and the breakdown of gluten proteins over time. Water absorption indicates the amount of water that can be added to the flour until the dough reaches a definite consistency. Peak time indicates the number of minutes required to achieve this level of dough consistency and mixing tolerance indicates the stability of the dough. Both development time and mixing tolerance are related to dough strength. Farinograms are rated on a scale of 1 to 8, with higher values indicating strong mixing properties.

The extensigraph measures dough strength by stretching a piece of dough on a hook until it breaks. The apparatus traces a curve that measures extensibility, resistance to extension and the area beneath the curve, or energy value.

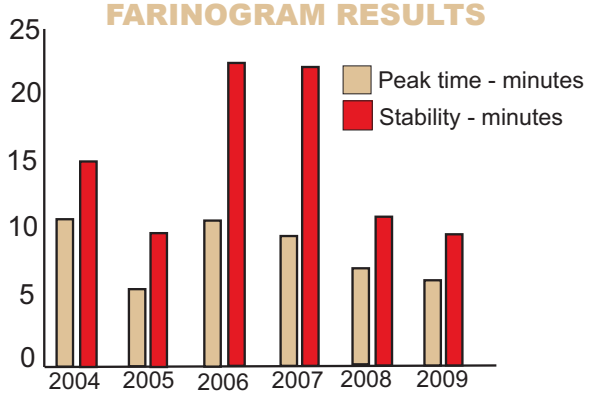
An alveograph traces a curve that measures the air pressure necessary to inflate a piece of dough to the point of rupture. The overpressure (P) value reflects the maximum pressure needed to deform the piece of dough during the inflation process and is an indication of resistance, or dough stability. The length (L) measurement reflects dough extensibility. The deformation energy (W) measurement is the amount of energy needed to inflate the dough to the point of rupture and is indicative of dough strength.

REGIONAL AVERAGE
FARINOGRAM ABSORPTION



The regional absorption is 66.2 percent, slightly lower than last year, but higher than the five-year average.

REGIONAL AVERAGE
FARINOGRAM RESULTS

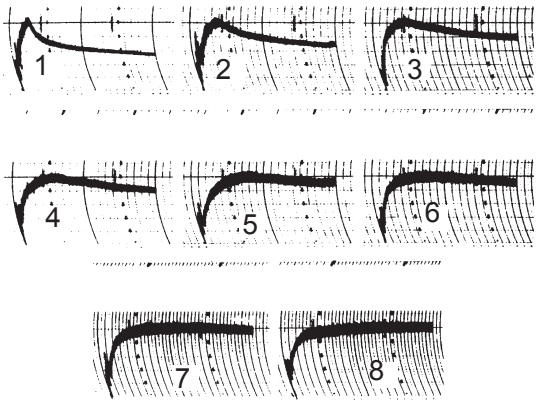


The regional average peak time is 6.3 minutes and stability is 9.9 minutes. The 2009 crop is very similar to 2005.

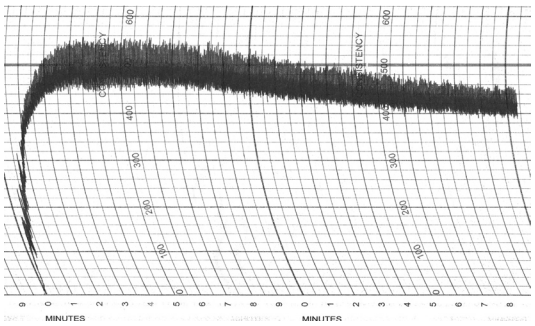
PHYSICAL DOUGH PROPERTIES

STATE AND CROP REPORTING AREA	FARINOGRAPH Absorption %	Peak Time MIN	Stability MIN	MTI B.U.	Classification	Valorimeter
MINNESOTA						
Area A	63.7	5.5	10.5	35	5.0	58
Area B	65.5	5.0	9.0	35	4.0	58
State Avg. 2009	64.2	5.4	10.1	35	4.7	58
State Avg. 2008	66.7	6.5	9.2	40	5.0	63
MONTANA						
Area A	65.4	8.0	12.0	35	6.0	69
Area B	66.8	7.0	8.5	40	4.0	69
Area C	67.5	8.0	13.0	30	6.0	70
Area D	65.2	7.0	11.5	35	5.0	66
Area E	69.3	7.0	9.0	35	4.0	65
State Avg. 2009	66.3	7.4	10.2	37	4.9	69
State Avg. 2008	66.6	6.9	10.2	30	4.9	67
NORTH DAKOTA						
Area A	67.3	8.0	12.0	30	6.0	69
Area B	66.1	6.0	10.0	40	5.0	61
Area C	66.4	5.0	10.0	35	5.0	57
Area D	67.7	7.5	10.0	50	5.0	69
Area E	66.4	6.5	9.5	35	5.0	63
Area F	65.4	5.5	8.5	40	4.0	58
State Avg. 2009	66.6	6.5	10.3	38	5.1	63
State Avg. 2008	67.4	7.6	12.7	31	5.2	69
SOUTH DAKOTA						
Area A	65.9	5.5	8.0	45	4	60
Area B	66.7	5.0	7.5	40	3	55
Area C	66.5	5.5	6.5	40	3	58
State Avg. 2009	66.5	5.2	7.3	41	3.1	56
State Avg. 2008	65.9	6.4	8.2	40	4.1	63
FOUR-STATE REGION						
Avg. 2009	66.2	6.3	9.9	38	4.8	62
Avg. 2008	66.9	7.1	11.0	34	5.0	67
Five-Year Avg.	65.9	8.8	16.1	26	6.0	71

REFERENCE FARINOGRAMS FOR HARD RED SPRING WHEAT

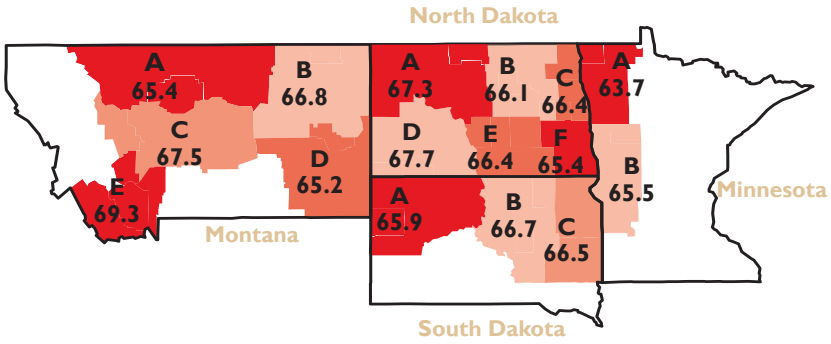


REGIONAL AVERAGE FARINOGRAM

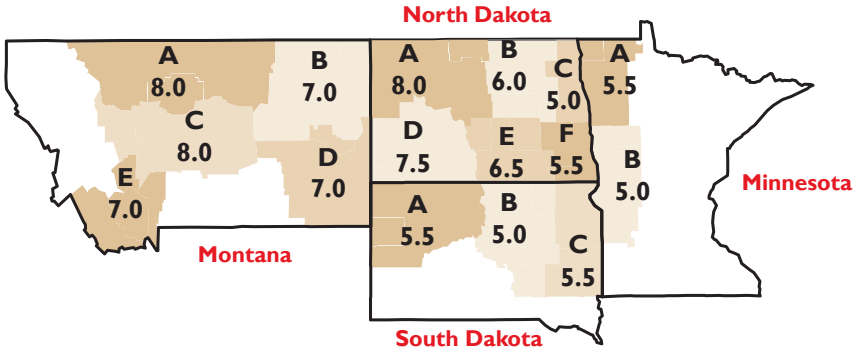


A 4.8 classification indicates medium mixing properties.

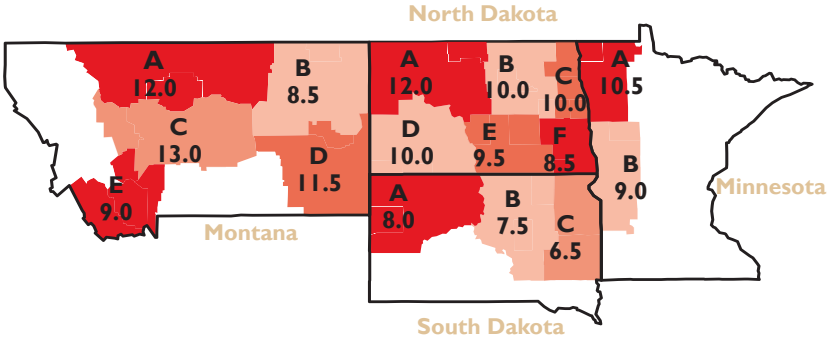
AVERAGE FARINOGRAPH ABSORPTION BY AREA
(percent)



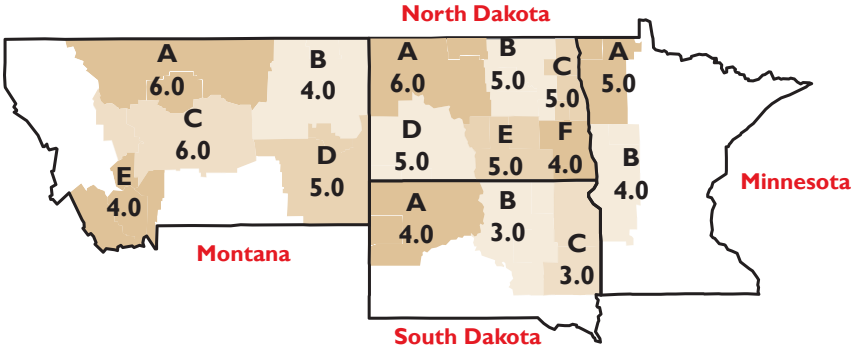
AVERAGE PEAK TIME BY AREA
(minutes)



AVERAGE STABILITY BY AREA
(minutes)



AVERAGE DOUGH CLASSIFICATION BY AREA
(scale of 1-8)

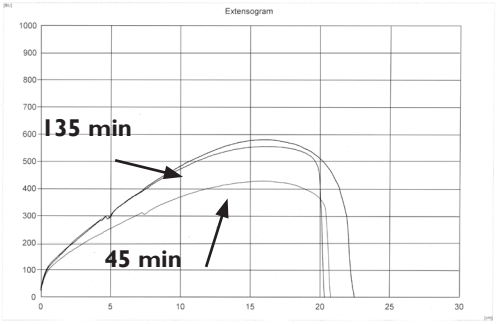


PHYSICAL DOUGH PROPERTIES

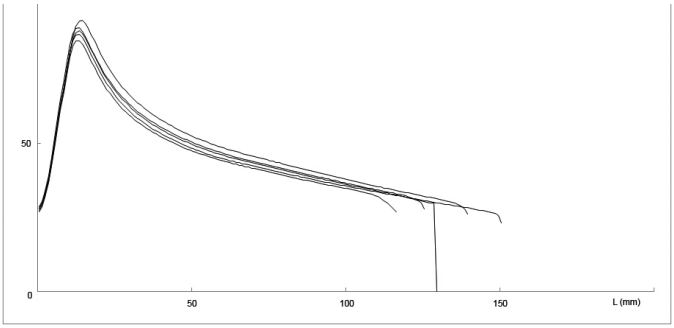
	*EXTENSIGRAPH						ALVEOGRAPH			
STATE AND CROP REPORTING AREA	EXTENSIBILITY 45 MIN cm	RESISTANCE 45 MIN B.U.	AREA sq cm	EXTENSIBILITY 135 MIN cm	RESISTANCE 135 MIN B.U.	AREA sq cm	P mm	L mm	P/L Ratio	W joulesX10^4
MINNESOTA										
Area A	19.5	399	102	19.2	477	120	92	127	0.72	386
Area B	17.9	354	86	18.7	366	92	103	103	1.00	375
State Avg. 2009	19.0	387	98	19.1	447	112	95	120	0.79	383
State Avg. 2008	18.4	406	99	18.6	503	120	107	111	0.96	400
MONTANA										
Area A	18.3	383	93	18.5	509	126	91	150	0.61	413
Area B	18.7	345	88	19.0	397	101	97	127	0.76	398
Area C	19.7	491	128	17.7	598	137	122	111	1.10	491
Area D	17.5	409	95	17.1	492	111	96	133	0.72	410
Area E	20.0	356	96	21.5	368	106	117	106	1.10	436
State Avg. 2009	18.6	371	93	18.8	454	113	97	134	0.72	411
State Avg. 2008	19.1	406	102	19.0	578	142	105	118	0.89	405
NORTH DAKOTA										
Area A	22.3	440	131	20.2	495	135	79	140	0.56	365
Area B	17.9	398	96	18.3	470	112	107	114	0.94	421
Area C	19.2	513	128	17.3	601	135	108	114	0.95	439
Area D	18.8	404	102	18.2	492	117	107	121	0.88	420
Area E	19.7	373	100	21.2	475	134	103	121	0.85	398
Area F	18.9	359	92	18.1	467	112	94	125	0.75	374
State Avg. 2009	19.5	422	110	18.8	502	124	99	123	0.80	404
State Avg. 2008	20.0	455	121	20.8	598	163	115	110	1.05	441
SOUTH DAKOTA										
Area A	17.3	280	69	17.4	315	76	96	96	1.00	290
Area B	17.2	235	57	18.4	269	70	81	110	0.74	247
Area C	20.6	231	67	19.7	237	66	78	114	0.68	247
State Avg. 2009	18.1	238	61	18.7	265	69	82	110	0.75	251
State Avg. 2008	16.8	313	73	17.8	413	98	90	105	0.86	286
FOUR-STATE REGION										
Avg. 2009	19.2	386	100	18.8	456	114	96	122	0.79	382
Avg. 2008	19.1	418	107	19.7	549	142	108	110	0.98	406
Five-Year Avg.	19.6	498	126	19.4	589	144	115	105	1.10	424

REGIONAL AVERAGE *EXTENSIGRAM

Indicates extensibility and resistance to extension. Area beneath curve indicates the energy or work required.



REGIONAL AVERAGE ALVEOGRAM



P-Curve height shows maximum pressure needed to deform dough, indicating stability. L-Length of curve reflects extensibility. W-Measurement of total energy or work needed to inflate dough.

BAKING CHARACTERISTICS

The gluten strength in flour milled from U.S. hard red spring wheat is essential to supporting the heavy ingredients in many whole grain and artisan breads.

Although consumers make the ultimate judgement, baking tests are the final laboratory method for evaluating wheat quality. In general, a good correlation exists between loaf volume and protein quantity and quality.

Laboratory technicians also visually evaluate test loaves for crumb grain, texture and color, as well as crust color and loaf symmetry.

Above: freshly baked bread waits to cool at NDSU's Baking Laboratory.

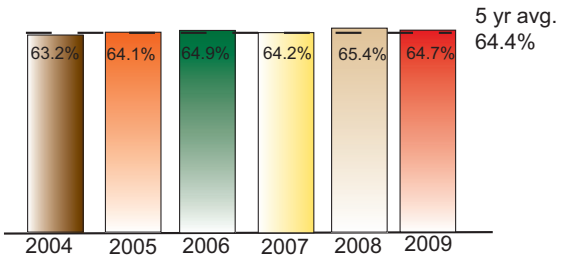
Right Top: NDSU's Baking Laboratory

Right Bottom: Researchers at NDSU's Baking Laboratory rely on the same tools found in many bakeries such as these bread pans.

BAKING DATA

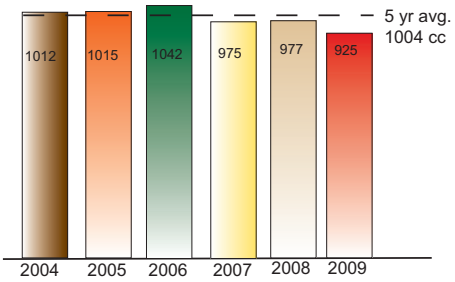
STATE AND CROP REPORTING AREA	Baking Absorption %	Dough Handling Properties	Loaf Volume CC	Grain and Texture	Crumb color	Crust Color	Symmetry
MINNESOTA							
Area A	62.2	10.0	913	8.5	8.5	10.0	8.5
Area B	64.0	10.0	955	8.5	9.0	10.0	9.0
State Avg. 2009	62.7	10.0	924	8.5	8.6	10.0	8.6
State Avg. 2008	65.2	10.0	951	8.8	8.8	10.0	9.0
MONTANA							
Area A	63.9	10.0	935	8.5	9.5	10.0	9.0
Area B	65.3	10.0	985	8.0	8.5	10.0	8.5
Area C	66.0	10.0	993	9.0	9.0	10.0	9.0
Area D	63.7	10.0	953	9.0	9.0	10.0	8.0
Area E	67.8	10.0	968	8.5	9.0	10.0	8.5
State Avg. 2009	64.8	10.0	964	8.3	9.0	10.0	8.7
State Avg. 2008	65.1	10.0	971	8.8	8.7	10.0	9.7
NORTH DAKOTA							
Area A	65.8	10.0	973	8.5	8.5	10.0	8.0
Area B	64.6	10.0	900	8.5	9.0	10.0	8.0
Area C	64.9	10.0	910	9.0	9.0	10.0	8.0
Area D	66.2	10.0	913	9.0	8.5	10.0	8.5
Area E	64.9	10.0	878	8.5	9.0	10.0	8.0
Area F	63.9	10.0	890	8.5	9.0	10.0	7.5
State Avg. 2009	65.1	10.0	918	8.7	8.8	10.0	8.0
State Avg. 2008	65.9	10.0	993	9.0	8.8	10.0	9.4
SOUTH DAKOTA							
Area A	64.4	9.0	840	8.5	9.0	10.0	7.5
Area B	65.2	9.0	910	9.5	9.5	10.0	8.5
Area C	65.0	9.0	963	8.0	9.0	10.0	9.0
State Avg. 2009	65.0	9.0	918	9.0	9.3	10.0	8.5
State Avg. 2008	64.4	10.0	962	8.4	8.9	10.0	9.3
FOUR-STATE REGION							
Avg. 2009	64.7	9.8	925	8.6	8.9	10.0	8.3
Avg. 2008	65.4	10.0	977	8.9	8.8	10.0	9.3
Five-Year Avg.	64.4	9.7	1004	8.1	8.1	10.0	9.8

AVERAGE BAKING ABSORPTION



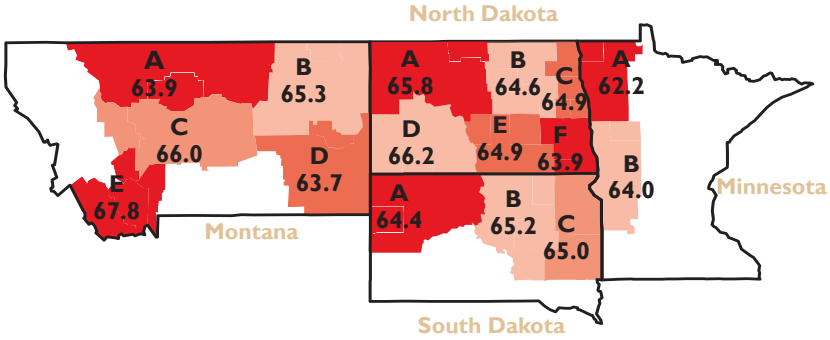
Average absorption for the four-state region is 64.7 percent, lower than last year but slightly above the five-year average.

AVERAGE LOAF VOLUME (cubic centimeters)

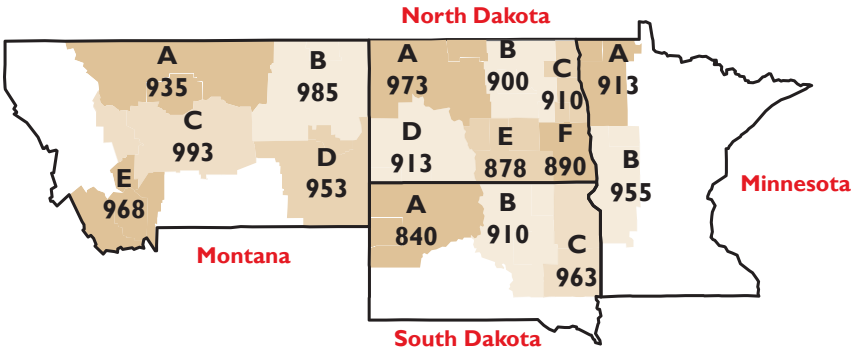


Average loaf volume for the four-state region is 925 cubic centimeters, lower than last year and the five-year average.

AVERAGE BAKING ABSORPTION BY AREA (percent)



AVERAGE LOAF VOLUME BY AREA (cubic centimeters)



SUMMARY INFORMATION

AVERAGE QUALITY FACTORS FOR THE REGIONAL HARD RED SPRING WHEAT CROP

	2004	2005	2006	2007	2008	Five-year Average	2009
GRADING AND WHEAT DATA							
Test Weight (lbs/bu)	61.1	60.2	60.6	61.1	61.0	60.8	61.8
Test Weight (kg/hl)	80.4	79.1	79.7	80.4	80.2	80.0	81.3
Vitreous Kernels (%)	65	68	82	79	71	73	71
1000 Kernel Weight (gm)	32.9	29.8	28.9	31.2	32.6	31.1	34.0
Protein: 12% moisture (%)	13.8	14.6	15.0	14.2	14.3	14.4	13.1
Protein: dry (%)	15.6	16.5	17.1	16.1	16.2	16.3	14.9
Ash: 14% moisture (%)	1.55	1.72	1.53	1.60	1.55	1.59	1.51
Falling Number (sec)	355	414	416	428	379	398	375
FLOUR DATA							
Flour Extraction (%)	69.0	70.0	68.6	68.8	69.8	69.2	69.1
Ash: 14% moisture (%)	0.42	0.53	0.51	0.51	0.53	0.50	0.51
Protein: 14% moisture (%)	12.4	13.4	13.9	13.4	13.3	13.3	12.3
Wet Gluten (%)	32.2	35.2	37.2	36.1	35.2	35.2	33.9
Falling Number (sec)	365	418	436	449	397	413	397
Amylograph Peak Viscosity							
65g FL (B.U.)	549	731	783	711	689	693	580
100g FL (B.U.)	1813	2547	3086	2647	2501	2519	2027
PHYSICAL DOUGH PROPERTIES							
Farinograph:							
Absorption (%)	64.8	65.6	66.4	65.7	66.9	65.9	66.2
Peak Time (min)	10.9	5.7	10.8	9.6	7.1	8.8	6.3
Stability (min)	15.2	9.9	22.4	22.1	11.0	16.1	9.9
Classification	5.6 (med)	5.1 (med)	7.5 (strong)	6.9 (strong)	5.0 (med)	6.0 (med-strong)	4.8 (med)
Extensigraph:							
Extensibility-45 min (cm)	20.1	21.0	20.7	17.0	19.1	19.6	19.2
Resistance-45 min (B.U.)	564	458	544	508	418	498	386
Area-45 min (sq cm)	144	125	143	110	107	126	100
Alveograph:							
P (mm)	124	112	116	116	108	115	96
L (mm)	103	102	106	104	110	105	122
W (Joules X 10^4)	446	382	453	433	406	424	382
BAKING DATA:							
Absorption (%)	63.2	64.1	64.9	64.2	65.4	64.4	64.7
Dough Handling Properties	10.0	8.5	10.0	10.0	10.0	9.7	9.8
Loaf Volume (cc)	1012	1015	1042	975	977	1004	925
Grain and Texture	7.9	7.7	8.0	7.9	8.9	8.1	8.6
Crumb Color	8.0	8.0	7.7	8.2	8.8	8.1	8.9
Crust Color	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Symmetry	9.8	10.0	10.0	9.9	9.3	9.8	8.3

2009 QUALITY FACTORS BY PROTEIN RANGE

PNW	Protein Ranges		
	Low	Medium	High
Production %	36	34	30
WHEAT GRADING DATA			
Test Weight (lb/bu)	62.4	61.7	60.8
Test Weight (kg/hl)	82.0	81.1	80.0
Damage (%)	0.0	0.0	0.0
Shrunken/Broken (%)	1.1	0.9	0.9
Total Defects (%)	1.1	0.9	0.9
Vitreous Kernels (%)	78	87	91
Grade	1 DNS	1 DNS	1 DNS
WHEAT DATA			
Dockage (%)	0.5	0.6	0.3
Moisture (%)	12.2	12.2	11.8
Protein: 12%/0% moisture (%)	12.3/13.9	13.8/15.7	15.2/17.3
Ash: 14%/0% moisture (%)	1.45/1.69	1.46/1.70	1.54/1.79
1000 Kernel Weight	33.1	32.5	32.4
Falling Number (sec)	375	356	395
Sedimentation (cc)	63	69	67
FLOUR DATA			
Extraction (%)	68.3	69.1	67.8
Color: L	90.5	90.3	90.2
a	-1.1	-1.1	-1.0
b	9.8	10.0	9.8
Protein: 14%/0% moisture (%)	11.5/13.4	12.9/15.0	14.5/16.8
Ash: 14%/0% moisture (%)	0.46/0.53	0.45/0.52	0.48/0.56
Wet Gluten (%)	31.9	35.0	41.2
Gluten Index (%)	96.4	95.0	87.6
Falling Number (sec)	401	405	464
Amylograph Viscosity: 65g FL (BU)	690	700	765
DOUGH PROPERTIES			
Farinograph: Absorption (%)	66.7	67.9	68.9
Peak Time (min)	7.0	8.0	8.5
Stability (min)	10.0	10.5	11.5
Classification	5.0	5.0	5.0
Alveograph: P (mm)	120	110	103
L (mm)	90	111	140
P/L Ratio	1.33	0.99	0.73
W (10^{-4} joules)	387	419	462
Extensograph (45/135 min): Resistance	423/491	389/404	335/364
Extensibility (cm)	17.4/17.3	18.9/20.3	22.0/21.2
Area (sq cm)	97/114	98/111	102/105
BAKING DATA			
Absorption (%)	65.2	66.4	67.4
Crumb Grain and Texture	8.0	8.5	8.5
Loaf Volume (cc)	868	935	988

Samples in this region were collected from Montana, North Dakota areas A and D, and South Dakota area A.

GULF/GREAT LAKES			
	Low	Medium	High
Production %	62	27	11
WHEAT GRADING DATA			
Test Weight (lb/bu)	61.5	61.7	61.6
Test Weight (kg/hl)	80.9	81.1	81.0
Damage (%)	0.1	0.2	1.0
Shrunken/Broken (%)	0.7	0.7	0.7
Total Defects (%)	0.8	0.9	1.7
Vitreous Kernels (%)	56	71	61
Grade	1 NS	1 NS	1 NS
WHEAT DATA			
Dockage (%)	0.9	0.6	0.4
Moisture (%)	13.3	13.3	12.7
Protein: 12%/0% moisture (%)	12.2/13.9	13.9/15.8	14.9/16.9
Ash: 14%/0% moisture (%)	1.55/1.80	1.57/1.82	1.67/1.94
1000 Kernel Weight	33.7	34.6	32.9
Falling Number (sec)	370	376	389
Sedimentation (cc)	44	66	63
FLOUR DATA			
Extraction (%)	69.3	68.6	68.2
Color: L	90.3	90.3	89.7
a	-1.1	-1.0	-0.9
b	9.5	9.7	9.7
Protein: 14%/0% moisture (%)	11.3/13.1	12.7/14.8	13.7/15.9
Ash: 14%/0% moisture (%)	0.52/0.60	0.53/0.62	0.54/0.63
Wet Gluten (%)	29.8	36.0	39.0
Gluten Index (%)	98.4	89.1	80.2
Falling Number (sec)	387	372	414
Amylograph Viscosity: 65g FL (BU)	540	470	555
DOUGH PROPERTIES			
Farinograph: Absorption (%)	64.7	66.7	66.7
Peak Time (min)	5.0	7.0	5.5
Stability (min)	10.0	9.0	9.5
Classification	5.0	5.0	4.0
Alveograph: P (mm)	103	90	88
L (mm)	103	130	117
P/L Ratio	1.00	0.69	0.75
W (10^{-4} joules)	371	364	315
Extensograph (45/135 min): Resistance	392/488	346/358	296/288
Extensibility (cm)	18.9/17.5	19.1/17.2	18.2/18.5
Area (sq cm)	100/111	92/84	76/74
BAKING DATA			
Absorption (%)	63.2	65.2	65.2
Crumb Grain and Texture	8.5	8.5	8.5
Loaf Volume (cc)	898	915	960

Samples in this region were collected from North Dakota areas B, C, E and F, South Dakota areas B and C, and Minnesota.

2009 REGIONAL QUALITY FACTORS BY PROTEIN RANGE

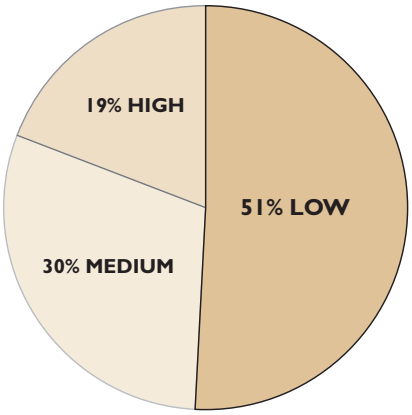
ENTIRE CROP	Protein Ranges		
	Low	Medium	High
Production %	51	30	19
WHEAT GRADING DATA			
Test Weight (lb/bu)	61.8	61.7	61.1
Test Weight (kg/hl)	81.2	81.1	80.3
Damage (%)	0.1	0.1	0.3
Shrunken/Broken (%)	0.8	0.8	0.8
Total Defects (%)	0.9	0.9	1.2
Vitreous Kernels (%)	62.5	78.6	81.3
Grade	1 NS	1 DNS	1 DNS
WHEAT DATA			
Dockage (%)	0.8	0.6	0.3
Moisture (%)	13.0	12.8	12.1
Protein: 12%/0% moisture (%)	12.2/13.9	13.8/15.7	15.1/17.2
Ash: 14%/0% moisture (%)	1.52/1.77	1.52/1.77	1.58/1.83
1000 Kernel Weight	33.5	33.6	32.6
Falling Number (sec)	371	366	393
Sedimentation (cc)	50	67	66
FLOUR DATA			
Extraction (%)	69.0	68.8	67.9
Color: L	90.4	90.3	90.0
a	-1.1	-1.1	-0.9
b	9.6	9.8	9.7
Protein: 14%/0% moisture (%)	11.3/13.2	12.8/14.9	14.2/16.5
Ash: 14%/0% moisture (%)	0.50/0.58	0.49/0.57	0.50/0.58
Wet Gluten (%)	30.4	35.5	40.5
Gluten Index (%)	97.8	91.9	85.2
Falling Number (sec)	391	388	448
Amylograph Viscosity: 65g FL (BU)	585	580	697
DOUGH PROPERTIES			
Farinograph: Absorption (%)	65.3	67.3	68.2
Peak Time (min)	5.6	7.5	7.5
Stability (min)	10.0	9.7	10.9
Classification	5.0	5.0	4.7
Alveograph: P (mm)	108	100	98
L (mm)	99	121	133
P/L Ratio	1.10	0.83	0.74
W (10^{-4} joules)	376	390	414
Extensograph (45/135 min): Resistance	401/489	367/380	322/339
Extensibility (cm)	18.5/17.4	19.0/18.7	20.8/20.3
Area (sq cm)	99/112	95/97	94/95
BAKING DATA			
Absorption (%)	63.8	65.8	66.7
Crumb Grain and Texture	8.4	8.5	8.5
Loaf Volume (cc)	889	925	979

As protein content increased in the 2009 crop, wet gluten, absorption, W values and loaf volume all improved.

Performance characteristics often improve as buyers increase their protein specifications. To illustrate the correlation between higher protein and other quality parameters, samples of the regional crop were segregated by protein levels (all based on 12 percent moisture content):

- low (less than 13.5 percent),
- medium (13.5 percent to 14.5 percent), and
- high (more than 14.5 percent).

REGIONAL AVERAGE: PRODUCTION DISTRIBUTION BY PROTEIN RANGE



EXPORT CARGO SAMPLING

Data contained in previous sections of this report are derived from the testing of samples gathered during harvest from origination points throughout the U.S. hard red spring wheat region. The results provide an assessment of the overall quality of the crop produced in a given year.

U.S. Wheat Associates, the export market development arm for American wheat growers, furthers this information by commissioning an export cargo sampling program. The program provides an accurate representation of the supplies moving through the grain marketing and transportation system and actually reaching export points. Results show the quality levels at which U.S. wheat is realistically traded and are useful to customers in developing reasonable purchase specifications.

The Federal Grain Inspection Service oversees the program whereby all export inspection agencies at all ports collect every tenth sublot sample from every vessel of U.S. wheat shipped during three two-month time periods annually.

The hard red spring wheat samples are sent to the North Dakota State University Plant Science Department's Hard Red Spring Wheat Quality Laboratory for analysis. Average results for the past two years are at right. through the grain marketing and transportation system and actually reaching export points. Results show the quality levels at which U.S. wheat is realistically traded and are useful to customers in developing reasonable purchase specifications.

	PNW AVERAGE		GREAT LAKES AVERAGE		GULF AVERAGE	
	2007	2008	2007	2008	2007	2008
SAMPLE COUNT	134	105	26	14	48	33
GRADING DATA						
Test Weight (lbs/bu)	61.4	61.6	61.8	62.6	61.1	61.9
Test Weight (kg/hl)	80.7	81.0	81.3	82.3	80.4	81.3
Damaged Kernels (%)	0.2	0.5	1.2	1.2	1.6	1.1
Shrunken & Broken (%)	1.6	1.2	1.3	1.1	1.3	0.8
Total Defects (%)	2.0	1.8	2.6	2.4	3.0	2.1
Vitreous Kernels (%)	82.3	74.5	52.7	47.5	56.6	53.7
Grade	1 DNS	1 NS	1 NS	1 NS	2 NS	1 NS
OTHER WHEAT DATA						
Dockage (%)	0.3	0.3	0.6	0.6	0.7	0.7
Moisture (%)	11.1	11.6	12.2	12.3	12.6	12.7
Protein 12%/0% Moisture basis	14.3/16.2	14.0/15.9	14.2/16.1	13.7/15.6	14.1/16.0	13.7/15.6
Ash: (%) 14%/0% Moisture basis	1.59/1.85	1.52/1.76	1.64/1.91	1.57/1.82	1.65/1.92	1.57/1.83
1000 Kernel Weight (g)	31.7	33.6	31.6	33.1	32.0	32.7
Kernel Size (%) lg/md/sm	21/60/23	52/48/3	40/52/10	59/40/2	34/50/18	59/42/2
Single Kernel: Hardness	79.8	76.8	80.9	79.6	79.7	79.1
Weight (mg)	29.5	31.5	29.5	31.1	29.5	31.5
Diameter (mm)	2.4	2.5	2.4	2.5	2.4	2.5
Falling Number (sec)	434	398	412	387	402	400

	PNW AVERAGE		GREAT LAKES AVERAGE		GULF AVERAGE	
	2007	2008	2007	2008	2007	2008
FLOUR DATA						
Lab Mill Extraction (%)	69.0	70.1	68.7	70.1	69.5	70.4
Color: L (white-black)	90.8	90.3	90.8	90.0	90.5	89.5
a (red-green)	-1.1	-0.9	-1.3	-1.1	-1.1	-1.0
b (yellow-blue)	8.9	9.3	9.3	9.7	9.3	9.7
Protein: 14%/0% Moisture basis	13.3/15.4	13.0/15.1	13.0/15.1	12.5/14.6	13.0/15.2	12.6/14.7
Ash: (%) 14%/0% Moisture basis	0.51/0.59	0.54/0.63	0.50/0.58	0.54/0.63	0.54/0.63	0.57/0.66
Wet Gluten (%)	35.2	34.9	34.4	33.5	34.6	34.0
Gluten Index (%)	89	90	93	91	91	89
Falling Number (sec)	459	448	428	416	422	427
Amylograph Peak Viscosity 65 g FL (BU)	800	623	690	592	617	638
PHYSICAL DOUGH DATA						
Farinograph: Absorption (%)	65.2	67.2	65.2	66.1	64.5	67.4
Peak Time (min)	8.6	7.2	8.1	6.9	7.8	6.7
Stability (min)	18.7	11.0	17.1	12.5	15.2	11.5
Classification	6.5	5.1	6.3	5.6	6.0	5.2
Alveograph: P (mm)	115	107	117	110	109	110
L (mm)	100	107	97	99	100	99
P/L Ratio	1.15	1.00	1.21	1.11	1.09	1.11
W (joules X 10^{-4})	410	384	413	375	379	374
BAKING DATA						
Absorption	65.2	64.7	65.5	63.8	64.2	64.2
Loaf Volume (CC)	953	968	945	928	939	954
Crumb Grain & Texture	9.2	8.9	9.0	9.0	8.9	8.8

LABORATORY ANALYSIS

All quality data contained in this report are the result of testing and analysis conducted by or under the supervision of Dr. Senay Simsek, Wheat Quality Specialist, and Brent Hinsz, Rachel Olson, DeLane Olson and Kelly McMonagle, food technologists with the Hard Red Spring Wheat Quality Laboratory in the Department of Plant Science at North Dakota State University, Fargo, USA.

COLLECTION • The North Dakota, South Dakota, Montana and Minnesota state offices of the National Agricultural Statistics Service obtained wheat samples during harvest directly from growers, farm bins and local elevators. These samples reflect the condition of the grain at the point of origin. Collection began in mid August when approximately 10 to 15 percent of the hard red spring wheat had been harvested and continued until the end of September when about 95 percent of the region's crop was harvested.

Sample collection was weighted by county production histories with a total of 739 samples being collected during harvest from Minnesota (118), Montana (158), North Dakota (376), and South Dakota (87).

ANALYSIS • Approximately 40 percent of the total wheat samples collected were analyzed for grade and other physical kernel characteristics. Distributions as a percentage of the harvested crop were calculated for key factors including test weight, thousand kernel weight, protein, falling number, and overall grade. Distribution results may differ from data presented in the various tables, because the latter are derived from production adjusted averages, rather than simple averages.

Quality tests, including milling, flour evaluation, physical dough and bread properties, were conducted on composite samples representing each crop reporting area. Again, all state and regional averages have been adjusted to reflect production as opposed to simple averaging.

METHODS, TERMS, SYMBOLS

WHEAT

SAMPLE COLLECTION • Each sample contained approximately 2 to 3 pounds of wheat, stored in sealed, moisture proof plastic bags.

MOISTURE • Official USDA procedure using Motomco Moisture Meter.

GRADE • Official United States Standards for Grain, as determined by a licensed grain inspector. North Dakota Grain Inspection Service, Fargo, ND, provided grades for composite wheat samples representing each crop reporting area.

VITREOUS KERNELS • Approximate percentage of kernels having vitreous endosperm.

DOCKAGE • Official USDA procedure. All matter other than wheat which can be removed readily from a test portion of the original sample by use of an approved device (Carter Dockage Tester). Dockage may also include underdeveloped, shriveled and small pieces of wheat kernels removed in properly separating the material other than wheat and which cannot be recovered by properly rescreening or recleaning.

TEST WEIGHT • American Association of Cereal Chemists Method 55-10 approved April 1961, revised October 1999. Measured as pounds per bushel (lb/bu), kilograms per hectoliter (kg/hl) = (lbs/bu X 1.292) + 1.419. *Approved Methods of the American Association of Cereal Chemists, Cereal Laboratory Methods (10th Edition), St. Paul, MN (2000).

THOUSAND KERNEL WEIGHT • Based on 10 gram sample of cleaned wheat (free of foreign material and broken kernels) counted by electronic seed counter.

KERNEL SIZE DISTRIBUTION • Percentages of the size of kernels (large, medium, small) were determined using a wheat sizer equipped with the following sieve openings:
•top sieve—Tyler #7 with 2.92 mm opening;
•middle sieve—Tyler #9 with 2.24 mm opening; and
•bottom sieve—Tyler #12 with 1.65 mm opening.

PROTEIN • American Association of Cereal Chemists (AAC) Method: 46-30 (Combustion Method), expressed on dry basis and 12 percent moisture basis.

ASH • American Association of Cereal Chemists Method 08-01, approved April 1961, revised October 1999; expressed on a 14 percent moisture basis.

FALLING NUMBER • American Association of Cereal Chemists Method 56-81B, approved November 1972, revised September 1999; units of seconds (14 percent moisture basis).

SEDIMENTATION • American Association of Cereal Chemists Method 56-61A, expressed in centimeters. Approved Methods of the American Association of Cereal Chemists, (8th Edition), St. Paul, MN (1983).

FLOUR

EXTRACTION • Thoroughly cleaned wheat is tempered to 15.5 percent moisture for 16 hours and an additional 0.5 percent water is added five minutes prior to milling. The milling laboratory is controlled at 68 percent relative humidity and 72°F to 74°F. Milling is performed on a Buhler laboratory mill (Type MLU-202). Straight grade flour (of all six flour streams) is blended and reported as "flour extraction." The blended flour is rebolted through an 84 SS sieve to remove any foreign material. This product is used for the other flour quality determinations.

ASH • American Association of Cereal Chemists Method 08-01, approved April 1961, revised October 1999; expressed on a 14 percent moisture basis.

PROTEIN • American Association of Cereal Chemists (AACC) Method 46-30 (Combustion Method), expressed on a 14 percent moisture basis.

WET GLUTEN • American Association of Cereal Chemists Method 38-12, approved October 1999; expressed on a 14 percent moisture basis determined with the glutomatic instrument.

GLUTEN INDEX • American Association of Cereal Chemists Method 38-12, approved October 1999; determined with the glutomatic instrument as an indication of gluten strength.

FLOUR FALLING NUMBER • American Association of Cereal Chemists Method 56-81B, approved November 1972, revised September 1992; units of seconds. Determination is performed on 7.0 g of Buhler milled flour (14 percent moisture basis).

AMYLOGRAM • (100 g) American Association of Cereal Chemists Method 22-10. Peak viscosity reported in Brabender units (B.U.), on a 14 percent moisture basis.

(65 g) American Association of Cereal Chemists Method 22-10, modified as follows: 65 g of flour (14 percent moisture basis) are slurried in 450 ml distilled water, paddle stirrers are used with the Brabender Amylograph. Peak viscosity reported in Brabender units (B.U.), on a 14 percent moisture basis.

STARCH DAMAGE • American Association of Cereal Chemists Method 76-31. Proportion of starch granules that have incurred physical damage from milling.

PHYSICAL DOUGH PROPERTIES

FARINOGRAM • American Association of Cereal Chemists Method 54-21; constant flour weight method, small (50 g) mixing bowl. (Flour weight 14 percent moisture basis)

ABSORPTION • Amount of water required to center curve peak on the 500 Brabender unit line, expressed on 14 percent moisture basis.

PEAK TIME • The interval, to the nearest 0.5 min, from the first addition of water to the maximum consistency immediately prior to the first indication of weakening. Also known as dough development time.

STABILITY • The time interval, to the nearest 0.5 min, between the point where the top of the curve that first intersects the 500-BU line and the point where the top of the curve departs the 500-BU line.

MIXING TOLERANCE INDEX • The difference, in Brabender units, from the top of the curve at the peak to the top of the curve measured five minutes after the peak.

VALORIMETER VALUE • An empirical, single-figure quality score based on the development time and tolerance to mixing. Derived from the farinogram by means of a special template supplied by the equipment manufacturer. Generally, stronger flours have higher valorimeter values.

CLASSIFICATION • An empirical classification incorporating peak time, stability, MTI, and general curve characteristics. A scale of 1 to 8 is employed with higher values indicating stronger curve types.

EXTENSIGRAM • American Association of Cereal Chemists Method 54-10, approved April 1961, revised October 1982; modified as follows: (a) 100 grams of flour (14 percent moisture basis), 2.0 percent sodium chloride (U.S.P.) and water (equal to farinograph absorption minus 2 percent) are mixed to optimum development in a National pin dough mixer; (b) doughs are scaled to 150 grams, rounded, moulded, placed in extensigram holders, and rested for 45 minutes and 135 minutes, respectively, at 30°C and 78 percent relative humidity. The dough is then stretched as described in the procedure referenced above. For conversion purposes, 500 grams equals 400 B.U.

EXTENSIBILITY • Total length of the curve at the base line in centimeters.

RESISTANCE • Maximum curve height, reported in Brabender units (B.U.).

AREA • The area under the curve is measured and reported in square centimeters.

ALVEOGRAPH • International Association of Cereal Chemists Standard No. 121. Measurement of dough extensibility and resistance to extension.

"P" • Maximal overpressure; related to dough's resistance to deformation.

"L" • Dough extensibility.

"w" • The "work" associated with dough deformation.

BAKING

PROCEDURE • American Association of Cereal Chemists Method 10-09, approved September 1985; modified as follows: (a) fungal amylase (SKB 15) replacing malt dry powder, (b) Instant dry yeast (1 percent) in lieu of compressed yeast, (c) 5 to 10 ppm ammonium phosphate, where added oxidants are required, (d) 2 percent shortening added. Doughs are mechanically punched using 6-inch rolls, and mechanically moulded using a National "Roll-R-Up" moulder. Baking is accomplished in "Shogren-type" pans.

BAKING ABSORPTION • Water required for optimum dough baking performance, expressed as a percent of flour weight on a 14 percent moisture basis.

DOUGH CHARACTER • Handling characteristics assessed at panning on a scale of 1 to 10 with higher scores preferred.

LOAF VOLUME • Rapeseed displacement measurement made 30 minutes after bread is removed from the oven.

CRUMB GRAIN AND TEXTURE • Visual comparison to standard using a constant illumination source. Scale of 1 to 10, the higher scores preferred.

CRUMB COLOR • Visual comparison with a standard using a constant illumination source on a scale of 1 to 10, the higher scores preferred.

CRUST COLOR • Visual comparison with a standard using a constant illumination source on a scale of 1 to 10, the higher scores preferred.

SYMMETRY • Visual comparison with a standard using a constant illumination source on a scale of 1 to 10, the higher scores preferred.

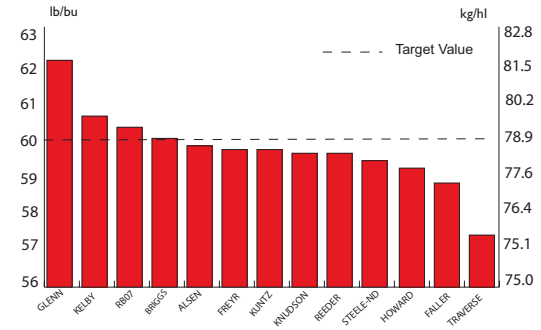
VARIETAL INFORMATION

Quality products begin with quality ingredients. In wheat, quality begins with the varieties planted. Within the hard red spring class of wheat, there are different varieties available — all with relatively uniform characteristics.

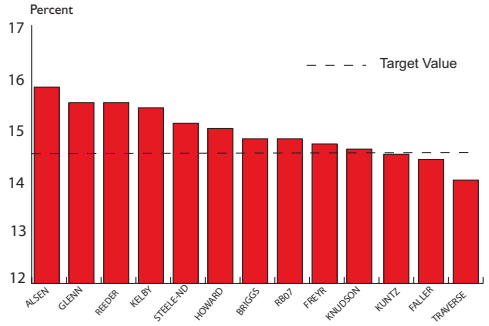
Spring wheat variety development is carried out through public breeding programs at North Dakota State University in Fargo, the University of Minnesota in St. Paul, South Dakota State University in Brookings, and Montana State University in Bozeman. Public plant breeders test varieties for performance at experiment stations across the region. Private firms also develop spring wheat varieties for the region. The two primary ones are AgriPro and Westbred.

Before any spring wheat variety is released for commercial production, it must meet or exceed current standards for the class. Prospective variety releases are evaluated for milling and baking characteristics as well as for yield, protein content, test weight, resistance to diseases and insects, and straw strength.

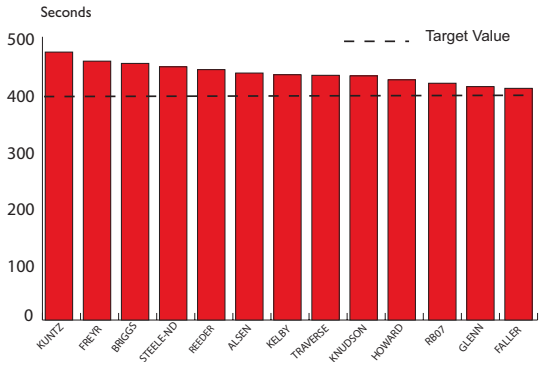
TEST WEIGHT COMPARISON



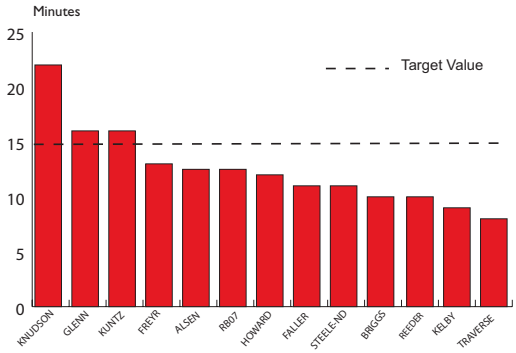
PROTEIN CONTENT COMPARISON
(12% moisture basis)



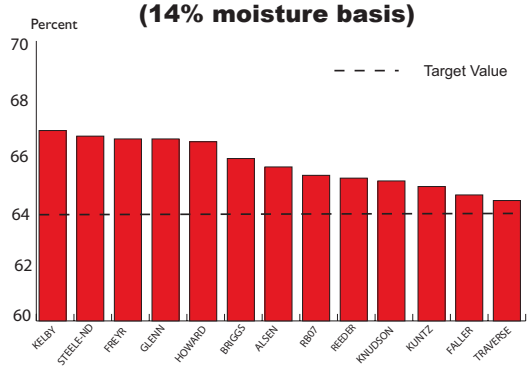
FALLING NUMER COMPARISON



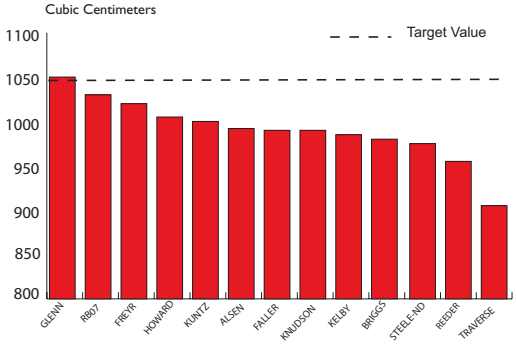
FARINOGRAPH STABILITY COMPARISON



FARINOGRAPH ABSORPTION COMPARISON
(14% moisture basis)



LOAF VOLUME COMPARISON



Target values represent regionally agreed upon goals of public and private variety development programs. Environment influences the quality of varieties across growing areas and planting years. For this reason, wheat breeders use "check" or reference varieties to evaluate quality in experimental varieties. They usually test and analyze quality data from multiple years and growing locations before a variety is released.

VARIETAL INFORMATION

Grown & Tested across North Dakota • Agronomic Factors

			Agronomic Description		Reaction to Disease[2]			Average Yield			
								Eastern North Dakota[3]		Western North Dakota[4]	
	Agent or Origin[1]	Year Released	Straw Strength	Maturity	Leaf Rust	Foliar Disease	Head (Scab)	BU/Acre	MT/HA	BU/Acre	MT/HA
Alsen	ND	2000	strg.	m. early	MR/MS	S	MR	70.1	4.71	47.9	3.22
Briggs	SD	2002	med.	m. early	R	MS	S	73.3	4.93	44.4	2.98
Faller	ND	2007	strg.	med.	R	MR	MR/M	80.4	5.41	45.8	3.08
Freyr	AgriPro	2004	strg.	med.	MR/M	MS	MR	71.3	4.79	49.2	3.31
Glenn	ND	2005	strg.	m. early	R	M	MR	73.1	4.91	45.3	3.05
Howard	ND	2006	strg.	med.	R	MS	M	77.1	5.18	44.9	3.02
Kelby	AgriPro	2006	strg.	m. early	R	M	M	73.0	4.91	50.0	3.36
Knudson	AgriPro	2001	strg.	med.	MR	MR	M	76.2	5.12	48.3	3.25
Kuntz	AgriPro	2007	strg.	m.early	MR	MS	M	75.7	5.09	45.1	3.03
RB07	MN	2007	m.strg.	m.early	R	MS	M	77.1	5.18	53.9	3.59
Reeder	ND	1999	strg.	m.early	MS	S	S	73.6	4.95	45.8	3.08
Steele-ND	ND	2004	med.	med.	R	MS	M	70.8	4.76	47.9	3.22
Traverse	SD	2006	med.	m. early	MR	MS	MR/M	80.3	5.40	42.8	2.88

Grown & Tested in Williston, North Dakota • Agronomic Factors

			Agronomic Description		Reaction to Disease[2]			Average Yield	
								Williston, North Dakota	
	Agent or Origin[1]	Year Released	Straw Strength	Maturity	Leaf Rust	Foliar Disease	Head (Scab)	BU/Acre	MT/HA
Choteau	MT	2004	strg.	m.early	R	M	S	37.6	2.53
Faller	ND	2007	strg.	med.	MR/MS	MS	MR	35.6	2.39
Freyr	AgriPro	2004	strg.	med.	MR	MS	MR	34.8	2.34
Glenn	ND	2005	strg.	m.early	R	M	MR	37.7	2.53
McNeal	MT	1995	strg.	m. early	MS	MR	S	38.9	2.62
Reeder	ND	1999	strg.	m.early	MS	S	S	42.6	2.86
Vida	MT	2005	n/a	n/a	n/a	n/a	n/a	42.3	2.84

1 ND=North Dakota State University (Public), SD=South Dakota State University (Public), MN=University of Minnesota (Public), MT=Montana State University (Public), and AgriPro (Private).

2 Reaction to Disease: resistant (R), moderately resistant (MR), intermediate (M), moderately susceptible (MS), susceptible (S), very susceptible (VS). *Indicates yield and/or quality have often been higher than would be expected based on visual head blight symptoms alone.

3 2008 North Dakota average yield data from Prosper, Carrington, Casselton and Langdon locations in North Dakota.

4 2008 North Dakota average yield data from Williston, Dickinson and Hettinger locations in North Dakota.

Source: NDSU Plant Science Department, Hard Red Spring Wheat Quality Laboratory.

Grown & Tested across North Dakota • Quality & End-Use Factors

	Quality Factors[5]						End-Use[7]		
Variety	Test Weight LB/BU	Test Wheat KG/HL	Wheat Protein %	Wheat Falling # Seconds	Farinogram Stability (Min)	Absorption %	Loaf Volume CC	Gluten Strength Description [7]	Mill & Bake Quality Rating [8]
Alsen	59.8	78.7	15.8	436	12.5	65.5	992	traditional strong	★★★★
Briggs	60.0	78.9	14.8	453	10.0	65.8	980	mellow	★★
Faller	58.8	77.4	14.4	409	11.0	64.5	990	traditional strong	★★★
Freyr	59.7	78.6	14.7	457	13.0	66.5	1020	traditional strong	★★★
Glenn	62.1	81.7	15.5	412	16.0	66.5	1050	traditional strong	★★★★★
Howard	59.2	77.9	15.0	424	12.0	66.4	1005	traditional strong	★★★★
Kelby	60.6	79.7	15.4	433	9.0	66.8	985	mellow	★★★
Knudson	59.6	78.4	14.6	431	22.0	65.0	990	extra strong	★★★
Kuntz	59.7	78.6	14.5	473	16.0	64.8	1000	traditional strong	★★★
RB07	60.3	79.3	14.8	418	12.5	65.2	1030	traditional strong	★★★
Reeder	59.6	78.4	15.5	442	10.0	65.1	955	mellow	★★★
Steele-ND	59.4	78.2	15.1	447	11.0	66.6	975	mellow	★★★
Traverse	57.4	75.6	14.0	432	8.0	64.3	905	mellow	★

Grown & Tested in Williston, North Dakota • Quality & End-Use Factors

	Quality Factors[6]						End Use[7]		
	Test Weight LB/BU	Test Weight KG/HL	Wheat Protein %	Wheat Falling # Seconds	Farinogram Stability (Min)	Absorption %	Loaf Volume CC	Gluten Strength Description[7]	Mill & Bake Quality Rating [8]
Choteau	57.1	75.2	15.8	451	11.0	64.0	960	traditional strong	★★★
Faller	55.2	72.7	15.0	411	14.0	61.3	1025	traditional strong	★★★
Freyr	57.2	75.3	14.8	443	16.0	64.2	1000	traditional strong	★★★
Glenn	58.3	76.7	16.0	399	21.0	63.7	1110	traditional strong	★★★★★
McNeal	55.9	73.6	15.7	477	18.5	65.8	1055	extra strong	★★★
Reeder	56.6	74.5	15.3	439	14.5	63.1	910	mellow	★★★
Vida	57.7	76.0	14.5	391	10.0	66.1	1005	n/a	

5 Source: NDSU Plant Science Department, Hard Red Spring Wheat Quality Laboratory, 2008 drill strip trials at six locations in N.D.

6 2008 Drill strip trials at Williston, N.D. only.

7 Traditional Strong—functionality characteristic of hard red spring wheat; relatively quick mixing time, long mixing stability and tolerance to over-mixing.
Extra Strong—stronger than traditional hard red spring wheat varieties; longer mixing time and very long mixing stability.
Mellow—weaker than "traditional strong" varieties; shorter mixing time and stability.

8 Mill and bake quality rating based on protein content, milling performance, flour attributes, dough characteristics and baking performance.

Five stars = superior, four stars = excellent, three stars = good, two stars = average, one star = poor.

NORTH DAKOTA

The North Dakota Agricultural Statistics Service reports leading varieties in 2009 are Glenn, Faller, Briggs, Freyr and Steele-ND. Of the 6.7 million acres of spring wheat in North Dakota, the top five varieties account for 61 percent.

GLENN was the top variety planted in North Dakota for the third straight year with 24 percent of the acres, and it ranks third in Minnesota with 7 percent. Glenn is popular with producers across a broad part of the region because of its disease resistance to Fusarium headblight and leaf rust, competitive yield and its ability to produce high market quality traits, especially test weight. It is the quality "check" variety used by both public and private breeding programs and is rated as superior for milling and baking properties.

FALLER made robust gains across both North Dakota and Minnesota in 2009, moving into second place in North Dakota with 17 percent of the acres and assuming the top spot in Minnesota with 21 percent. It is popular, especially in eastern areas of the region, for its high yield and resistance to Fusarium headblight and leaf diseases. Faller does have lower average protein but its milling and baking qualities are rated as good.

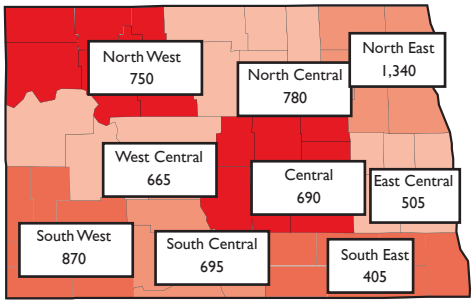
FREYR remains a popular variety in both North Dakota and Minnesota with 7 and 5 percent of the acres, respectively. It is popular for its high levels of resistance to Fusarium headblight and consistent agronomics for producers, in both dry and wet growing seasons. Freyr has good milling and baking qualities.

SPRING WHEAT VARIETIES PLANTED ACRES IN NORTH DAKOTA

Variety	2008%[1]	2009%[1]	2009 Acres (1,000)
Glenn	27.9	23.6	1,583.7
Faller	2.2	17.2	1,150.1
Briggs	7.6	7.6	510.9
Freyr	8.6	7.0	469.1
Steele-ND	9.2	5.8	390.4
Howard	5.1	5.1	344.9
Kelby	4.1	4.4	294.6
Alsen	7.6	4.2	280.3
Knudson	4.1	2.7	181.9
Kuntz	1.3	2.7	180.3
Reeder	2.5	2.6	172.0
RB07	0.0	1.3	86.1
Choteau	1.7	1.2	79.2
Granger	1.2	1.0	68.9
Other[2]	16.9	13.4	907.6

1. Percentages may not add to 100 due to rounding.
2. Includes varieties with less than 1% of acreage in 2009 and unknown varieties.

NORTH DAKOTA AGRICULTURAL STATISTICS DISTRICTS 2009 PLANTED AREA (1,000 ACRES)

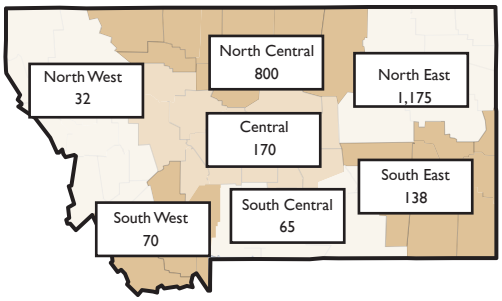


SPRING WHEAT VARIETIES IN NORTH DAKOTA SHARE OF 2009 SEEDED ACRES BY CROP DISTRICT

Variety	North West	North Central	North East	West Central	Central	East Central	South West	South Central	South East	State
					Percentage (%)[1]					
Glenn	26.7	38.2	19.3	30.3	34.7	10.3	15.7	17.4	18.5	23.6
Faller	12.9	16.3	37.8	5.5	19.8	30.7	0.6	1.7	18.5	17.2
Briggs	4.1	5.5	4.6	1.0	8.7	9.8	7.7	14.1	23.3	7.6
Freyr	8.3	5.6	2.1	12.5	3.9	6.2	9.4	15.6	1.1	7.0
Steele-ND	13.4	8.8	1.6	3.7	1.8	0.8	12.5	5.6	2.8	5.8
Howard	2.4	5.6	4.9	2.9	4.1	4.4	14.1	1.2	4.3	5.1
Kelby	5.3	1.3	4.3	3.9	3.1	15.2	1.7	4.4	4.3	4.4
Alsen	6.4	5.4	2.9	6.9	4.9	1.2	2.4	3.3	5.2	4.2
Knudson	3.6	4.8	1.3	2.0	1.8	1.4	0.1	7.4	3.7	2.7
Kuntz	4.1	1.1	5.5	2.4	2.5	1.3	1.3	2.1	0.3	2.7
Reeder	6.2	0.0	0.0	3.9	0.0	0.0	6.2	6.5	0.1	2.6
RB07	0.1	0.1	2.3	0.4	0.3	2.4	2.3	1.6	1.2	1.3
Choteau	0.0	1.1	0.0	0.2	0.0	0.0	7.6	0.4	0.0	1.2
Granger	0.0	0.0	0.0	6.1	1.2	0.2	1.4	0.0	1.7	1.0
Other[2]	6.5	6.2	13.3	18.3	13.2	16.0	16.9	18.7	14.9	13.4
					1,000 acres					
All Varieties	750	780	1,340	665	690	505	870	695	405	6,700[3]

1. Columns may not add to 100 due to rounding.
2. Includes varieties with less than 1% of acreage in 2009 and unknown varieties.
3. September 30, 2009 small grains estimate was 6.7 million acres.

MONTANA AGRICULTURAL STATISTICS DISTRICTS 2009 PLANTED AREA (1,000 ACRES)



SPRING WHEAT VARIETIES PLANTED ACRES IN MONTANA

Variety	2008%[1]	2009%[1]	2009 Acres (1,000)
Reeder	25.0	22.5	555.3
Choteau	21.6	22.2	547.7
McNeal	12.1	10.5	256.4
Vida	0.0	4.9	119.0
Corbin	3.4	4.1	99.8
Conan	2.9	3.4	82.6
Fortuna	4.1	2.6	64.6
Hank	2.6	1.8	43.2
AC Lillian	2.9	1.7	40.7
Westbred 936	0.8	1.5	36.7
Ernest	2.3	1.5	36.2
Other[2]	22.3	573	567.8

1. Percentages may not add to 100 due to rounding.
2. Includes varieties with less than 1% of acreage in 2009 and unknown varieties.

SPRING WHEAT VARIETIES IN MONTANA SHARE OF 2009 SEEDED ACRES BY CROP DISTRICT

Variety	North West	North Central	North East	Central	South West	South Central	South East	Total State
				Percentage (%)[1]				
Reeder	0.0	1.0	42.3	12.2	0.0	5.7	18.8	22.5
Choteau	0.0	41.4	14.3	19.0	2.6	4.2	8.5	22.2
McNeal	0.1	9.0	10.9	5.3	8.2	19.2	21.1	10.5
Vida	0.0	1.4	8.5	2.1	0.0	1.0	2.6	4.9
Corbin	0.0	12.1	0.2	0.3	0.1	0.0	0.0	4.1
Conan	0.0	9.1	0.8	0.1	0.0	0.3	0.0	3.4
Fortuna	0.0	7.0	0.0	2.2	0.0	5.9	0.8	2.6
Hank	3.6	0.3	0.5	13.6	6.5	9.0	0.1	1.8
AC Lillian	0.0	1.9	1.8	1.3	0.0	3.3	0.0	1.7
Westbred 936	0.8	0.2	0.0	4.8	23.7	0.2	7.2	1.5
Ernest	0.0	3.3	0.8	0.0	0.0	0.0	0.3	1.5
Other[2]	95.5	13.3	19.9	39.1	44.0	51.2	40.6	23.3
				1,000 Acres				
All Varieties	32	800	1,175	170	70	65	138	2,450[3]

1/Columns may not add to 100 due to rounding.
2/Includes varieties with less than 1% of acreage in 2009 and unknown varieties.
3/September 30, 2009 small grains estimate was 2.45 million acres.

MONTANA

Montana Agricultural Statistics Service reports the most popular varieties of hard red spring wheat planted in the state in 2009 are Reeder, Choteau, McNeal. and Vida. Of 2.45 million acres planted, these four varieties account for 60 percent.

REEDER is the leading spring wheat variety in Montana for the fourth straight year with 23 percent of the acres. It remains one of the highest yielding varieties in western parts of the region. Reeder is rated good for milling and baking properties.

CHOTEAU is the second most popular variety in Montana with 22 percent of the acres. It is a solid stem variety which helps producers manage the wheat stem sawfly which is becoming an increasing economic and production threat to wheat in the region. Choteau is rated as good for milling and baking qualities.

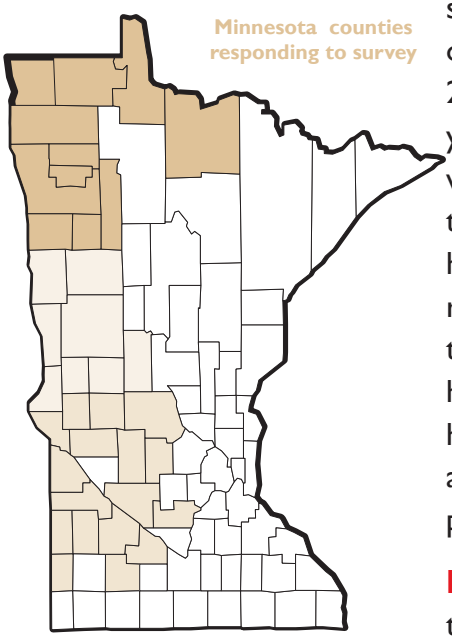
MCNEAL holds onto third place with 11 percent of the acres. The one-time dominant variety remains most popular in southern districts. McNeal has uniquely strong dough characteristics and is rated as good for milling and baking qualities.

VIDA moved into fourth place with 5 percent of the acres. It is a recent release which is expected to capture additional acres in the upcoming years due to its higher level of disease resistance and increased yield potential. Vida is rated as good for milling and baking qualities.

MINNESOTA & SOUTH DAKOTA

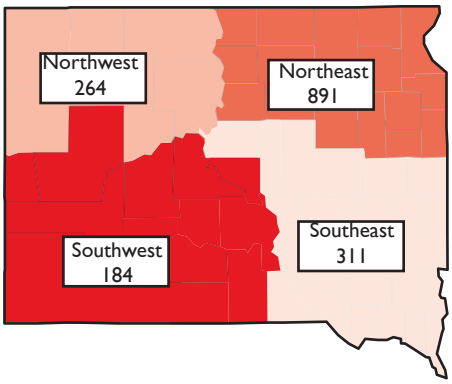
A Minnesota Wheat Research and Promotion Council 2009 survey indicates the most popular varieties are Faller, RB07, Glenn, Knudson and Oklee.

RB07 is the second most popular variety in Minnesota with 19 percent of the acres, up significantly from only 5 percent in 2008. It is a high yielding variety which is resistant to leaf rust and has intermediate resistance to Fusarium headblight. RB07 has good milling and baking properties.



KNUDSON is the fourth most popular variety in Minnesota with 6 percent of the acres, and accounts for 3 percent of the acres in North Dakota. It is a high yielding variety with a good disease package. Knudson does have lower protein levels but has exceptionally strong dough mixing properties and good milling and baking qualities.

BRIGGS remains a highly popular variety in the southeastern part of the production region. Based on a 2008 survey, it accounted for one-half of the acres in South Dakota, and was the third most popular variety in North Dakota in 2009 with 7.5 percent of the acres. Briggs remains popular for its strong yield and resistance to leaf rust. It is rated as average for milling and baking qualities.



The South Dakota Agricultural Statistics Service only conducts a variety survey every three years. The 2008 survey showed leading varieties were Briggs, Traverse, Steele-ND, Granger and Forge.

Spring Wheat Varieties Share of 2009 Minnesota Acres

VARIETY	NORTH %[1]	CENTRAL %[1]	SOUTH %[1]	TOTAL STATE[3] 2009%[1]	TOTAL STATE 2008%
Faller	21.0	23.4	13.3	21.3	1.3
RB07	22.0	13.7	14.5	19.0	5.5
Glenn	8.2	5.0	1.6	6.8	10.0
Knudson	3.4	10.2	9.3	5.9	12.5
Oklee	1.6	14.6	4.6	5.8	9.0
Samson	6.5	2.1	1.2	4.8	3.0
Freyr	4.7	5.2	2.3	4.7	10.6
Kuntz	5.3	2.1	8.5	4.4	3.2
Briggs	5.3	1.7	4.6	4.1	8.4
Howard	3.3	3.6	1.2	3.3	5.5
Kelby	2.9	2.3	2.1	2.7	5.1
Other[2]	15.8	16.1	36.8	17.2	25.9

1/Columns may not add to 100 due to rounding.
2/Includes varieties with less than 1% of acreage in 2009 and unknown varieties.
3/September 30, 2009 small grains estimate was 1.6 million planted acres.

Spring Wheat Varieties in South Dakota Share of 2008 Seeded Acres by Crop District[4]

VARIETY	NORTH WEST %[1]	NORTH EAST %[1]	SOUTH WEST %[1]	SOUTH EAST %[1]	TOTAL STATE %[1]	STATE ACRES (1,000)
Briggs	39.1	58.0	30.8	45.1	49.5	816.6
Traverse	1.3	9.4	7.8	12.3	8.5	139.7
Steele-ND	13.2	5.9	0.2	12.6	7.7	126.7
Granger	9.8	1.5	4.9	4.8	3.8	63.0
Forge	1.3	0.7	10.9	4.7	2.7	44.9
Russ	1.8	2.0	3.9	3.3	2.4	40.0
Oxen	2.0	1.9	4.0	1.4	2.1	34.3
Kelby	0.7	2.9	1.2	0.8	2.0	32.4
Butte 86/Butte	2.7	1.0	5.2	1.2	1.8	29.4
Reeder	5.4	0.6	1.9	1.3	1.7	27.4
Knudson	0.0	2.4	0.3	0.1	1.3	21.9
Other[2]	22.8	13.8	28.9	12.3	16.5	273.7
		1,000 Acres				
All Varieties	264	891	184	311	1,650[3]	

1/Columns may not add to 100 due to rounding.
2/Includes varieties with less than 1% of acreage in 2008 and unknown varieties.
3/September 30, 2008 small grains estimate was 1.6 million planted acres.
4/No survey was conducted for 2009.

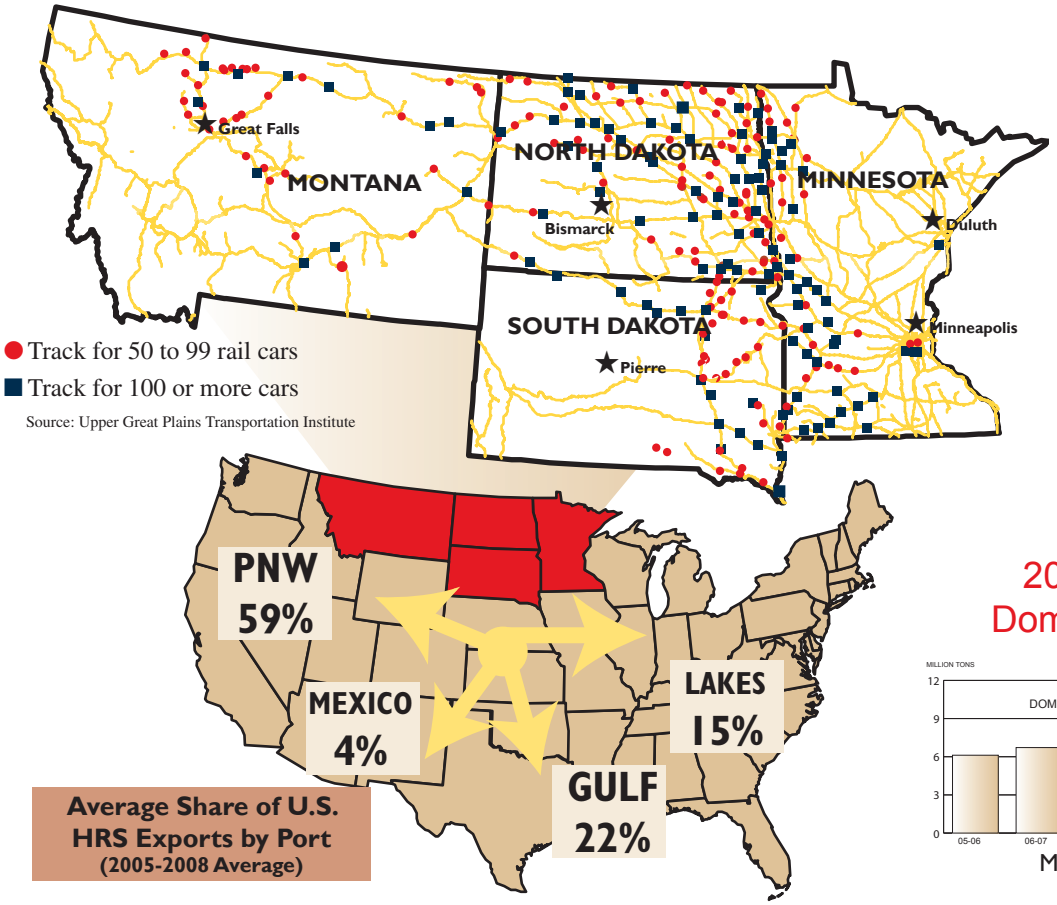
HANDLING & TRANSPORTATION

The hard red spring wheat growing region in the Northern Plains has a vast network of country elevators to facilitate efficient and precise movement to domestic and export markets. On average, nearly 80 percent of the region's wheat moves to markets by rail. Duluth is the only export market serviced by a greater share of trucks. Shipments to the Pacific Northwest and Gulf export markets are almost entirely by rail, with some barge movement to the Gulf. The dominant railroad is the Burlington Northern Santa Fe, followed by the Canadian Pacific.

An increasing number of the elevators in the region are investing in facilities and rail capacity to ship 100 car units. Each rail car holds approximately 3,500 bushels (95 metric tons) of wheat. Some of the 100-car shippers have invested in "shuttle" capabilities. Shuttle-equipped facilities receive the lowest rates, sharing volume and transaction efficiencies with the railroad.

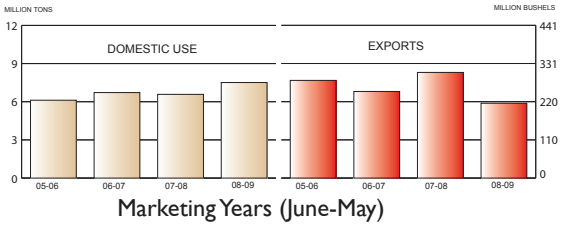
The diverse rail shipping capacities and a widespread network of elevators are strengths that buyers can capitalize on, especially as their demand heightens for more precise quality specifications and consistency between shipments. Buyers are increasingly exploring origin-specific shipments. Many international buyers now find it possible to request wheat from certain locations to optimize the quality and value of wheat they purchase.

The rail and elevator network in the U.S. hard red spring wheat region is well suited for meeting the increasing quality demands of both domestic and international customers.



Grain Handling and Transportation Facilities in the Four-State Region

2005-2008 U.S. HRS Domestic USE & Exports



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