2015
U.S. HARD RED SPRING WHEAT
REGIONAL
QUALITY REPORT

U.S. HARD RED SPRING WHEAT

MINNESOTA • MONTANA • NORTH DAKOTA
SOUTH DAKOTA • IDAHO • OREGON • WASHINGTON

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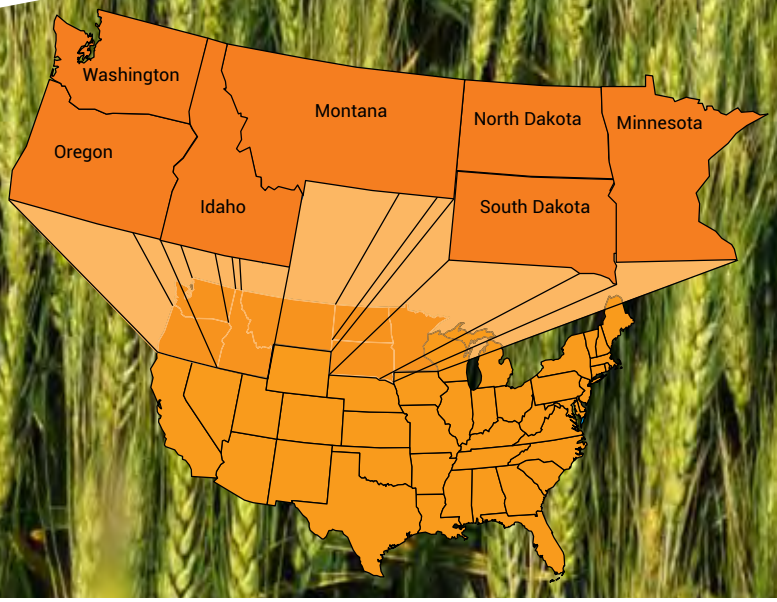


THE ARISTOCRAT OF WHEAT

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.

U.S. HARD RED SPRING WHEAT

MINNESOTA • MONTANA • NORTH DAKOTA • SOUTH DAKOTA • IDAHO • OREGON • WASHINGTON

PRODUCTION DATA	2015	2014	2010-14 AVERAGE
MILLION BUSHELS			
Minnesota	86	65	88
Montana	76	104	111
North Dakota	319	292	304
South Dakota	60	72	65
ID/OR/WA	23	22	42
U.S. Total	564	555	610
MILLION METRIC TON			
Minnesota	2.34	1.77	2.41
Montana	2.06	2.83	3.01
North Dakota	8.68	7.95	8.27
South Dakota	1.63	1.96	1.78
ID/OR/WA	0.62	0.60	1.15
U.S. Total	15.4	15.1	16.6

Source: USDA 2015 Small Grains Summary

2015 OVERVIEW

The 2015 U.S. hard red spring wheat crop produced high grades, high protein and is sound in overall kernel traits. Regional production is up slightly from 2014 but a larger share in 2015 was produced in the eastern half of the region due to higher planted acres and record per acre/hectare yields. Production was lower across the western half due to less planted area and reduced yields due to minor to severe mid-summer drought conditions. Functional crop performance is showing positive improvements over 2014 for mill yields and loaf volumes, with similar to slightly stronger dough properties, and good bake quality.

The crop averages a #1 Dark Northern Spring compared to a #1 Northern Spring in 2014, showing significant improvements for color or vitreous kernels. Specifically, the crop averages a 61.6 lb/bu (81 kg/hl) test weight, 0.4% damage and 83% vitreous kernels. Test weight and kernel damage are similar but vitreous kernels are vastly improved over the historically low 53% recorded in 2014. Grade distributions show ninety-two percent is a #1 grade, up slightly from eighty-six percent in 2014. Test weight distributions have seventy-nine percent of the crop above 60 lb/bu (78.9 kg/hl) or higher, and only four percent falling below 57 lb/bu (75 kg/hl). Vitreous kernel distributions show nearly seventy percent of the crop above 75%, compared to just forty-three percent in 2014. Only twenty percent of the crop fell below 50% vitreous kernels compared to nearly forty percent last year.

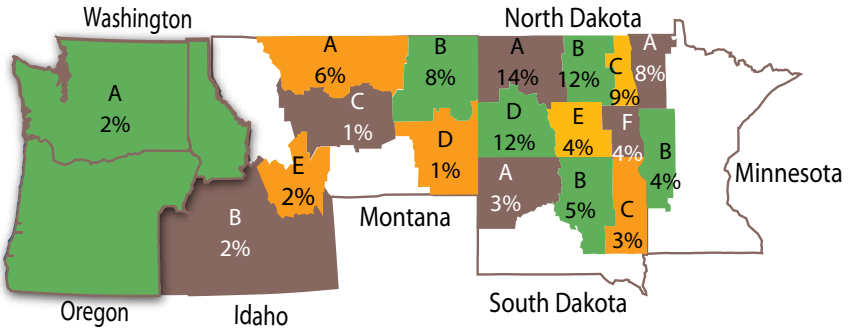
Average protein is 14.1%, up from 13.6% in 2014 and similar to the 5-yr average. All parts of the region show higher kernel protein levels. Nearly two-thirds of the 2015 crop is above 14% protein (12% moisture basis), compared to just forty percent in 2014. Likewise, only twelve percent of the crop falls below 13% protein compared to nearly thirty percent last year. A warmer, drier finish to the growing season favored the higher protein average. An extended period of warm, dry conditions supported the harvest of a sounder, drier crop compared to 2014. Kernel moisture is about one-half percentage point lower, and the average falling number for the overall crop is 372 seconds, up from 339 seconds in 2014. Distribution of falling number better reflects the improved crop soundness, as ninety-four percent of the crop averages above 350 seconds compared to just seventy-three percent in 2014. Only one percent of the 2015 crop falls below 300 seconds compared to eleven percent last year.

Disease pressures were minimal across the region and were more isolated, with the greatest pressures in the central portion of the region. The vast majority of the crop analyzed had no detectable DON. Overall crop DON levels are just 0.1 ppm, down from 0.3 in 2014 and 0.4 for a 5-yr average.

Milling yields in 2015, based on a Buhler Lab Mill, are at 67.1%, up 1 percentage point from 2014. Flour ash is slightly higher at 0.52%, compared to 0.45% in 2014, paralleling the slightly higher kernel ash in much of the crop. Average wet gluten values are 34.9%, up from just 31.5% last year. Amylograph values are up significantly from last year, with the value for 100 grams of flour at 2917 B.U., compared to just 1816 in 2014 and 2310 for a 5-yr average.

Farinograph tests indicate similar to slightly stronger dough properties compared to 2014 with ap-

Approximate Share of Regional Production by Area



preciably stronger values across some western portions. The crop average stability is 10.3 minutes, up from 9.4 in 2014 and similar to the 5-yr average. Stabilities range from a low of 7 minutes to a high of 16.6 minutes. Absorption values are similar to 2014, averaging 61.9 %, but slightly below the 5-yr average. Dough strength as measured on the Extenisgraph and Alveograph indicate slightly weaker but more extensible characteristics compared to 2014 and the 5-yr average.

Baking quality in 2015 is showing similar absorption to 2014, at 67.5% but improved loaf volume at 964 cubic centimeters, compared to 938. Dough handling properties are improved over the 2014 crop but bread scores are slightly lower.

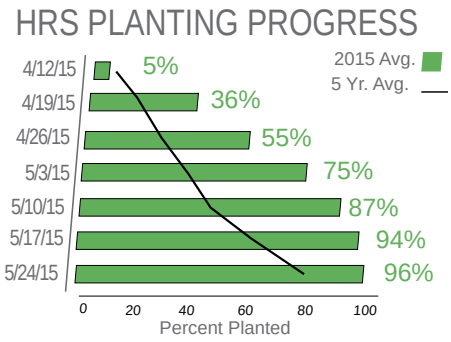
Buyers will appreciate the 2015 crop for its high grades and overall soundness, and find improved value in the higher protein levels, lower moisture content, zero to minimal DON levels and notably improved color or vitreous kernels compared to 2014. The crop provides buyers with a slight improvement in dough strength, and higher loaf volumes. While some functional traits are lower than expected, based on the improved protein levels, higher protein segments of the crop do provide parallel improvements in factors like absorption, dough stability, and loaf volume. Buyers can buy with confidence in the 2015 crop as extreme shortfalls or differences in quality across the region are minimal, but diligent contract specifications are still encouraged to attain the best quality.

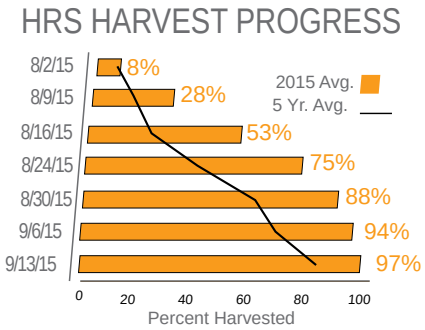
SEASONAL CONDITIONS

Planting of the U.S. hard red spring wheat crop began in early April, well ahead of last year's pace and the five-year average. Conditions were warm and dry, allowing for a quick planting pace with very few interruptions. The majority of the crop was planted in a five week period, finishing up by the end of May. The earlier start to planting was welcomed by producers after recent wet years and benefitted final yields and quality.

Emergence was a bit slow to start due to cool, dry conditions in late May and early June. As temperatures warmed up, emergence took off at an above average pace. Growing season conditions were more favorable than last year with lower disease pressure. Overall yields were above average, but varied from record yields in the eastern half of the region to below average yields in the west where much drier conditions prevailed throughout the growing season.

Harvest began at the end of July in the southern growing region and progressed fairly quickly with warm, dry conditions providing good harvest conditions. There were very few rain events during harvest which limited any falling number issues and allowed for a timely harvest. Harvest was completed in mid September, about two weeks ahead of normal.





WHEAT CHARACTERISTICS

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:					
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 material	3	3	3	3	3
Total [4]	4	4	4	4	4
Insect-damaged kernels	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.

Wheat grades, as defined by 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.

Subclass is a separate marketing factor based on the number of kernels that are dark, hard and vitreous. 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.

Other basic criteria not included as grading factors but important in the U.S. wheat marketing system.

Protein is probably the most important factor in determining the value of hard red spring wheat since it relates to many processing properties. In the U.S. market HRS prices 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.

Moisture content is an indicator of grain storability. Wheat with lower moisture content is generally more stable during storage and more profitable to a miller. U.S. HRS ranges from 12 to 13 percent.

Dockage is any material easily removed from a wheat sample during cleaning using standard mechanical means. All U.S. grade and non-grade factors are determined only after dockage is removed.

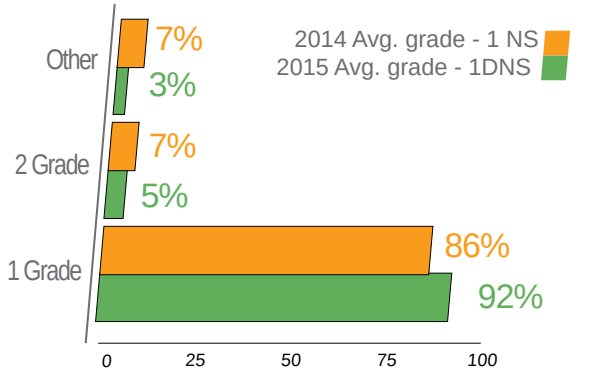
Falling number indicates the soundness of wheat or its alpha-amylase activity. Falling numbers above 300 seconds are most desired for baking products.

WHEAT GRADING DATA

STATE AND CROP REPORTING AREA	TEST WEIGHT LBS/BU	TEST WEIGHT KG/HL	DAMAGE %	SHRUNKEN/ BROKEN KERNELS %	TOTAL DEFECTS %	U.S. GRADE SUBCLASS	VITREOUS KERNELS %
MINNESOTA							
Area A	61.4	80.7	0.4	0.7	1.1	1 DNS	86
Area B	61.7	81.2	0.0	0.5	0.5	1 DNS	86
State Avg. 2015	61.4	80.7	0.3	0.7	1.0	1 DNS	86
State Avg. 2014	61.9	81.4	0.3	0.6	0.9	1 NS	60
MONTANA							
Area A	60.6	79.8	0.2	1.1	1.3	1 DNS	96
Area B	61.4	80.7	0.0	1.2	1.2	1 DNS	94
Area C	59.3	78.1	0.2	2.9	3.1	2 DNS	97
Area D	62.7	82.4	0.2	0.5	0.7	1 DNS	94
Area E	63.4	83.3	0.0	0.7	0.7	1 DNS	93
State Avg. 2015	61.1	80.3	0.1	1.2	1.3	1 DNS	95
State Avg. 2014	59.6	78.4	0.0	1.2	1.2	1 NS	38
NORTH DAKOTA							
Area A	62.0	81.6	0.8	0.8	1.6	1 DNS	86
Area B	62.9	82.6	0.0	0.6	0.6	1 DNS	89
Area C	62.1	81.7	0.2	0.5	0.7	1 DNS	95
Area D	61.0	80.2	0.7	1.0	1.7	1 NS	67
Area E	61.2	80.4	0.4	0.7	1.1	1 NS	70
Area F	61.7	81.1	0.3	0.4	0.7	1 NS	58
State Avg. 2015	61.9	81.4	0.5	0.7	1.2	1 DNS	81
State Avg. 2014	61.3	80.6	0.4	0.5	0.9	1 NS	54
SOUTH DAKOTA							
Area A	63.2	83.0	0.0	1.1	1.1	1 DNS	83
Area B	61.3	80.6	0.4	0.8	1.2	1 DNS	77
Area C	61.4	80.7	0.3	0.5	0.8	1 NS	64
State Avg. 2015	61.7	81.2	0.3	0.8	1.1	1 DNS	76
State Avg. 2014	61.9	81.3	0.1	0.6	0.7	1 NS	47
ID/OR/WA							
Area A	60.3	79.3	0.2	1.9	2.1	1 DNS	98
Area B	61.0	80.2	0.2	0.5	0.7	1 DNS	89
State Avg. 2015	60.7	79.8	0.2	1.1	1.3	1 DNS	93
State Avg. 2014	62.6	82.3	0.0	0.9	0.9	1 DNS	97
REGION AVERAGE							
Avg. 2015	61.6	81.0	0.4	0.8	1.2	1 DNS	83
Avg. 2014	61.4	80.7	0.2	0.7	0.9	1 NS	53
Five-Year Avg	61.4	80.7	0.1	1.1	1.2	1 NS	69

REGIONAL DISTRIBUTION

GRADE DISTRIBUTION



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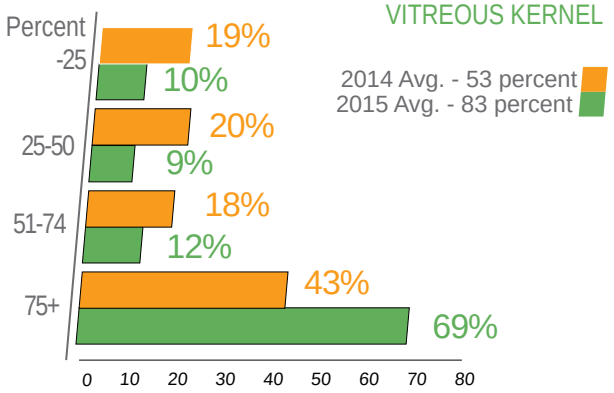
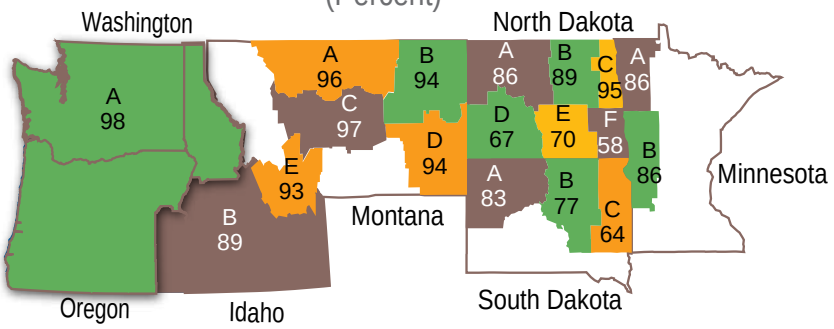
VITREOUS KERNEL



AVERAGE VITREOUS KERNEL BY AREA

(Percent)



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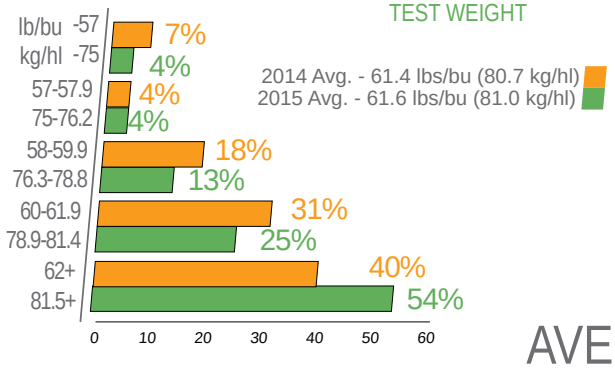
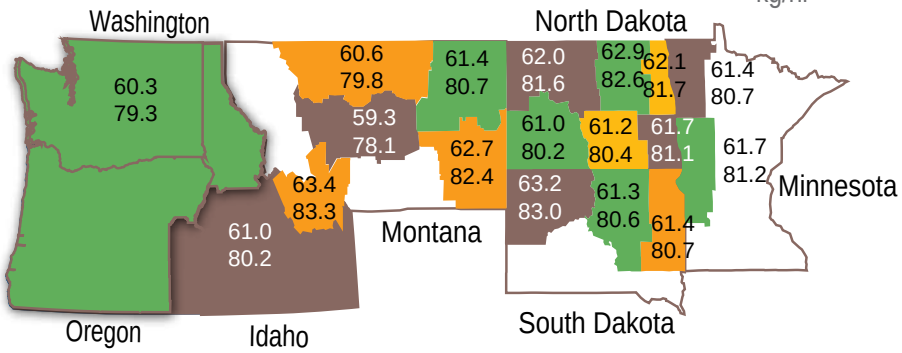
TEST WEIGHT



AVERAGE TEST WEIGHT BY AREA

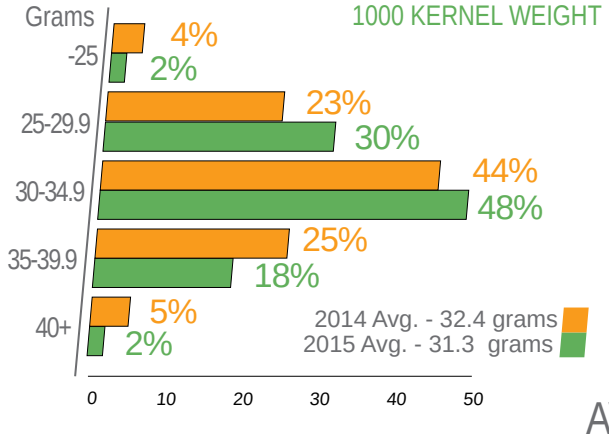
lbs/bu
kg/hl



OTHER KERNEL QUALITY DATA

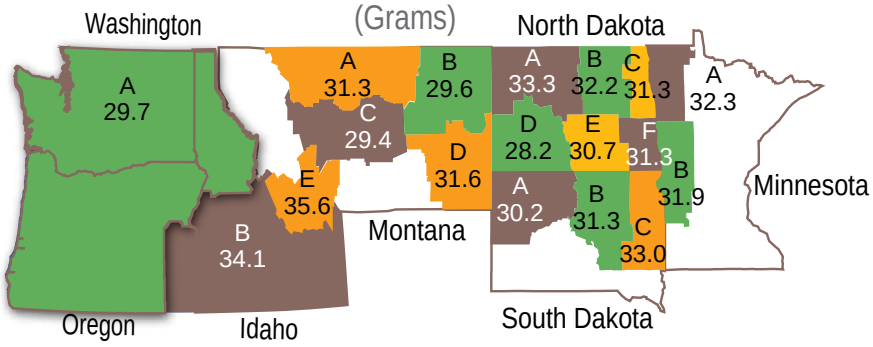
STATE AND CROP REPORTING AREA	Dockage %	Moisture %	1000 Kernel Weight G	Kernel Dist. Medium %	Kernel Dist. Large %	Protein (12% moisture) %	Protein (0% moisture) %	DON PPM	Wheat Ash %	Falling Number SEC	Zeleny Sed CC
MINNESOTA											
Area A	0.7	13.0	32.3	42	55	13.9	15.7	0.0	1.50	371	63
Area B	0.7	12.7	31.9	40	57	13.5	15.3	0.0	1.53	386	54
State Avg. 2015	0.7	12.9	32.2	42	55	13.8	15.7	0.0	1.50	373	61
State Avg. 2014	0.6	13.3	32.8	33	65	13.2	15.0	0.3	1.49	348	59
MONTANA											
Area A	0.4	10.4	31.3	66	29	14.6	16.6	0.0	1.51	342	66
Area B	0.6	10.9	29.6	70	26	14.3	16.2	0.0	1.55	372	64
Area C	1.2	10.0	29.4	63	31	14.2	16.1	0.0	1.45	378	64
Area D	1.3	11.5	31.6	46	52	13.0	14.7	0.0	1.53	376	59
Area E	0.6	11.6	35.6	36	62	14.7	16.7	0.0	1.39	356	67
State Avg. 2015	0.6	10.7	30.5	67	29	14.4	16.3	0.0	1.53	359	65
State Avg. 2014	0.6	12.2	29.4	63	33	13.8	15.6	0.0	1.42	323	63
NORTH DAKOTA											
Area A	0.7	12.6	33.3	45	53	14.4	16.4	0.4	1.56	376	62
Area B	0.7	12.3	32.2	44	53	14.0	15.9	0.0	1.50	365	63
Area C	0.7	12.2	31.3	43	55	14.1	16.0	0.0	1.48	382	63
Area D	1.0	11.9	28.2	56	41	14.0	15.9	0.0	1.57	374	60
Area E	0.8	12.6	30.7	53	44	14.0	16.0	0.6	1.48	358	59
Area F	0.9	12.3	31.3	41	57	13.7	15.6	0.2	1.54	379	50
State Avg. 2015	0.8	12.3	31.3	48	50	14.1	16.1	0.2	1.53	372	61
State Avg. 2014	0.6	13.0	33.9	35	63	13.6	15.4	0.3	1.43	329	64
SOUTH DAKOTA											
Area A	0.5	12.1	30.2	53	44	12.7	14.4	0.0	1.57	391	50
Area B	0.5	12.4	31.3	51	47	14.3	16.3	0.0	1.56	388	51
Area C	0.7	12.5	33.0	39	59	14.1	16.0	0.0	1.64	364	54
State Avg. 2015	0.6	12.4	31.3	50	48	14.0	15.9	0.0	1.57	385	51
State Avg. 2014	0.4	12.9	29.9	45	53	13.2	15.0	0.8	1.57	386	59
ID/OR/WA											
Area A	0.3	8.1	29.7	57	36	14.2	16.2	0.0	1.54	393	61
Area B	0.2	10.4	34.1	40	58	15.5	17.6	0.0	1.68	379	60
State Avg. 2015	0.2	9.4	32.3	47	49	15.0	17.0	0.0	1.62	384	61
State Avg. 2014	0.3	8.8	33.9	41	57	14.6	16.6	0.0	1.49	376	55
REGION AVERAGE											
Avg. 2015	0.7	12.1	31.3	49	48	14.1	16.0	0.1	1.53	372	61
Avg. 2014	0.6	12.7	32.4	42	56	13.6	15.4	0.3	1.46	339	62
Five-Year Avg	0.7	12.2	31.0	51	46	14.0	15.9	0.4	1.60	383	60

REGIONAL DISTRIBUTION



AVERAGE 1000 KERNEL WEIGHT BY AREA

(Grams)



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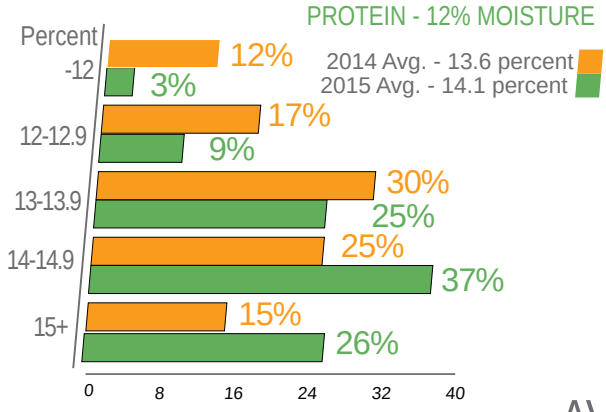
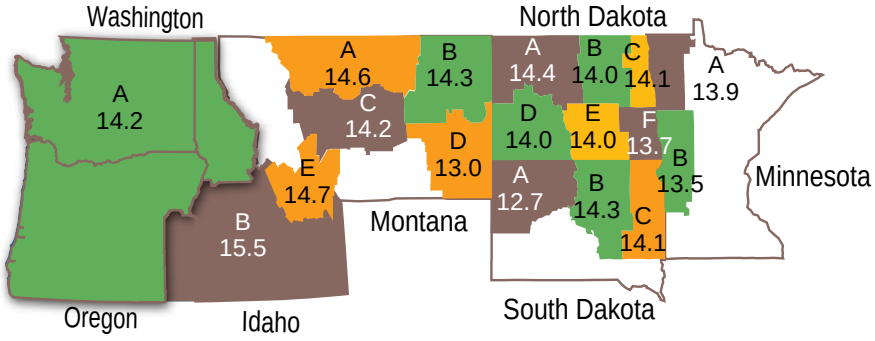


AVERAGE WHEAT PROTEIN BY AREA

12% Moisture Basis-Percent



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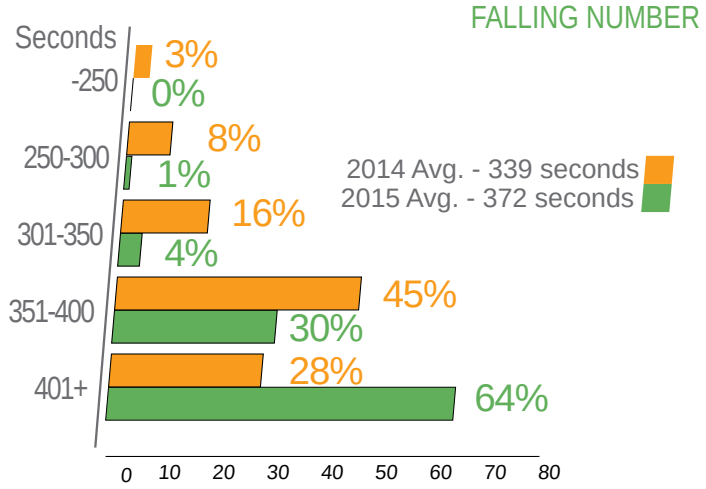
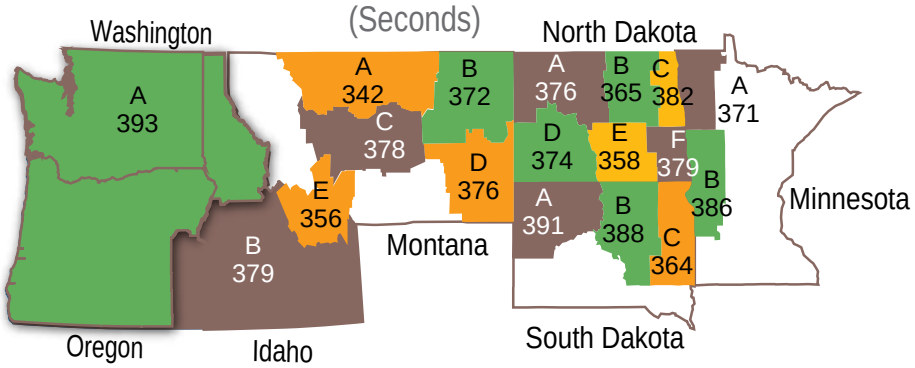


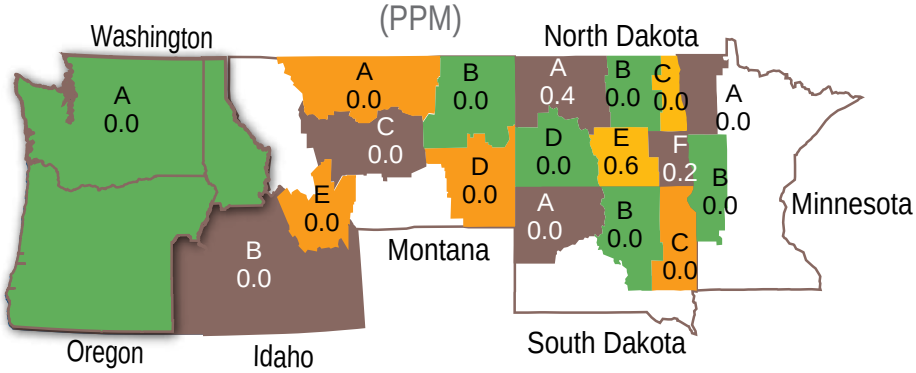
AVERAGE FALLING NUMBER BY AREA

(Seconds)



AVERAGE DON BY AREA

(PPM)



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.

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.

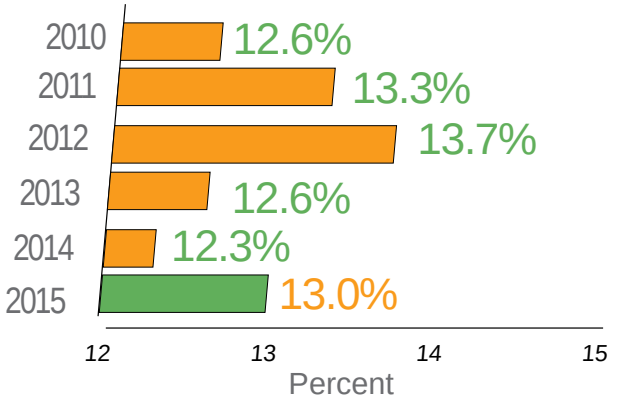
Falling number measures enzyme activity in flour. A fast time indicates high activity, revealing too much sugar and too little starch. Since starch provides bread's supporting structure, too much activity results in sticky dough and poor texture in finished products.

FLOUR QUALITY DATA

STATE AND CROP REPORTING AREA	FLOUR EXTRACTION %	FLOUR ASH %	FLOUR PROTEIN (14% MOISTURE) %	STARCH DAMAGE %	WET GLUTEN %	GLUTEN INDEX %	FALLING NUMBER %	AMYLOGRAPH PEAK VISCOSITY 65 G FL B.U.	AMYLOGRAPH PEAK VISCOSITY 100 G FL B.U.
MINNESOTA									
Area A	68.8	0.54	13.0	7.2	34.6	94	383	683	3020
Area B	65.7	0.50	12.3	7.3	33.9	87	382	687	3130
State Avg. 2015	68.2	0.53	12.9	7.2	34.4	93	383	684	3041
State Avg. 2014	67.4	0.50	12.0	8.1	29.4	99	355	535	1804
MONTANA									
Area A	66.8	0.53	13.7	6.7	36.9	83	392	565	2549
Area B	63.7	0.50	13.0	6.4	35.7	84	396	780	3212
Area C	65.9	0.55	13.6	6.2	35.6	86	411	658	2807
Area D	67.9	0.53	12.4	8.2	32.4	91	386	874	3130
Area E	68.0	0.54	13.7	7.5	37.8	87	412	573	2173
State Avg. 2015	65.3	0.52	13.3	6.6	36.1	84	395	685	2898
State Avg. 2014	65.7	0.48	12.5	7.1	30.4	99	378	491	1921
NORTH DAKOTA									
Area A	68.0	0.52	13.5	6.9	37.0	79	385	661	2747
Area B	68.4	0.50	12.8	7.3	35.1	86	378	678	3000
Area C	66.3	0.50	12.9	6.9	34.2	90	379	662	3045
Area D	66.6	0.52	12.9	6.9	33.8	88	384	690	2858
Area E	68.3	0.55	13.2	6.6	34.4	88	368	555	2326
Area F	65.6	0.49	12.2	6.5	32.9	88	383	626	2959
State Avg. 2015	67.4	0.52	13.0	7.0	35.0	85	381	662	2847
State Avg. 2014	65.8	0.43	12.3	7.9	32.0	98	356	473	1560
SOUTH DAKOTA									
Area A	67.0	0.50	11.5	7.4	30.6	91	383	768	3434
Area B	67.1	0.53	13.0	6.9	32.5	92	404	741	3127
Area C	66.4	0.52	12.6	6.8	33.5	88	377	560	2618
State Avg. 2015	67.0	0.52	12.6	7.0	32.3	91	395	718	3110
State Avg. 2014	66.8	0.46	12.1	7.1	30.8	97	399	648	2406
ID/OR/WA									
Area A	65.1	0.54	14.4	6.5	38.1	79	448	788	3024
Area B	68.4	0.56	13.5	6.8	39.5	68	420	683	3057
State Avg. 2015	67.0	0.55	13.9	6.7	38.9	73	432	727	3043
State Avg. 2014	63.3	0.45	13.5	7.5	37.9	84	475	775	2810
REGION AVERAGE									
Avg. 2015	67.1	0.52	13.0	6.9	34.9	86	386	676	2917
Avg. 2014	66.0	0.45	12.3	7.6	31.5	98	370	518	1816
Five-Year Avg.	68.5	0.50	12.9	7.5	34.7	92	398	600	2310

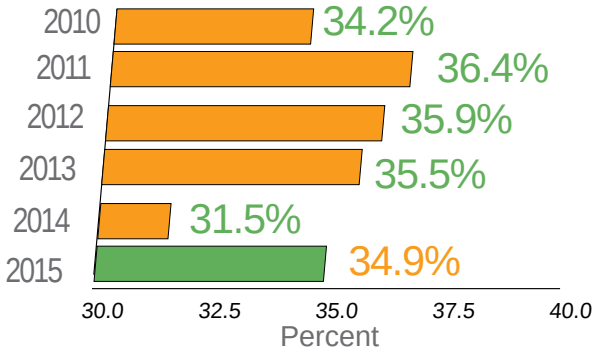
REGIONAL AVERAGE

FLOUR PROTEIN



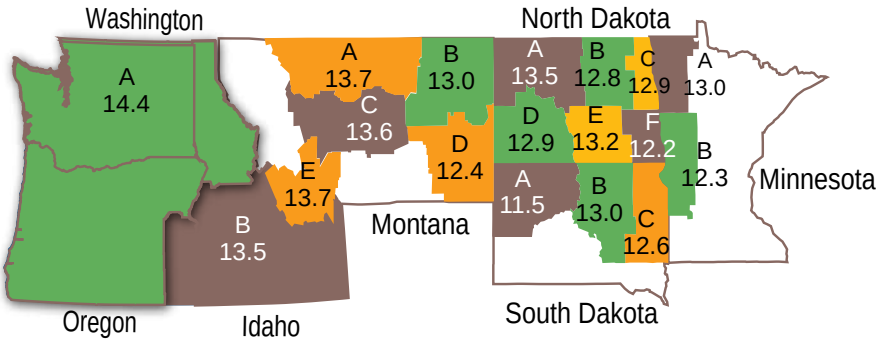
REGIONAL AVERAGE

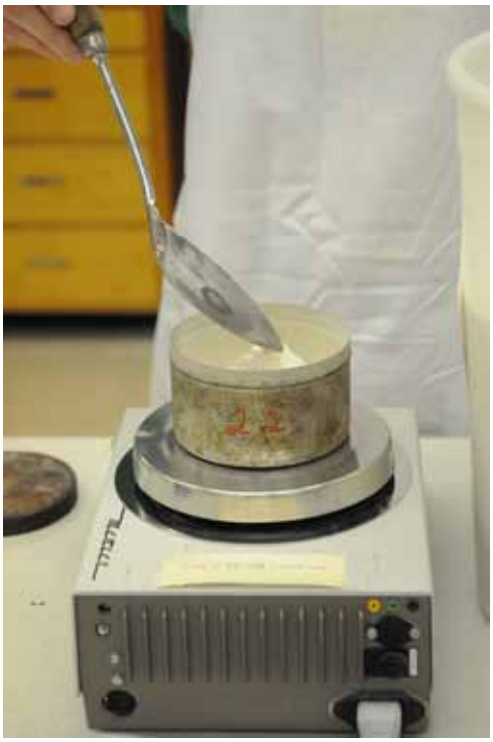
WET GLUTEN



AVERAGE FLOUR PROTEIN BY AREA

14% moisture basis-percent





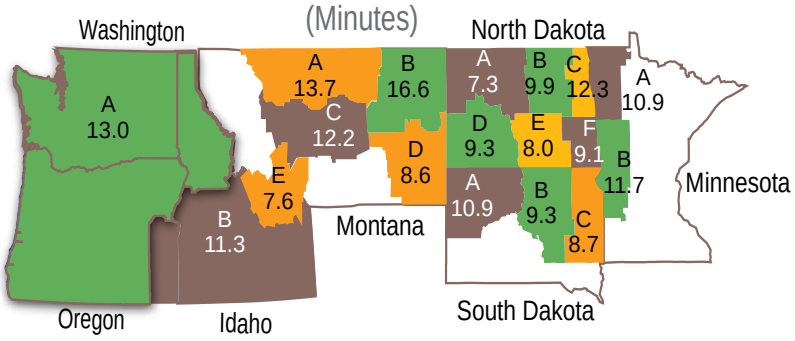
DOUGH CHARACTERISTICS

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

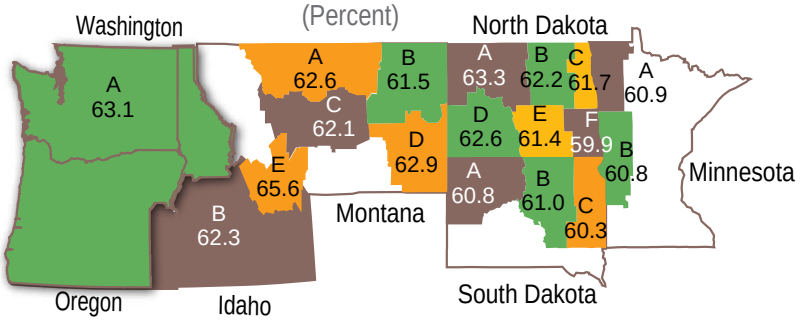
A farinograph traces a curve during the dough mixing process to record variations in gluten development and the breakdown of gluten proteins over time. Water absorption indicates the amount of water that can be added to the flour until the dough reaches a definite consistency. Peak time indicates the number of minutes required to achieve this level of dough consistency and mixing tolerance indicates the stability of the dough. Both peak time and stability are related to dough strength. 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.

AVERAGE STABILITY BY AREA
(Minutes)



AVERAGE FARINOGRAM ABSORPTION BY AREA
(Percent)



PHYSICAL DOUGH QUALITY

FARINOGRAPH					
STATE AND CROP REPORTING AREA	ABSORPTION %	PEAK TIME MIN	STABILITY MIN	MTI B.U.	QUALITY NUMBER
MINNESOTA					
Area A	60.9	6.3	10.9	29	113
Area B	60.8	6.9	11.7	30	117
State Avg. 2015	60.9	6.4	11.0	29	113
State Avg. 2014	61.8	5.4	10.2	23	115
MONTANA					
Area A	62.6	7.8	13.7	27	135
Area B	61.5	7.8	16.6	20	157
Area C	62.1	7.7	12.2	26	130
Area D	62.9	6.1	8.6	38	104
Area E	65.6	6.8	7.6	34	110
State Avg. 2015	62.1	7.7	14.8	24	145
State Avg. 2014	60.5	6.7	10.4	25	126
NORTH DAKOTA					
Area A	63.3	6.0	7.3	32	117
Area B	62.2	6.4	9.9	34	107
Area C	61.7	7.9	12.3	27	136
Area D	62.6	6.6	9.3	33	106
Area E	61.4	6.0	8.0	35	100
Area F	59.9	6.2	9.1	36	104
State Avg. 2015	62.3	6.5	9.1	32	112
State Avg. 2014	62.5	5.9	9.2	28	114
SOUTH DAKOTA					
Area A	60.8	6.4	10.9	38	101
Area B	61.0	7.3	9.3	36	110
Area C	60.3	6.2	8.7	39	98
State Avg. 2015	60.9	6.9	9.5	37	106
State Avg. 2014	60.7	5.6	8.7	29	106
ID/OR/WA					
Area A	63.1	8.7	13.0	22	163
Area B	62.3	6.2	11.3	24	128
State Avg. 2015	62.6	7.3	12.0	23	143
State Avg. 2014	64.3	5.8	6.7	28	111
REGION AVERAGE					
*Avg. 2015	61.9	6.7	10.3	31	117
*Avg. 2014	61.9	6.0	9.4	27	115
*Four-Year Avg.	63.4	6.8	10.7	34	123

REGIONAL AVERAGE

FARINOGRAPH RESULTS

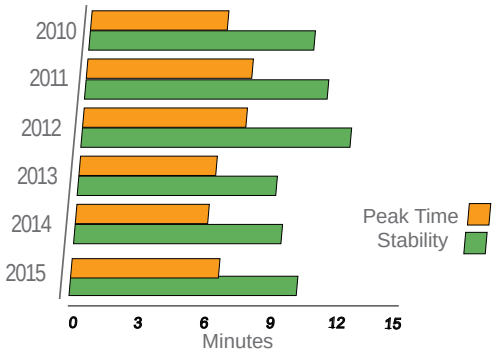
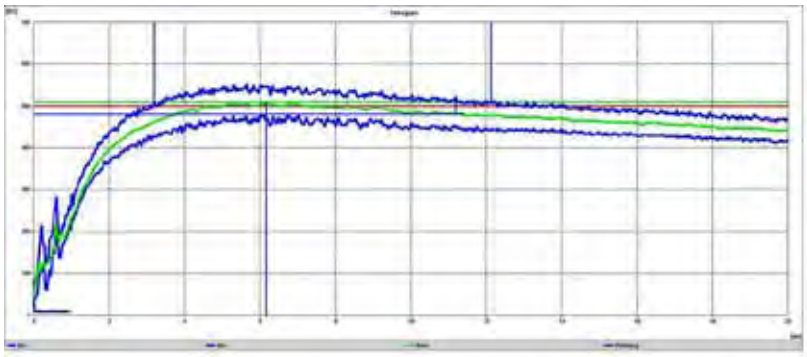
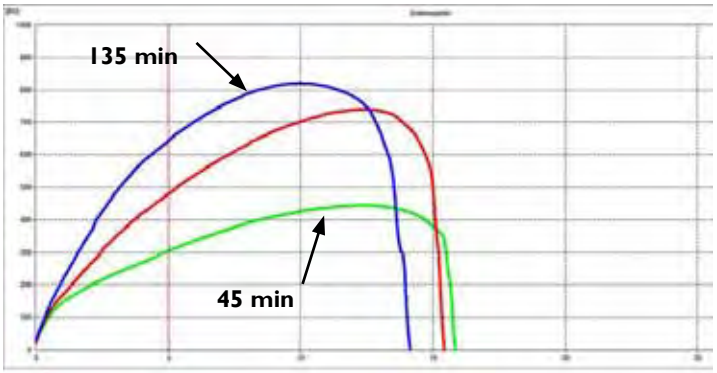


Photo: Kaitlyn Peterson, Bismarck, ND

2015 AVERAGE FARINOGRAM

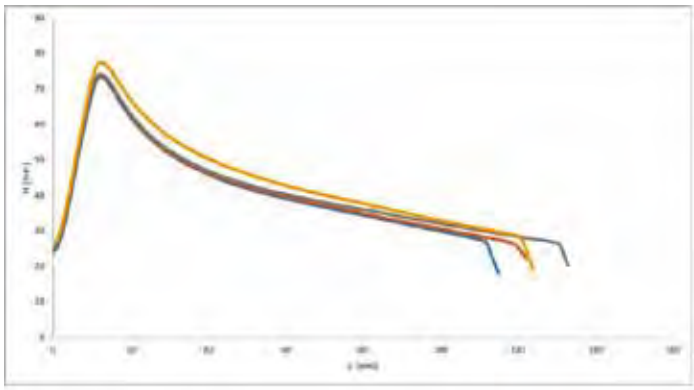


2015 AVERAGE EXTENSIGRAM



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

2015 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.

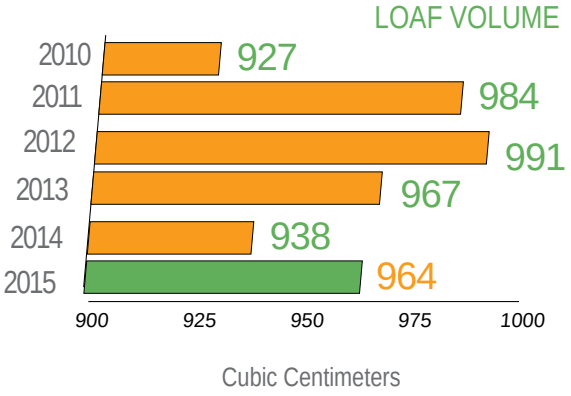
PHYSICAL DOUGH QUALITY

	EXTENSIGRAPH						ALVEOGRAPH			
STATE AND CROP REPORTING AREA	EXTENSIBILITY 45 MIN SQ CM	RESISTANCE 45 MIN B.U.	AREA SQ CM	EXTENSIBILITY 135 MIN SQ CM	RESISTANCE 135 MIN B.U.	AREA SQ CM	P MM	L MM	P/L RATIO	W JOULES X 10^4
MINNESOTA										
Area A	16.6	525	113	13.5	833	148	80	130	0.61	365
Area B	15.0	474	92	13.4	824	146	80	115	0.70	317
State Avg. 2015	16.3	515	109	13.5	831	148	80	127	0.63	356
State Avg. 2014	17.3	559	126	14.2	733	136	114	96	1.19	403
MONTANA										
Area A	16.5	416	91	14.9	762	151	83	129	0.64	357
Area B	15.1	503	98	11.1	1011	144	89	118	0.76	369
Area C	16.9	510	115	12.7	1076	174	88	129	0.68	387
Area D	16.1	433	90	11.5	959	143	93	105	0.89	339
Area E	18.0	401	99	12.3	762	122	97	127	0.76	388
State Avg. 2015	15.8	463	95	12.8	902	147	87	123	0.71	364
State Avg. 2014	16.1	506	105	14.0	812	148	99	110	0.92	381
NORTH DAKOTA										
Area A	18.9	336	85	15.7	617	129	73	120	0.61	275
Area B	16.6	443	96	14.1	853	159	82	120	0.68	336
Area C	17.3	574	129	15.0	948	187	85	109	0.78	344
Area D	14.7	402	76	13.1	836	145	88	116	0.76	335
Area E	17.1	395	88	13.9	717	134	68	135	0.50	284
Area F	16.9	452	100	12.8	708	119	69	126	0.55	283
State Avg. 2015	16.9	418	92	14.3	779	147	80	119	0.67	314
State Avg. 2014	16.0	470	97	13.3	799	138	105	97	1.11	359
SOUTH DAKOTA										
Area A	15.7	480	97	12.5	818	134	91	102	0.89	319
Area B	15.1	449	88	14.7	861	165	74	114	0.65	278
Area C	16.6	454	100	14.0	743	135	73	121	0.60	289
State Avg. 2015	15.5	456	92	14.1	833	154	77	113	0.69	288
State Avg. 2014	16.4	422	89	13.3	729	125	95	103	0.92	333
ID/OR/WA										
Area A	15.9	445	94	14.2	820	153	86	108	0.79	329
Area B	18.4	389	96	16.5	579	128	76	134	0.57	314
State Avg. 2015	17.4	413	95	15.5	680	139	80	123	0.66	320
State Avg. 2014	16.1	316	71	13.0	620	107	94	113	0.84	326
REGION AVERAGE										
Avg. 2015	16.5	442	95	14.0	805	147	80	120	0.67	324
Avg. 2014	16.2	475	100	13.5	778	137	103	101	1.05	364
Five-Year Avg.	17.0	450	100	15.2	666	128	94	114	0.84	359

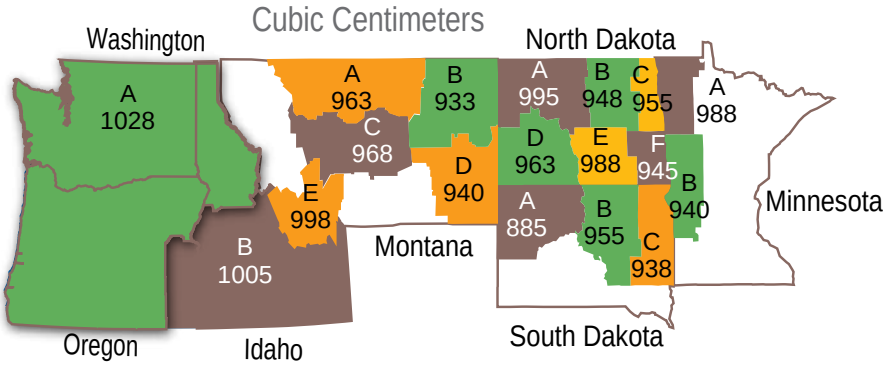
U.S. HARD RED SPRING WHEAT

MINNESOTA • MONTANA • NORTH DAKOTA • SOUTH DAKOTA • IDAHO • OREGON • WASHINGTON

REGIONAL AVERAGE



AVERAGE LOAF VOLUME BY AREA



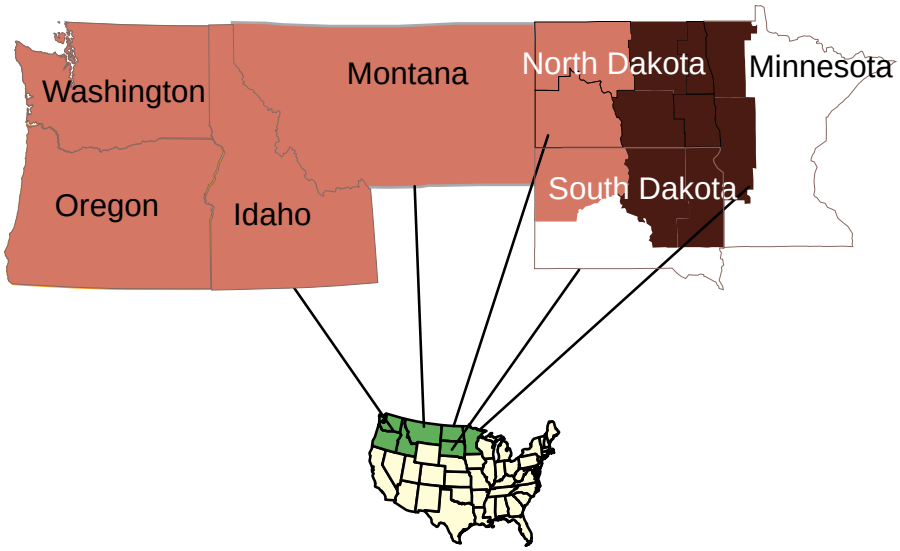
BAKING DATA

STATE AND CROP REPORTING AREA	BAKING ABSORPTION %	DOUGH HANDLING PROPERTIES	LOAF VOLUME CC	GRAIN AND TEXTURE	CRUMB COLOR	CRUST COLOR	SYMMETRY
MINNESOTA							
Area A	68.0	9.5	988	7.8	8.0	9.0	9.0
Area B	65.2	9.0	940	7.3	7.3	9.0	9.5
State Avg. 2015	67.5	9.4	978	7.7	7.9	9.0	9.1
State Avg. 2014	66.7	8.8	893	8.0	7.8	9.0	8.2
MONTANA							
Area A	67.9	10.0	963	7.5	8.3	10.0	10.0
Area B	66.0	10.0	933	7.5	7.3	9.5	9.0
Area C	70.0	10.0	968	8.3	8.0	9.0	10.0
Area D	71.2	9.0	940	7.8	7.8	10.0	8.0
Area E	73.3	10.0	998	7.5	8.3	10.0	9.5
State Avg. 2015	67.2	10.0	948	7.5	7.7	9.7	9.4
State Avg. 2014	65.6	8.9	918	7.9	7.8	9.9	9.0
NORTH DAKOTA							
Area A	69.7	9.0	995	7.3	7.3	9.5	10.0
Area B	67.2	9.5	948	7.0	7.5	10.0	9.5
Area C	65.8	10.0	955	7.5	7.5	9.0	9.0
Area D	68.2	9.5	963	7.5	7.0	9.0	8.0
Area E	69.0	9.5	988	7.5	7.3	9.5	9.0
Area F	64.2	9.0	945	7.5	7.0	9.0	10.0
State Avg. 2015	67.9	9.4	968	7.3	7.3	9.4	9.2
State Avg. 2014	68.2	8.8	948	8.0	7.7	9.8	9.5
SOUTH DAKOTA							
Area A	65.4	9.5	885	7.8	7.5	8.5	7.5
Area B	65.7	10.0	955	7.8	7.8	9.5	7.5
Area C	64.6	9.5	938	7.8	7.8	9.5	8.0
State Avg. 2015	65.4	9.8	938	7.8	7.7	9.3	7.6
State Avg. 2014	64.6	8.0	958	7.6	7.9	9.8	9.4
ID/OR/WA							
Area A	69.5	9.0	1028	7.5	8.0	10.0	9.5
Area B	69.2	9.0	1005	7.5	8.0	9.5	9.5
State Avg. 2015	69.3	9.0	1014	7.5	8.0	9.7	9.5
State Avg. 2014	70.4	7.4	967	8.5	8.2	10.0	10.0
REGION AVERAGE							
Avg. 2015	67.5	9.5	964	7.4	7.5	9.4	9.0
Avg. 2014	67.2	8.6	938	7.9	7.8	9.7	9.3
Five-Year Avg.	64.5	9.4	961	8.1	8.2	9.9	8.5

TYPICAL GEOGRAPHICAL SPLIT FOR EXPORT FLOW

Data contained on pages 20-23 represent the composites of samples by West and East production region and a low, medium and high protein range.

The same base collection samples as shown in the area specific data displayed on previous pages were used for the West/East and protein splits.

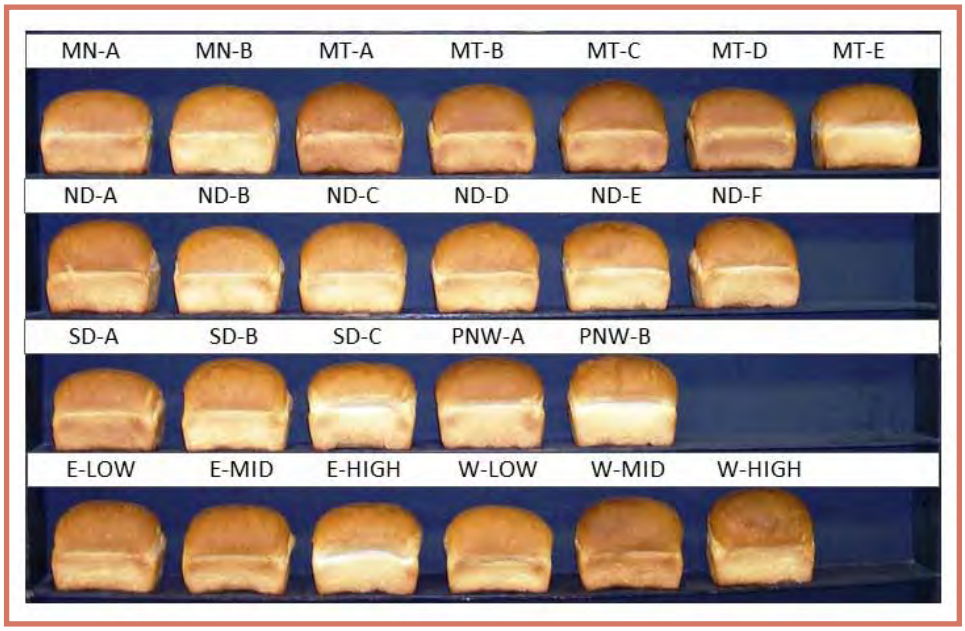


WEST-PNW EXPORT TRIBUTARY

EAST - GULF/GREAT LAKES EXPORT TRIBUTARY

PROTEIN BREAKS

LOW (less than 13.5 percent), **MEDIUM** (13.5 to 14.5 percent), and **HIGH** (more than 14.5 percent).

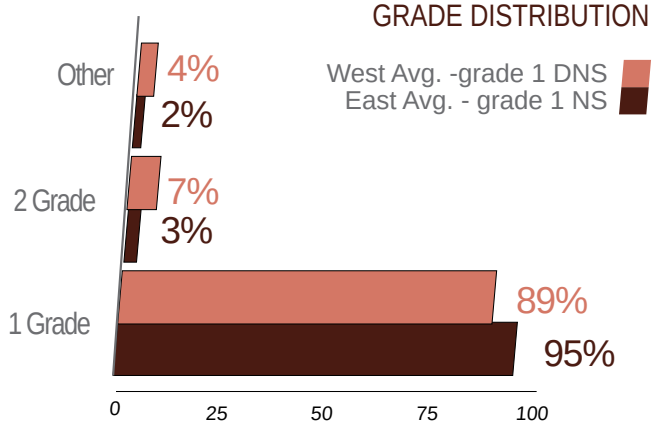


Higher protein flour typically yields greater loaf volume.
Photo: NDSU Quality Lab

DISTRIBUTIONS BY EAST/WEST PRODUCTION REGIONS

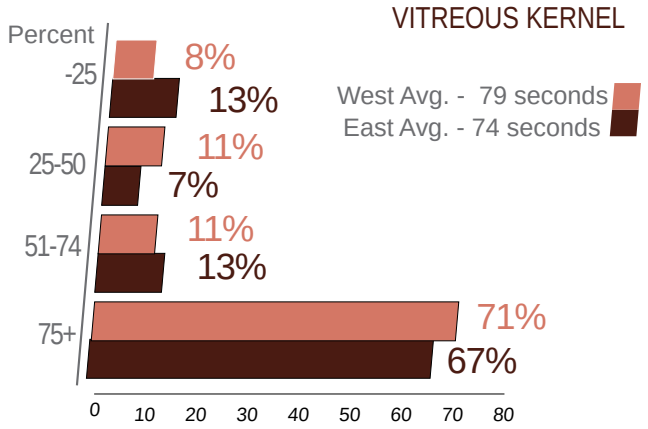
REGIONAL DISTRIBUTION

GRADE DISTRIBUTION



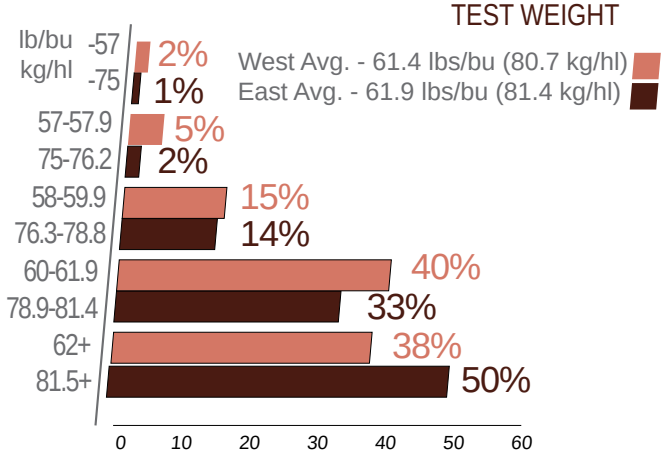
REGIONAL DISTRIBUTION

VITREOUS KERNEL



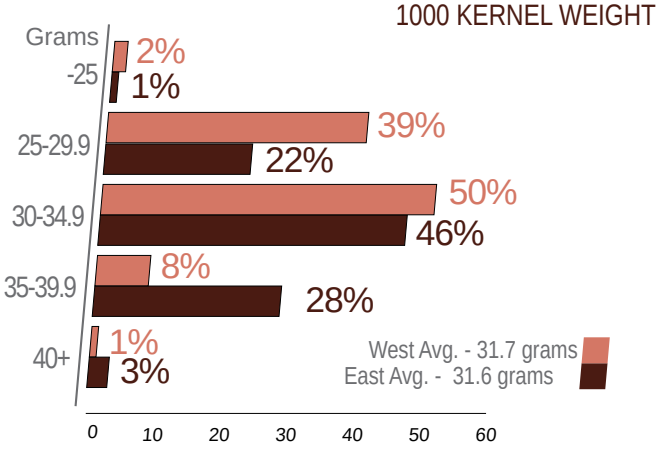
REGIONAL DISTRIBUTION

TEST WEIGHT



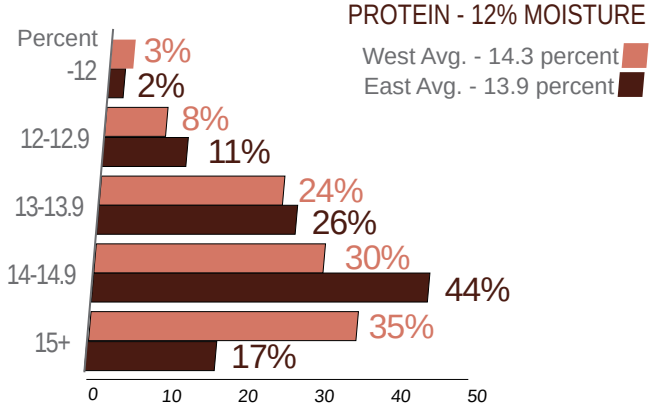
REGIONAL DISTRIBUTION

1000 KERNEL WEIGHT



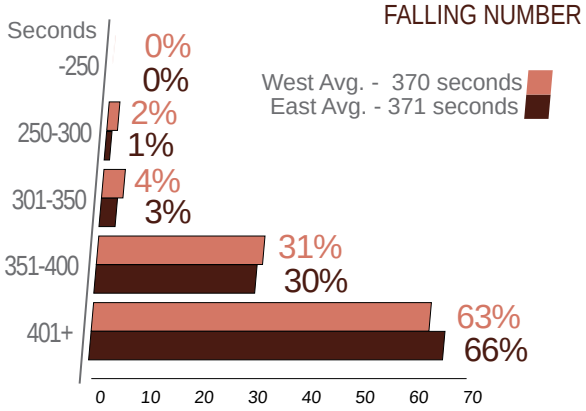
REGIONAL DISTRIBUTION

PROTEIN - 12% MOISTURE



REGIONAL DISTRIBUTION

FALLING NUMBER



2015 QUALITY FACTORS BY PROTEIN RANGE

WEST

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

	Protein Ranges		
WHEAT GRADING DATA	**Low**	**Medium**	**High**
Test Weight (lb/bu)/kg/hl)	61.8/81.3	61.9/81.4	60.7/79.9
Damage (%)	0.4	0.2	0.3
Shrunken/Broken (%)	2.4	1.0	1.2
Total Defects (%)1.1	2.8	1.2	1.5
Vitreous Kernels (%)	74	83	80
Grade	1 NS	1 DNS	1 DNS
WHEAT DATA			
Dockage (%)	0.7	0.6	0.6
Moisture (%)	11.7	11.7	11.2
Protein: 12%/0% moisture (%)	12.6/14.3	13.9/15.8	15.5/17.5
Ash: 14%/0% moisture (%)	1.53/1.78	1.50/1.75	1.51/1.75
1000 Kernel Weight	31.4	31.3	32.1
Falling Number (sec)	378	347	382
Sedimentation (cc)	60	65	67
FLOUR DATA			
Extraction (%)	67.4	67.0	66.0
Color: L	90.6	90.7	90.5
a/b	-1.34/10.1	-1.24/10.1	-1.19/9.9
Protein: 14%/0% moisture (%)	11.6/13.5	12.9/15.0	14.2/16.5
Ash: 14%/0% moisture (%)	0.50/0.58	0.50/0.58	0.52/0.60
Wet Gluten (%)	30.5	34.0	38.6
Gluten Index (%)	94	89	77
Falling Number (sec)	385	373	391
Amylograph Viscosity: 65g FL (BU)	663	677	684
DOUGH PROPERTIES			
Farinograph: Absorption (%)	61.0	62.4	63.3
Peak Time (min)	6.3	7.2	7.6
Stability (min)	9.7	10.5	12.6
Alveograph: P (mm)	85	85	82
L (mm)	104	115	113
P/L Ratio	0.81	0.74	0.72
W (10^{-4} joules)	306	328	312
Extensograph (45/135 min): Resistance	432/678	433/739	408/824
Extensibility (cm)	18.5/13.4	16.4/13.4	16.6/13.8
Area (sq cm)	101/125	92/133	88/150
BAKING DATA			
Absorption (%)	66.2	67.6	68.9
Crumb Grain and Texture	7.0	7.8	8.3
Loaf Volume (cc)	875	938	1020
PRODUCTION %	26	30	44

EAST

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

	Protein Ranges		
WHEAT GRADING DATA	**Low**	**Medium**	**High**
Test Weight (lb/bu)/kg/hl)	62.1/81.7	62.1/81.6	61.5/80.9
Damage (%)	0.4	0.2	0.6
Shrunken/Broken (%)	0.7	0.6	0.6
Total Defects (%)1.1	1.1	0.8	1.2
Vitreous Kernels (%)	68	75	77
Grade	1 NS	1 DNS	1 DNS
WHEAT DATA			
Dockage (%)	0.5	0.5	0.5
Moisture (%)	12.6	12.5	12.5
Protein: 12%/0% moisture (%)	12.7/14.4	14.0/15.9	15.0/16.9
Ash: 14%/0% moisture (%)	1.50/1.75	1.51/1.75	1.49/1.73
1000 Kernel Weight	31.5	31.8	31.5
Falling Number (sec)	373	362	383
Sedimentation (cc)	55	60	64
FLOUR DATA			
Extraction (%)	70.5	67.8	67.0
Color: L	90.6	90.1	90.3
a/b	-0.98/8.9	-1.12/9.8	-1.09/9.9
Protein: 14%/0% moisture (%)	11.9/13.8	12.9/15.0	13.8/16.1
Ash: 14%/0% moisture (%)	0.53/0.62	0.52/0.61	0.53/0.61
Wet Gluten (%)	28.6	34.6	36.8
Gluten Index (%)	97	89	89
Falling Number (sec)	377	387	388
Amylograph Viscosity: 65g FL (BU)	773	643	693
DOUGH PROPERTIES			
Farinograph: Absorption (%)	60.5	61.8	62.5
Peak Time (min)	6.2	7.0	7.7
Stability (min)	8.0	10.1	12.9
Alveograph: P (mm)	77	79	77
L (mm)	120	108	120
P/L Ratio	0.64	0.74	0.64
W (10^{-4} joules)	311	300	318
Extensigraph (45/135 min): Resistance	467/737	483/833	434/835
Extensibility (cm)	17.1/14.7	15.7/12.8	18.0/12.8
Area (sq cm)	104/140	97/147	103/138
BAKING DATA			
Absorption (%)	67.1	67.8	68.0
Crumb Grain and Texture	8.0	8.3	8.0
Loaf Volume (cc)	925	1018	1018
PRODUCTION %	28	42	30

OVERALL

As protein increased in 2015, wet gluten, absorption, dough stability, loaf volume and bread scores all improved.

	Protein Ranges		
WHEAT GRADING DATA	**Low**	**Medium**	**High**
Test Weight (lb/bu)/kg/hl)	62.0/81.5	62.0/81.5	61.1/80.3
Damage (%)	0.4	0.2	0.4
Shrunken/Broken (%)	1.5	0.8	1.0
Total Defects (%)1.1	1.9	1.0	1.4
Vitreous Kernels (%)	71	78	79
Grade	1 NS	1 DNS	1 DNS
WHEAT DATA			
Dockage (%)	0.6	0.6	0.6
Moisture (%)	12.2	12.2	11.7
Protein: 12%/0% moisture (%)	12.7/14.4	14.0/15.9	15.3/17.3
Ash: 14%/0% moisture (%)	1.51/1.76	1.51/1.75	1.50/1.75
1000 Kernel Weight	31.5	31.6	31.9
Falling Number (sec)	375	355	382
Sedimentation (cc)	57	62	66
FLOUR DATA			
Extraction (%)	69.0	67.4	66.4
Color: L	90.6	90.3	90.4
a/b	-1.2/9.5	-1.2/9.9	-1.2/9.9
Protein: 14%/0% moisture (%)	11.8/13.7	12.9/15.0	14.0/16.3
Ash: 14%/0% moisture (%)	0.52/0.60	0.51/0.60	0.52/0.61
Wet Gluten (%)	29.5	34.3	37.9
Gluten Index (%)	95	89	82
Falling Number (sec)	381	381	389
Amylograph Viscosity: 65g FL (BU)	719	657	688
DOUGH PROPERTIES			
Farinograph: Absorption (%)	60.7	62.1	63.2
Peak Time (min)	6.2	7.1	7.6
Stability (min)	8.8	10.3	12.7
Alveograph: P (mm)	81	82	80
L (mm)	112	111	116
P/L Ratio	0.72	0.73	0.69
W (10^{-4} joules)	309	312	314
Extensigraph (45/135 min): Resistance	450/708	462/793	418/828
Extensibility (cm)	17.8/14.1	16.0/13.1	17.2/13.4
Area (sq cm)	103/133	95/141	94/145
BAKING DATA			
Absorption (%)	66.7	67.7	68.6
Crumb Grain and Texture	7.5	8.0	8.1
Loaf Volume (cc)	900	984	1019
PRODUCTION %	27	36	37

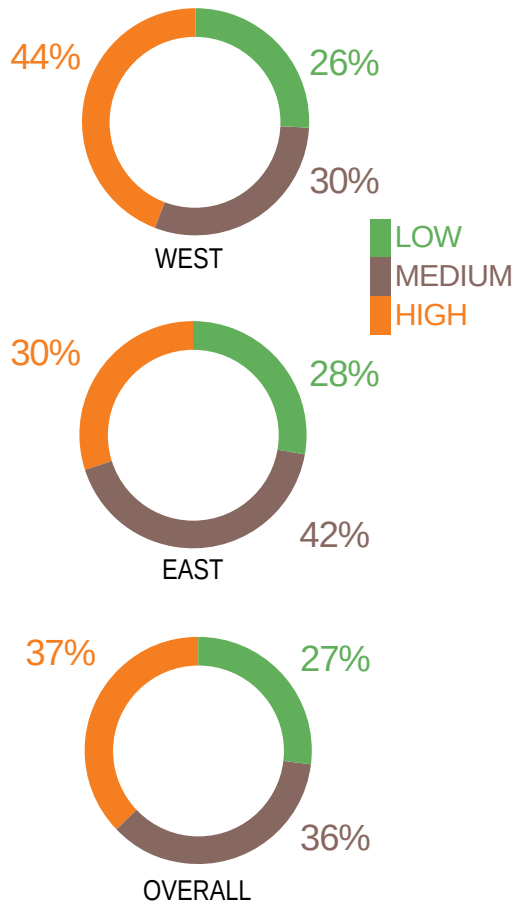
Performance characteristics often improve as buyers increase their protein specifications. To illustrate the correlation between higher protein and other quality parameters, samples of the regional crop were segregated by protein levels (all based on 12 percent moisture content):

LOW (less than 13.5 percent),

MEDIUM (13.5 to 14.5 percent), and

HIGH (more than 14.5 percent).

PRODUCTION DISTRIBUTION BY PROTEIN RANGE



HISTORICAL AVERAGE OF QUALITY FACTORS

SUMMARY INFORMATION							
CROP YEAR	2015	2014	2013	2012	2011	2010	Five-year Average
WHEAT GRADING DATA							
Test Weight (lb/bu)	61.6	61.4	62.5	60.8	60.7	61.6	61.4
Test Weight (kg/hl)	81.0	80.7	82.2	80.0	79.6	81.0	80.7
Vitreous Kernels (%)	83	53	68	75	82	70	69
1000 Kernel Weight (gm)	31.3	32.4	32.9	29.2	27.9	32.8	31.0
Protein: 12% moisture (%)	14.1	13.6	13.5	14.6	14.6	13.7	14.0
Protein: dry (%)	16.0	15.4	15.4	16.6	16.6	15.6	15.9
Ash: 14% moisture (%)	1.53	1.46	1.54	1.56	1.73	1.57	1.60
Falling Number (sec)	372	339	403	421	365	387	383
FLOUR DATA							
Extraction (%)	67.1	66.0	69.1	69.0	68.1	70.0	68.5
Ash: 14% moisture (%)	0.52	0.45	0.53	0.49	0.54	0.51	0.50
Protein: 14% moisture (%)	13.0	12.3	12.6	13.7	13.3	12.6	12.9
Wet Gluten (%)	34.9	31.5	35.5	35.9	36.4	34.2	34.7
Falling Number (sec)	386	370	417	424	388	391	398
AMYLOGRAPH PEAK VISCOSITY							
65g FL (B.U.)	676	518	590	733	581	578	600
100g FL (B.U.)	2917	1816	2221	2831	2069	2613	2310
PHYSICAL DOUGH PROPERTIES							
***FARINOGRAPH:**							
Absorption (%)	61.9	61.9	63.0	63.3	64.5	64.5	63.4
Peak Time (min)	6.7	6.0	6.2	7.4	7.5	6.2	6.8
Stability (min)	10.3	9.4	9.0	12.2	11.0	10.2	10.7
EXTENSIGRAPH:							
Extensibility-45 min (cm)	16.5	16.2	17.2	16.3	18.5	16.5	17.0
Resistance-45 min (B.U.)	442	475	413	481	394	489	450
Area-45 min (sq cm))	95	100	94	103	97	105	100
ALVEOGRAPH:							
P (mm)	80	103	89	94	80	104	94
L (mm)	120	101	116	115	126	109	114
W (joules X 10^4)	324	364	335	376	318	402	359
BAKING DATA							
Absorption (%)	67.5	67.2	66.1	62.9	63.0	63.0	64.5
Dough Handling Properties	9.5	8.6	9.1	9.5	10.0	10.0	9.4
Loaf Volume (CC)	964	938	967	991	984	927	961
Grain and Texture	7.4	7.9	8.0	8.0	8.6	8.2	8.1
Crumb Color	7.5	7.8	7.9	8.0	8.2	8.9	8.2
Crust Color	9.4	9.7	9.8	10.0	10.0	9.9	9.9
Symmetry	9.0	9.3	8.0	8.2	8.8	8.2	8.5

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 average quality of the crop produced in a given year, but actual market channel quality may vary from the crop average.

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 and collects every tenth sublot sample from every vessel of U.S. wheat shipped during three two-month time periods annually at the two main wheat export ports.

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 shown to the right. The samples represented here are based on samples collected from the fall of 2013 through the summer of 2014 for crop year 2013. And from the fall of 2014 through the spring of 2015 for crop year 2014. Grade data in the table is the actual official grade on individual sublots.

	PNW AVERAGE (WEST)		GULF AVERAGE (EAST)	
CROP YEAR	2014 (88)	2013 (197)	2014 (23)	2013 (43)
WHEAT GRADING DATA				
Test Weight (lb/bu)	61.1	62.4	61.8	62.7
Test Weight (kg/hl)	80.3	82.0	81.3	82.5
Damaged Kernels (%)	0.5	0.3	1.2	0.8
Shrunken & Broken (%)	1.2	1.0	0.7	0.8
Total Defects (%)	1.7	1.4	2.0	1.8
Vitreous Kernels (%)	59	74	45	58
Grade	1 NS	1 NS	1 NS	1 NS
OTHER WHEAT DATA				
Dockage (%)	0.3	0.3	0.6	0.6
Moisture (%)	11.6	11.2	12.4	11.8
Protein: 12%/0% moisture basis	14.0/15.9	13.9/15.8	13.4/15.3	13.6/15.4
Ash: 14%/0% moisture basis	1.51/1.76	1.54/1.79	1.54/1.79	1.50/1.74
Falling Number (sec)	353	402	363	405
DON	n/a	0.4	n/a	0.2
FLOUR DATA				
Lab Mix Extraction (%)	71.5	71.3	71.5	71.7
Color: L (white-black)	89.8	90.0	89.6	89.7
a (red-green)	-1.01	-1.01	-0.94	-0.86
b (yellow-blue)	9.4	9.5	9.0	9.3
Protein: 14%/0% moisture basis	13.2/15.3	13.1/15.3	12.6/14.6	12.8/14.8
Ash: 14%/0% moisture basis	0.59/0.69	0.57/0.66	0.58/0.67	0.57/0.66
Wet Gluten(%)	34.1	34.8	31.3	33.0
Gluten Index (%)	89	92	94	94
Falling Number (sec)	409	447	401	435
Amylograph Peak Viscosity 65 g FL (BU)	492	567	522	563
PHYSICAL DOUGH DATA				
Farinograph: Absorption (%)	62.0	63.0	61.7	62.5
Peak Time (min)	6.5	6.8	6.0	6.4
Stability (min)	8.5	8.4	9.4	9.2
Classification	3.5	3.9	3.5	3.9
Alveograph: P (mm)	79.4	87.8	82.8	90.5
L (mm)	122	122	113	112
P/L Ratio	0.65	0.72	0.73	0.81
W (joules X 10^4)	306	332	315	326
BAKING DATA				
Absorption (%)	70.6	71.1	70.8	70.5
Loaf Volume (CC)	1035	917	1014	913
Crumb Grain and Texture	7.3	7.9	7.5	8.0

2015 SURVEY BACKGROUND

All quality data contained in this report are the result of testing and analysis conducted under the supervision of Dr. Senay Simsek, Wheat Quality Specialist, and by her team members Kaitlin Beck, DeLane Olsen, Kelly McMonagle, Kristin Whitney, Chris Cosette and Karen Dickey 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 either in the fields or farm bins and local elevators. These samples reflect the condition of the grain at the point of origin. Collection began in early August when approximately 10 percent of the hard red spring wheat had been harvested and continued until mid September when about 90 percent of the region's crop was harvested.

Sample collection was weighted by county production histories with a total of 805 samples being collected during harvest from Minnesota (120), Montana (141), North Dakota (386), South Dakota (85) and PNW (73).

Analysis - Approximately 60 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 Dickey-John 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. 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 International Approved Methods (11th Edition), St. Paul, MN.

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 (NIR) Method: 39.10.01 expressed on dry basis and 12 percent moisture basis.

ASH • American Association of Cereal Chemists Method 08.01, expressed on a 14 percent moisture basis.

DON • Analysis was done on ground wheat using a gas chromatograph with an electron capture detector as described in J. Assoc. Official Anal. Chem 79,472 (1996)

FALLING NUMBER • American Association of Cereal Chemists Method 56.81.03; units of seconds (14 percent moisture basis).

SEDIMENTATION • American Association of Cereal Chemists Method 56.61.01, expressed in centimeters.

FLOUR

EXTRACTION • Thoroughly cleaned wheat is tempered to 16 percent moisture for 16 hours and add an additional 0.5 percent water 15 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, expressed on a 14 percent moisture basis.

PROTEIN • American Association of Cereal Chemists Method 39.10.01 (NIR Method), expressed on a 14 percent moisture basis.

WET GLUTEN • American Association of Cereal Chemists Method 38.12.02, expressed on a 14 percent moisture basis determined with the glutomatic instrument.

GLUTEN INDEX • American Association of Cereal Chemists Method 38.12.02, determined with the glutomatic instrument as an indication of gluten strength.

FLOUR FALLING NUMBER • American Association of Cereal Chemists Method 56.81.03, 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 22.10.01. Peak viscosity reported in Brabender units (B.U.), on a 14 percent moisture basis.

(65 g) American Association of Cereal Chemists Method 22.10.01, 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 76.31.02. Proportion of starch granules that have incurred physical damage from milling.

PHYSICAL DOUGH PROPERTIES

FARINOGRAM • American Association of Cereal Chemists Method 54-21.02; 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.

QUALITY NUMBER • International Cereal Chemists Method 115. The length, expressed in mm, along the time axis, between the point of water addition and the point where the height in the center of the curve decreased by 30 BU compared to the height of the center of the curve at development time. Stronger flours have a higher quality number.

EXTENSIGRAM • American Association of Cereal Chemists Method 54-10.01; 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 • AACC Method 54.30.02. 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 10-09.01, 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 conversion 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 AND COMPARISONS

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 — to fit different environments, and disease and pest challenges across the region.

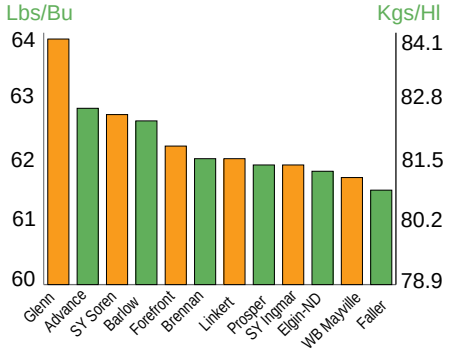
Variety development is carried out through public breeding programs at North Dakota State University, the University of Minnesota, South Dakota State University, Montana State University, University of Idaho, and Washington State University.

Private firms also develop spring wheat varieties for the region. Some major ones include Monsanto/Westbred, Limagrain, Syngenta/AgriPro, Bayer and others.

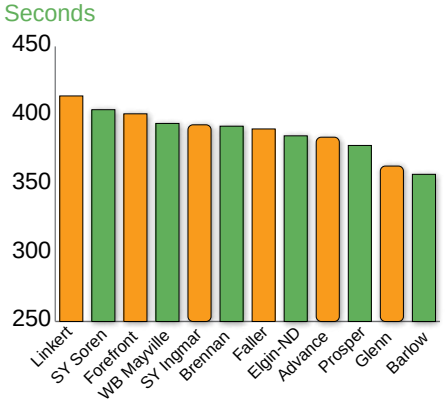
Before any spring wheat variety is released for commercial production, it is evaluated for milling and baking characteristics as well as for yield, protein content, test weight, resistance to diseases and insects, and straw strength. Wheat breeders are encouraged to develop varieties that meet or exceed industry agreed upon target values for the hard red spring wheat class. Target values help to enhance more uniform functional quality across a broad growing region.

Wheat breeding programs usually test and analyze quality data from multiple years and growing locations before a variety is released to account for environmental influences on varieties. Shown below are two-year average (2013-14) values for key quality traits of popular varieties in commercial production.

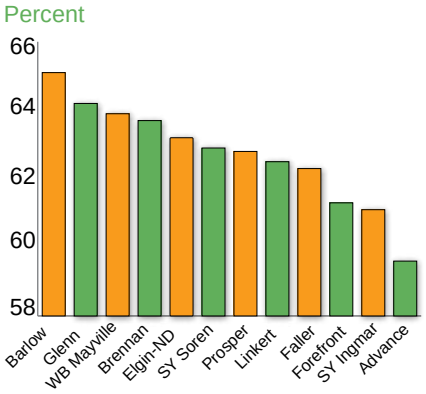
TEST WEIGHT



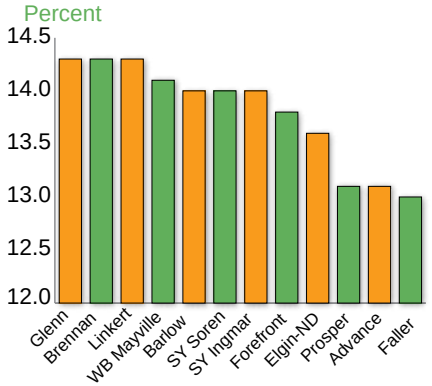
FALLING NUMBER



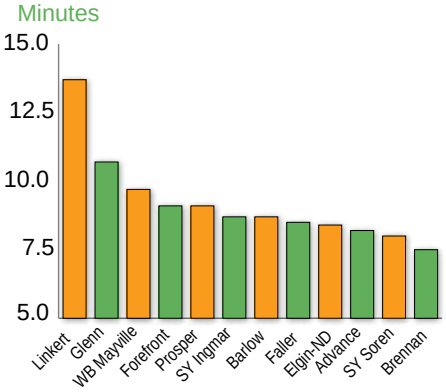
FARINOGRAPH ABSORPTION



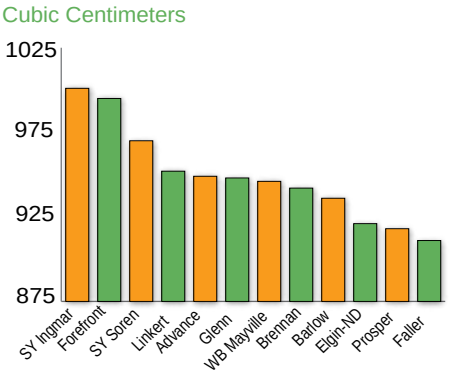
PROTEIN
(12% moisture basis)



FARINOGRAPH STABILITY



LOAF VOLUME



VARIETAL INFORMATION

MAJOR VARIETIES PRODUCED ACROSS ND, SD AND MN • AGRONOMIC FACTORS											
				Agronomic Description		Reaction to Disease[2]		Average Yield			
Variety	Agent or Origin[1]	Year Released	Straw Strength	Maturity	Leaf Rust	Foliar Disease	Head (Scab)	Eastern, North Dakota[3] BU/Acre	MT/ Hect	Western, North Dakota[4] BU/Acre	MT/Hect
Advance	SD	2012	med.	med.	MR/MS	M	MS	74.0	4.97	60.4	4.06
Barlow	ND	2009	med.	m. early	MR/MS	MR	M	69.9	4.70	58.4	3.93
Elgin-ND	ND	2012	med.	med.	MS	M	M	74.7	5.02	59.2	3.98
Faller	ND	2007	med.	med.	S	MR	M	81.4	5.47	60.7	4.08
Forefront	SD	2012	med.	m. early	MR	MR	MR	74.4	5.00	57.3	3.85
Glenn	ND	2005	strg.	m. early	MS	M	MR	68.5	4.61	55.9	3.76
Linkert	MN	2013	strg.	m. early	MR/MS	M	M	69.2	4.65	58.8	3.95
Prosper	ND	2011	med.	med.	MS	M	M	78.9	5.30	60.1	4.04
Select	SD	2010	med.	med.	MS	r/MR	MR	70.1	4.71	57.6	3.87
SY Ingmar	AgriPro	2014	m. strg.	med.	MR	M	M	n/a	n/a	n/a	n/a
SY Soren	AgriPro	2011	strg.	m. late	R	M	M	71.0	4.77	58.2	3.91
WB Mayville	Westbred	2011	strg.	m. late	R	MS	S	67.5	4.54	57.2	3.85

MAJOR VARIETIES PRODUCED ACROSS MT AND WESTERN ND • AGRONOMIC FACTORS									
			Agronomic Description		Reaction to Disease[2]			Average Yield	
Variety	Agent or Origin[1]	Year Released	Straw Strength	Maturity	Leaf Rust	Foliar Disease	Head (Scab)	Williston, North Dakota[4] BU/Acre	MT/Hect
Barlow	ND	2009	med.	m. early	MR/MS	MR	M	35.0	2.35
Brennan	Agripro	2009	m. strg.	m. early	MR	M	MS	37.5	2.52
Elgin-ND	ND	2012	med.	med.	R	n/a	M	37.6	2.53
Glenn	ND	2005	strg.	m. early	MR/MS	MR	MR	35.3	2.37
Mott	ND	2009	strg.	m. late	S	MS	MS	33.4	2.25
Reeder	ND	1999	strg.	m. early	S	S	S	36.6	2.46
SY Soren	AgriPro	2011	strg.	m.late	MR/MS	M	M	35.6	2.39
Vida	MT	2005	m. strg.	m. late	MR	MS	S	41.1	2.76

1. ND=North Dakota State University (Public), SD=South Dakota State University (Public), MN=University of Minnesota (Public), MT=Montana State University (Public), Westbred (Private) and AgriPro (Private).
2. Reaction to Disease: resistant (R), moderately resistant (MR), intermediate (M), moderately susceptible (MS), susceptible (S), very susceptible (VS).
3. 2011-14 ND average yield data from three locations in ND.
4. 2014-15 ND average yield data from Williston, ND.

80.661.3MAJOR VARIETIES PRODUCED ACROSS ND, SD AND MN • QUALITY & END-USE FACTORS								
	Quality Factors[5]							
Variety	Test Weight LB/BU	Test Wheat KG/HL	Wheat Protein %	Wheat Falling # Seconds	Farinogram Stability (Min)	Absorption %	Loaf Volume CC	Mill & Bake Quality Rating [7]
Advance	62.5	82.2	13.5	404	8.2	60.4	950	★★
Barlow	62.2	81.8	14.3	386	8.7	66.1	964	★★★
Elgin-ND	61.5	80.9	14.1	408	8.4	63.9	948	★★★
Faller	61.1	80.4	13.0	414	8.5	62.7	918	★★★
Forefront	62.3	81.9	14.2	410	9.1	61.8	987	★★★
Glenn	64.0	84.2	14.7	386	10.7	65.4	976	★★★★★
Linkert	61.8	81.2	14.9	428	13.7	63.2	974	★★★★
Prosper	61.2	80.4	13.1	397	9.1	62.4	926	★★★
Select	62.5	82.2	13.9	440	6.3	63.1	915	★★★
SY Ingmar	62.6	82.3	13.8	412	8.7	61.9	1002	★★★
SY Soren	62.2	81.8	14.3	421	8.0	63.0	965	★★★
WB Mayville	61.3	80.6	14.5	424	9.7	64.2	972	★★★

MAJOR VARIETIES PRODUCED ACROSS MT AND WESTERN ND • QUALITY & END-USE FACTORS								
	Quality Factors[6]							
Variety	Test Weight LB/BU	Test Weight KG/HL	Wheat Protein %	Wheat Falling # Seconds	Farinogram Stability (Min)	Absorption %	Loaf Volume CC	Mill & Bake Quality Rating [7]
Barlow	61.5	80.8	14.8	407	11.6	65.5	958	★★★
Brennan	61.1	80.3	15.5	461	8.7	64.5	930	★★★
Elgin-ND	59.7	78.6	15.6	463	12.2	65.8	948	★★★
Glenn	63.1	82.9	15.4	391	16.7	64.9	1023	★★★★★
Mott	60.9	80.1	15.7	406	13.1	63.1	963	★★★
Reeder	61.0	80.2	15.1	420	8.6	63.1	928	★★
SY Soren	60.9	80.1	15.4	482	16.7	63.5	1028	★★★
Vida	60.5	79.6	14.8	421	7.8	63.7	925	★★★

5 Source: NDSU Plant Science Department, Hard Red Spring Wheat Quality Laboratory, 2011-2014 drill strip trials across ND locations.

6 Drill strip trials in Williston, ND only for 2011 and 2013. No 2012 data available.

7 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

BARLOW remained the top variety in North Dakota in 2015, for a fourth straight year, although its share has slid to 12.6 percent compared to 18 percent in 2013 and 16 percent last year. It is largely planted in the western and central districts of North Dakota. The 2009 NDSU release provides producers with enhanced yield potential and a good balance of test weight, protein and leaf disease resistance. Barlow is rated as good for overall baking quality with uniquely high farinograph absorption

SY SOREN continues to gain acreage share in North Dakota and Montana, advancing to second place in North Dakota with 12.1 percent and third place in Montana with 6.2 percent. It gained about 2 percent in each state compared to 2014. SY Soren is also the sixth place variety in Minnesota with a 7 percent share. A 2011 release from Syngenta/AgriPro, it has broad acceptance across the entire region, with the greatest concentration in the central third of the region. SY Soren provides producers with a good balance of yield potential, moderately high protein levels and disease resistance. It is rated as good for milling and baking quality.

ELGIN-ND made the largest year-to-year gains of any variety in North Dakota in 2015, jumping to third place with a 10.8 percent share, up from 2.7 in 2014. It is most popular in western and central districts in the state. Elgin-ND is a 2012 release from NDSU that is at the top-end for yield potential but tends to produce higher protein content than other high yielding varieties. Its lower resistance to leaf and head diseases limits its acceptance in eastern areas of the region. Elgin-ND is rated as good for milling and baking quality.

NORTH DAKOTA VARIETIES SHARE OF PLANTED ACRES[3]

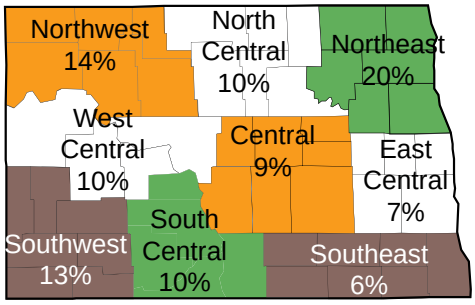
Variety	2015%[1]	2014%[1]
Barlow	12.6	15.7
SY Soren	12.1	10.4
Elgin-ND	10.8	2.7
Prosper	10.5	11.7
Faller	8.3	8.8
Glenn	6.5	8.2
WB Mayville	4.6	4.4
SY Ingmar	3.1	0.0
Brennan	2.9	3.2
SY Rowen	1.9	0.5
Other[2]	26.7	34.4

1. Percentages may not add to 100 due to rounding.
2. Includes varieties with less than 1% of acreage and unknown varieties.
3. (1 acre = 0.405 hectare)
   2015 - 6,300,000 planted acres
   2014 - 6,250,000 planted acres

TOP 3 ND VARIETIES BY CROP DISTRICT

	First	Second	Third
	percentage (%)		
Northwest	Barlow (24.1)	Glenn (14.4)	SY Soren (13.5)
North Central	Prosper (22.8)	Elgin-ND (16.2)	SY Soren (16.1)
Northeast	Faller (19.6)	WB Mayville (15.6)	Prosper (14.8)
West Central	Barlow (30.0)	SY Soren (15.6)	Elgin-ND (10.4)
Central	SY Soren (15.2)	Elgin-ND (14.5)	Prosper (13.8)
East Central	SY Soren (20.1)	WB Mayville (15.1)	Prosper (11.0)
Southwest	Barlow (21.7)	Elgin-ND (14.4)	SY Soren (8.8)
South Central	Elgin-ND (16.5)	SY Soren (11.6)	Brennan (11.2)
Southeast	Prosper (23.2)	Faller (15.5)	SY Soren (11.4)

NORTH DAKOTA 2015 SHARE OF PLANTED ACRES BY NASS DISTRICT



Estimated planted acres in 2015 are 6,300,000

SOUTH DAKOTA

ADVANCE and **FOREFRONT** are two of the leading varieties planted in South Dakota with 16 percent and 14 percent acre shares, respectively. Both varieties are 2012 releases from South Dakota State University. Advance is an elite yielding line. Forefront provides excellent disease resistance and is rated good for milling and baking quality.

SOUTH DAKOTA VARIETIES SHARE OF SURVEYED ACRES

Variety	North West%	North East%	South East%	State%
Advance	16	10	31	16
Select	13	27	9	15
Forefront	15	13	20	14
Brick	5	4	10	8
Briggs	9	8	6	3

*2015 survey completed "in-house" based on voluntary producer responses representing 9 percent of 2015 acres.

MONTANA

VIDA is the most popular variety in Montana in 2015 for a fifth straight year, garnering 16.8 percent of the acres, down from 20.3 percent in 2014. It is a high yielding variety with moderate resistance to leaf and stripe rust. A 2005 release from the Montana Agricultural Experiment Station it is most popular across central and northeast districts. Vida is rated good for milling and baking quality.

MONTANA VARIETIES SHARE OF PLANTED ACRES[3]

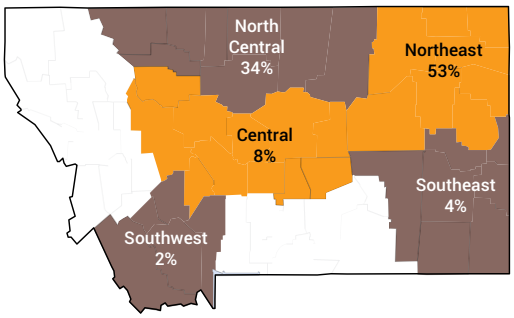
Variety	2015%[1]	2014%[1]
Vida	16.8	20.3
Reeder	15.7	17.0
SY Soren	6.2	4.1
Brennan	6.1	2.7
Mott	5.9	6.0
Corbin	5.8	5.2
Choteau	5.1	7.2
Duclair	4.0	2.4
McNeal	3.0	3.5
ONeal	2.7	5.3
Other[2]	28.7	26.3

1. Percentages may not add to 100 due to rounding.
2. Includes varieties with less than 1% of acreage and unknown varieties.
3. (1 acre = 0.405 hectares)
   2015 - 2,800,000 planted acres
   2014 - 3,050,000 planted acres

REEDER remained the second most popular variety in Montana with a 15.7 share of the acres, similar to 2014. A 1999 release from NDSU, it remains popular due to its "stay-green" trait which allows for higher yield potential throughout the growing season. Reeder has high protein content but is rated as average for milling and baking quality.

MOTT accounts for roughly 6 percent of the spring wheat acres in Montana in 2015, and also has a 1 percent share of acres in North Dakota. Mott is primarily grown from north central Montana down through southwest North Dakota, where the wheat stem sawfly is a challenge. It is a 2009 NDSU release that with enhanced yield potential for a semi-solid stem variety but has low levels of disease resistance. Mott is rated as good for milling and baking quality.

MONTANA 2015 SHARE OF PLANTED ACRES BY NASS DISTRICT



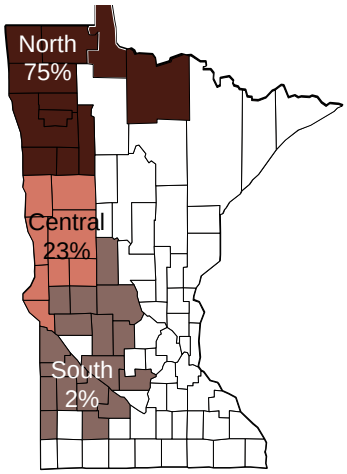
Estimated planted acres in 2015 are 2,800,000

TOP 3 MONTANA VARIETIES BY CROP DISTRICT

	First	Second	Third
	percentage (%)		
North Central	Vida (23.5)	Corbin (16.7)	Choteau (9.6)
Northeast	Reeder (27.8)	Vida (12.1)	SY Soren (11.1)
Central	Vida (22.8)	WB9879CLP (16.2)	Choteau (11.0)
Southwest	SY Soren (26.9)	WB 9668 (9.5)	
Southeast	SY Soren (13.5)	Choteau (5.3)	

MINNESOTA

MINNESOTA 2015 SHARE OF PLANTED ACRES



Estimated planted acres in 2015 are 1,650,000

PROSPER ranks as the most popular variety in Minnesota for a third straight year with a 16.6 percent share of acres in 2015, and holds fourth place in North Dakota with 10.5 percent. Prosper is most popular in the eastern half of the production region due to its elite yield potential and moderate resistance to leaf and head disease. It tends to be lower than average for kernel protein content and is rated as good for milling and baking quality.

WB MAYVILLE is the second most popular variety in Minnesota with a 13.6 percent share of acres, and ranks seventh in North Dakota with 4.6 percent. It fell from an 18 percent share in Minnesota in 2014 but held steady in North Dakota. WB Mayville is predominantly grown in the northeastern part of the region where straw strength is a priority. A 2011 release from Monsanta/WestBred it provides producers with higher protein potential compared to other high yielding varieties. WB Mayville is rated as average for milling and baking quality.

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Minnesota con't from p. 33

LINKERT jumped into third place in Minnesota in 2015 with a 13.5 percent share, up from just 3.9 percent in 2014. It also had some marginal gains across eastern districts of North Dakota. Linkert is a 2013 release from the University of Minnesota which promises to account for a larger share of acres in coming years due to its strong straw and higher protein. It is slightly lower in yield potential compared to other varieties with moderate disease resistance. Linkert is rated as excellent for milling and baking quality with strong dough properties.

MINNESOTA VARIETIES
SHARE OF SURVEYED ACRES[3]

Variety	2015%[1]	2014%[1]
Prosper	16.6	20.7
WB-Mayville	13.6	18.1
Linkert	13.5	3.9
Faller	12.2	13.5
Forefront	7.1	3.9
SY Soren	7.0	8.3
WB-9507	4.6	0.0
Rollag	4.1	4.8
Samson	2.8	3.6
LCS Albany	2.6	6.2
Other[2]	15.9	16.5

1. Percentages may not add to 100 due to rounding.
2. Includes varieties with less than 1% of acreage and unknown varieties.
3. (1 acre = 0.405 hectares)
   2015 - 1,650,000 planted acres
   2014 - 1,220 ,000 planted acres

TOP 3 MINNESOTA VARIETIES BY CROP DISTRICT

	First	Second	Third
	percentage (%)		
North	WB Mayville (16.1)	Linkert (15.9)	Prosper (14.3)
Central	Prosper (23.9)	Faller (15.5)	SY Soren (12.1)
South	Prosper (20.4)	Faller (14.3)	Barlow (13.0)

PNW VARIETAL INFORMATION

POPULAR VARIETIES GROWN IN WA/OR AND ID • QUALITY AND END-USE FACTORS

			Quality Factors[2]						End Use[3]
Variety	Agent or Origin[1]	Year Released	Test Weight LB/BU	Test Weight KG/HL	Wheat Protein %	Farinogram Stability (Min)	Absorption %	Loaf Volume CC	Mill/Bake Quality Rating
Buck Pronto	Buck Semilas S.A.	2001	61.7	81.1	15.3	22.1	67.9	932	D
Bullseye	AgriPro	2009	63.2	83.0	13.7	22.4	67.1	980	D
Cabernet	Resource Seeds	2008	62.3	82.0	13.3	9.0	65.9	1064	D
Expresso	Westbred	2007	62.6	82.2	14.7	5.1	68.5	1032	A
Glee	WSU	2012	62.7	82.4	14.2	13.6	66.8	1109	MD
Jefferson	ID	1997	62.3	82.0	13.7	19.9	66.1	976	D
Kelse	WSU	2008	61.8	81.2	15.2	19.8	68.7	1119	D
Solano	Westbred	2006	63.1	83.0	14.8	6.5	67.9	1095	A
SY605CL	Syngenta	2010	62.5	82.2	15.8	n/a	68.7	1053	MD
WB Fuzion	Westbred	2011	61.7	81.1	14.2	n/a	68.2	1122	MD

1. ID=University of Idaho (Public), WSU=Washington State University (Public), AgriPro (Private), Buck Semillas S.A. (Private), Resource Seeds (Private), Syngenta (Private) and Westbred (Private).
2. Western Wheat Quality Lab, Pullman, WA.
3. Mill and bake quality rating based on protein content, milling performance, flour attributes, dough characteristics and baking. Western Wheat Quality Lab. Most Desirable (MD), Desirable (D), Acceptable (A).

HANDLING AND TRANSPORTATION

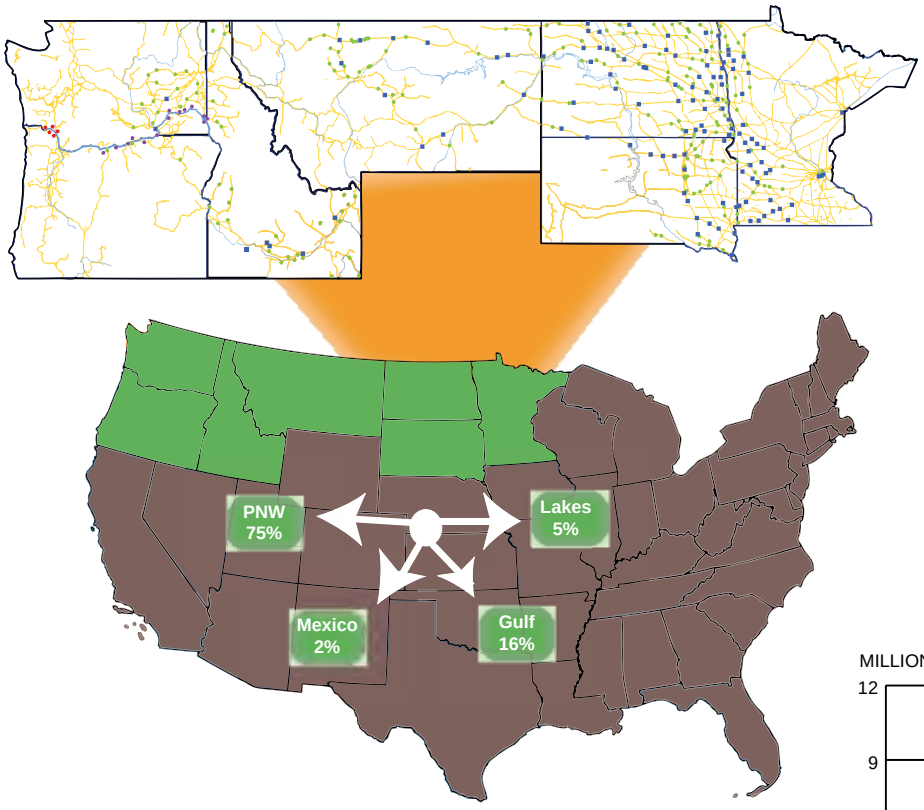
The hard red spring wheat growing region utilizes truck, rail and water to get wheat from farms to export facilities. The Northern Plains has a vast network of country elevators to facilitate efficient and precise movement to domestic and export markets. On average, nearly 80 percent of the region's wheat moves to markets by rail. The dominant railroads are the Burlington Northern Santa Fe, the Union Pacific and the Canadian Pacific.

In the Pacific Northwest, a large river system is used along with rail to move wheat to export points.

An increasing number of the elevators in the region are investing in facilities and rail capacity to ship 100-110 car units in "shuttle" trains. Each rail car holds approximately 3,500 bushels (95 metric tons) of wheat. Shuttle-equipped facilities receive the lowest rates, sharing volume and transaction efficiencies with the railroad.

The diverse rail and water 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 encouraged to explore origin-specific shipments to optimize the quality and value of wheat they purchase.

The 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.

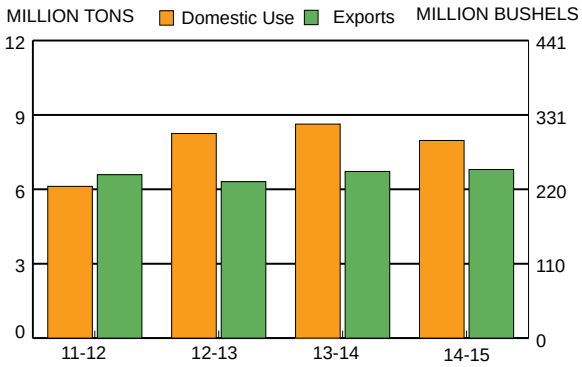


AVERAGE SHARE OF U.S. HRS EXPORTS BY PORT (2011-2014)

Grain Handling and Transportation Facilities in the U.S. HRS Region

- 100+ rail car track
- 50 - 99 rail car track
- Export terminals
- River terminals
- River system
- Rail network

2011-2014 U.S. HRS DOMESTIC USE AND EXPORTS



2015 U.S. HARD RED SPRING WHEAT

REGIONAL QUALITY REPORT

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