SOFT RED WINTER WHEAT 2021 Quality Survey



SOFT RED WINTER COMPETITIVE ADVANTAGE

Soft red winter (SRW) wheat is the third largest class of wheat grown in the United States with an annual average production over the last five years of 7.87 million metric tons (MMT), or just under 300 million bushels. Although SRW is the third largest class measured by production, it is the fourth largest as measured by export sales. U.S. SRW wheat is predominantly grown east of the Mississippi River and the South as far west as northeast Texas and southeast Kansas.

Importers of SRW are served from ports on the Lakes, East Coast, Gulf and Western Gulf. Mexico imports a substantial portion of its SRW purchases via direct rail shipment. Importers and the domestic milling and baking industries use SRW for specialty products such as cookies (biscuits), crackers, snack foods, and cake flour. SRW is a versatile wheat for blending with hard red spring (HRS) and hard red winter (HRW) wheat to lower grist cost and improve bread crumb texture, or to improve the quality and appearance of a wide variety of products.

Milling Advantages:

SRW can be challenging to mill. Some advantages to milling SRW are reduced energy requirements and fewer rollermills for mill flows designed specifically for soft wheat. The truth is, few mills are designed for only SRW as it is generally a specialty wheat used for specialty products. The real advantage for milling companies is in the cost reduction of the mill grist and increased diversity of products when SRW is included in a long term, strategic wheat procurement plan. SRW performs best on the mill at lower moisture content (14.5%) compared to hard wheat (16%) and requires increased sifter area per metric ton.

Baking Advanages:

As previously mentioned, the target market for SRW is confectionary products, but SRW performs well as a blending flour in a wider variety of products such as crackers and cookies. The lower moisture content of the flour creates an advantage for the baker by increasing the amount of water added while optimizing water absorption and product quality to the consumer. The finer particle size will generally increase the rate of water absorption, decreasing mix time and improving production efficiencies. As is the message with most of the U.S. wheat classes, blending SRW flour with other flour types creates opportunities to create the optimal flour type for any number of end-use products. Some markets have found success blending SRW wheat flour with HRS and HRW wheat flour to improve crumb texture and even the loaf volume of pan bread by improving the dough development and mixing properties.

Sourcing Opportunities:

Soft red winter wheat is lower in protein as compared to hard wheat classes and is generally lower cost. It is most often available out of the Mississippi River for export, but at times can be shipped via rail to the center Gulf or Mexico. Another important factor to consider when purchasing SRW is to include a maximum value for deoxynivalenol (DON), particularly in years when SRW matured during wet, humid conditions.

Optimal purchases of SRW are in combination with HRW or HRS, to minimize storage constraints at the destination mill. There is a high demand for SRW in the domestic U.S. market. In years where acreage and production are lower than average, the price can be inverted in comparison to higher protein classes.



SOFT RED WINTER WHEAT PRODUCTION



PERCENTAGE OF TOTAL SAMPLED U.S. SRW PRODUCTION BY EXPORT TRIBUTARY

For the major producing states (million metric tons)

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	2021	2020	2019	2018	2017
Alabama	0.23	0.14	0.17	0.22	0.21
Arkansas	0.22	0.11	0.07	0.14	0.18
Georgia	0.13	0.13	0.08	0.10	0.09
Illinois	1.42	0.96	1.00	1.01	0.97
Indiana	0.66	0.48	0.44	0.50	0.48
Kentucky	0.87	0.58	0.68	0.54	0.65
Maryland	0.33	0.30	0.34	0.34	0.36
Michigan	1.19	0.92	0.95	0.97	0.91
Missouri	0.95	0.62	0.67	0.84	1.00
North Carolina	0.20	0.22	0.11	0.18	0.23
New York	0.53	0.57	0.34	0.57	0.56
Ohio	1.21	0.95	0.59	0.92	0.93
Pennsylvania	0.42	0.37	0.28	0.26	0.29
Tennessee	0.64	0.37	0.39	0.50	0.52
Virginia	0.21	0.21	0.18	0.25	0.26
Wisconsin	0.46	0.23	0.26	0.39	0.31
Surveyed-States Total*	7.26	5.29	4.87	5.83	6.12
East Coast-Tributary	0.74	0.73	0.63	0.77	0.85
Gulf-Tributary	6.19	4.21	4.01	4.66	4.94
Sixteen-State Total	9.67	7.16	6.54	7.73	7.96
Total U.S. SRW Production	9.95	7.25	6.51	7.77	7.98

Based on August 2021 estimates from USDA's National Agricultural Statistics Service.

*Eleven states denoted by italices were surveyed accounting for 73% of 2021 SRW production.

2021 SURVEY OVERVIEW

The U.S. soft red wheat (SRW) production region experienced generally good growing conditions in the 2021 crop year. There were pockets of higher enzymatic activity (lower falling numbers) from the East Coast and isolated portions of the Gulf Ports region, but overall, buyers should be extremely happy with the quality of the entire 2021 SRW crop. Buyers are encouraged to review their quality specifications to ensure that purchases meet their expectations.

Weather and Harvest:

SRW is grown over a wide area of the eastern United States. The area seeded to SRW in fall 2020 for the 2021 harvest is estimated by USDA at 6.59 million acres (2.67 million hectares), up from 5.63 million acres (2.28 million hectares) seeded for the 2020 harvest and up from the five-year average.

PLANTING started at a normal pace the first week of September 2020 with similar progress as the fiveyear average. Crop emergence was slightly ahead of the prior year and 5-year average.

In the six SRW survey states where USDA estimates wheat crop conditions, by late fall 91% of the winter wheat crop had emerged and was rated 65% good to excellent and 95% fair to excellent. Much of the SRW growing area received plentiful moisture through the winter and spring; however, by late spring North Carolina and Virginia began experiencing drought conditions. Overall, timely mild temperatures and rainfall benefited critical kernel development.

HARVEST began slowly at the beginning of June due to a cool, wet spring. Sporadic rainfall continued through June that changed in most of the growing region to hot, dry conditions that pushed the crop to maturity with harvest finishing in line with the five-year average pace. Portions of Arkansas, North Carolina and Virginia received rainfall during harvest.

The 2021 SRW production, estimated at 366 million bushels (9.95 million metric tons (MMT), is up from 266 million bushels (7.25 MMT) in 2020 and up from the five-year average of 286 million bushels (7.78 MMT).















2021 SURVEY OVERVIEW

Survey Methods:

SAMPLE COLLECTION AND ANALYSIS

Great Plains Analytical Laboratory, Kansas City, Missouri, collected, tested and analyzed 263 samples from elevators in 18 reporting areas across 11 states.

SAMPLE TESTING

Test weight, moisture, protein, 1000 kernel weight, wheat ash, wheat falling number and DON were determined on individual samples; the remaining tests were determined on 18 composite samples.

The results were weighted by the estimated production for each reporting area and combined into "Composite Average," "East Coast" and "Gulf Ports" values. Gulf states include Alabama, Arkansas, Illinois, Indiana, Kentucky, Missouri, Ohio, and Tennessee, and account for 85% of the 2021 SRW production in the states surveyed. East Coast states include Maryland, North Carolina and Virginia and represent the remaining 15% of production in the states surveyed.

The states surveyed account for an estimated 73% of total 2021 U.S. SRW production.

Grade Data:

- **GRADE** the overall sample average collected for the 2021 SRW harvest survey is U.S. No. 2 Soft Red Winter; the Gulf Ports average is U.S. No. 1 Soft Red Winter.
- **TEST WEIGHT** averages are indicative of sound wheat and a uniform crop. The composite average is 59.7 lb/bu (78.6 kg/ hl), equal to 2020 but higher than the 5-year average; the Gulf Ports average is 60.0 lb/bu (79.8 kg/hl) and East Coast is 58.8 lb/bu (77.4 kg/hl).
- **TOTAL DEFECTS** for the crop are 0.9%, slightly higher than 2020 but significantly lower than the 5-year average. For the East Coast, total defects (0.9%) are significantly lower than last year (1.5%) whereas the Gulf Ports saw higher total defects this year (0.9%) compared to last year (0.6%).

Wheat Data:

- WHEAT PROTEIN content demonstrates a uniform crop. The Composite average of 9.3% (12% mb) and Gulf Ports average of 9.2% are lower than 2020 and 5-year averages. The East Coast average of 9.5% is slightly higher than 2020 but below the 5-year average.
- WHEAT MOISTURE for this year's crop is higher than 2020 and the 5-year averages due to some portions of the crop in Arkansas, North Carolina and Virginia receiving late rains at harvest: Composite 13.6%, East Coast 14.2%, Gulf Ports 13.4%.
- WHEAT FALLING NUMBER trended lower this year due to localized rainfall during harvest with Composite (297 sec), East Coast (257 sec) and Gulf Ports (307 sec) all below 2020 and 5-year averages. While low falling number values





2021 SURVEY OVERVIEW

are not eliminated from our survey, those below 250 sec typically divert to domestic feed channels.

- 1000 KERNEL WEIGHT and KERNEL DIAMETER values also reflect a relatively uniform crop.
- VOMITOXIN (DON) averages are well below the USDA threshold of 2.0 ppm and indicate that the sampled crop is relatively free of DON: Composite (0.8 ppm), Gulf Ports (0.9 ppm) and East Coast (0.2 ppm). As always, buyers are encouraged to review their quality specifications to ensure that purchases meet their expectations.

Flour Data:

- LABORATORY MILL FLOUR EXTRACTION for Composite (65.9%), East Coast (65.4%) and Gulf Ports (66.1%) are below 2020 and the 5-year averages, but still indicate a good milling crop.
- AMYLOGRAPH averages indicate relatively high levels of amylase activity in portions of the crop with low falling numbers. Averages for Composite (440 BU), East Coast (290 BU) and Gulf Ports (477 BU) are lower than last year and 5-year averages.
- DAMAGED STARCH values are slightly higher this year and can be attributed to higher enzymatic activity in isolated areas.

Dough Properties:

- **DOUGH PROPERTIES** suggest that this crop has similar protein qualities to last year, but weaker than the 5-year average.
- FARINOGRAPH peak and absorption values are similar to last year and 5-year averages; the East Coast stability values is higher than last year whereas the Gulf Ports value is lower.
- ALVEOGRAPH L averages for Composite, East Coast and Gulf Ports are 56 mm, significantly lower than 2020 and 5-year average values and indicate low extensibility.

Solvent Retention Capacity:

- SOLVENT RETENTION CAPACITY (SRC) values of the 2021 crop generally indicate excellent quality for cookies and crackers.
- LACTIC ACID values are above 100, and below 120, indicating excellent quality for crackers.

End-Products:

- **COOKIE SPREAD** for Composite (10.6), East Coast (10.8) and Gulf Ports (10.5) are all higher than last year and 5-year averages, indicating good spreadability.
- **LOAF VOLUME** averages are lower than last year and 5-year averages.

2021 SRW SURVEY

	2021	posite Ave	rage	2021	East Coast*	E Veen	2021	Gulf Ports*	E Veen
	2021	2020	5-Year	2021	2020	5-Year	2021	2020	5-Year
WHEAT GRADE DATA	F0 7	50.7	F0 7	FO O	F0.2	F7 F	60.0	F0 9	F0.0
	59.7	59.7	58.7	58.8	59.3	57.5	60.0 78.0	59.8	59.0
(Kg/III)	78.0	/8.0	77.2	77.4	78.0	/5./	78.9	/8./	77.6
Damage - Total (%)	0.3	0.2	0.6	0.3	0.8	1.4	0.3	0.1	0.5
Foreign Waterial (%)	0.1	0.0	0.1	0.1	0.2	0.2	0.1	0.0	0.1
Shrunken and Broken (%)	0.5	0.5	0.0	0.6	0.5	0.8	0.5	0.5	0.5
Crada	0.9	0.8	1.3	0.9	1.5	2.2	0.9	0.0	1.0
	Ζ	Ζ	2	2	Ζ	5	1	Ζ	2
	0.2	0.2	0.4	0.2	0.2	0.4	0.2	0.2	0.4
Moisture (%)	12.6	12.4	12.0	0.2	12.6	12.2	12.4	12.2	12.0
$\frac{1}{2} \frac{1}{2} \frac{1}$	0 2/10 5	0.4/10.7	0 5/10 9	0 5/10 9	0.4/10.7	0.9/11.2	0 2/10 5	13.5	0 5/10 9
(%) 12%/0% mb	9.5/10.5	9.4/10.7	9.5/10.8	9.5/10.6	9.4/10.7	9.0/11.2	9.2/10.5	9.4/10.7	9.5/10.8
1000 Karpal Waight (a)	1.55/1.57	1.52/1.55	1.41/1.04	1.51/1.55	1.24/1.44 26 E	22.0	24.1	1.54/1.50	1.41/1.04
Wheat Falling Number (see)	34.4	210	52.4 216	35.7	20.5	32.0	54.1 207	220	32.5
Kornal Size (%) Ig (mad (sm	297	519	510 94/1E/01	257	205	290	507 80/10/01	529	520 94/15/01
Single Kernel Hardness	24.2	24.7	04/15/01 21.9	27.4	91/09/00	os/15/02	22 E	3//12/01	04/15/01
Single Kernel Hardness	24.3	24.7	21.8	27.4	25.2	20.0	23.5	24.5	22.3
Diamatar (mm)	34.5	34.4	34.4	34.0	37.0	35.1	34.6	33.7	34.2
Diameter (mm)	2.05	2.64	2.03	2.61	2.73	2.64	2.66	2.62	2.62
	10.1	11.0	11.4	12.4	0.2	12.0	9.5	11.0	11.3
	0.8	0.5	0.7	0.2	0.2	0.7	0.9	0.6	0.7
	65.0	66.0	67.7	65.4	67.0	67.5	66.4	66.7	67.7
Lab Mill Extraction (%)	65.9	66.8	67.7	65.4	67.0	67.5	66.1	66.7	67.7
Flour Color - *L	91.2	91.4	91.2	91.1	91.5	91.2	91.2	91.3	91.2
- *a	-2.3	-2.4	-2.3	-2.3	-2.3	-2.3	-2.3	-2.4	-2.3
- *b	9.0	9.2	9.0	8.6	8.9	9.0	9.1	9.3	9.0
Flour Protein (%) 14%/0% mb	7.4/8.6	7.5/8.7	7.8/9.0	7.6/8.8	7.6/8.8	8.0/9.3	7.3/8.5	7.5/8.7	7.7/8.9
Flour Ash (%) 14%/0% mb	0.41/0.48	0.41/0.48	0.44/0.51	0.44/0.52	0.42/0.49	0.44/0.51	0.40/0.47	0.40/0.47	0.44/0.51
Wet Gluten (%)	19.9	20.4	21.4	19.4	22.0	22.4	20.1	20.0	21.2
Gluten Index	83.8	88.9	84.1	90.3	94.6	83.9	82.2	87.3	84.1
Falling Number (sec)	282	319	316	258	283	298	288	329	320
Amylograph (65g) (BU)	440	662	552	290	322	418	4//	760	588
Starch Damage (%)	5.1	3.9	4.6	4.2	4.5	4.5	5.3	3.7	4.5
SRC: GPI	0.63	0.69	0.62	0.64	0.65	0.61	0.63	0.70	0.62
Water/50% Sucrose	54/95	54/74	56/102	54/100	57/83	58/104	54/93	53/72	56/101
5% Lactic Acid/5% Na ₂ CO ₃	106/73	101/72	112/78	112/77	105/78	112/81	104/72	100/70	111/77
DOUGH PROPERTIES	1								
Farinograph Peak (min)	1.2	1.2	1.2	1.4	1.2	1.3	1.1	1.2	1.2
Stability (min)	1.6	1.6	2.0	2.0	1.5	1.9	1.5	1.6	2.0
Absorption (%)	52.1	52.4	52.5	52.3	53.6	53.1	52.1	52.0	52.4
Alveograph P (mm)	44	39	38	43	44	40	44	38	37
L (mm)	56	78	88	56	75	89	56	78	88
W (10 ⁻⁴ joules)	78	83	84	78	87	87	78	82	84
P/L	0.78	0.51	0.43	0.76	0.59	0.45	0.79	0.48	0.42
Extenso Resistance (BU)	177	188	182	183	164	168	175	195	186
Extensibility (cm)	15.8	16.1	15.8	16.4	16.9	16.5	15.7	15.8	15.7
Area (sq cm)	50	53	50	54	48	49	48	54	51
BAKING EVALUATION									
Bake Grain and Texture	4.4	5.6	5.1	4.5	5.7	5.2	4.4	5.6	5.1
Absorption (%)	53.4	54.4	54.4	53.2	55.6	55.0	53.4	54.0	54.2
Loaf Volume (cc)	602	605	698	603	589	704	602	609	696
Cookie Diameter (cm)	8.9	9.2	9.2	8.9	9.0	9.1	8.9	9.3	9.3
Spread Ratio	10.6	10.2	9.6	10.8	9.7	9.0	10.5	10.3	9.7
PRODUCTION OF 11 STATES (%):	100.0%			20.1%			79.9%		

Soft Red Winter 2021 Survey

*East Coast: Maryland, Virginia, North Carolina; Gulf: Alabama, Arkansas, Illinois, Indiana, Kentucky, Missouri, Ohio, Tennessee

2021 SRW STATE SUMMARY

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Sample Count	4	13	38	41	16	41	51	11	20	24	16			
WHEAT GRADE DATA FROM AREA	COMPOSITI	E SAMPLES					-							
Test Weight (lb/bu)	59.5	58.6	60.8	59.4	61.0	58.8	59.6	60.5	59.7	58.1	59.2			
(kg/hl)	78.3	77.1	80.0	78.2	80.2	77.4	78.4	79.6	78.6	76.5	77.9			
Damage - Total (%)	1.3	2.7	0.0	0.5	0.0	0.7	0.1	0.0	0.0	0.4	0.7			
Foreign Material (%)	0.0	0.3	0.0	0.1	0.0	0.0	0.3	0.3	0.0	0.2	0.0			
Shrunken and Broken (%)	0.3	0.6	0.5	0.5	0.4	0.6	0.5	0.4	0.4	0.7	0.8			
Total Defects (%)	1.6	3.6	0.5	1.1	0.4	1.3	0.9	0.7	0.4	1.0	1.5			
Grade	2	2	1	2	1	2	2	1	2	2	2			
WHEAT NON-GRADE DATA FROM	INDIVIDUAL	SAMPLES												
Moisture (%)	13.3	12.2	13.6	13.4	13.0	13.2	14.0	12.2	13.5	14.7	14.1			
Protein (%) 12%/0% mb	8.4/9.6	10.0/11.3	9.2/10.4	9.3/10.6	8.9/10.1	9.8/11.1	9.2/10.5	8.9/10.1	9.3/10.5	9.7/11.1	9.6/10.9			
Ash (%) 14%/0% mb	1.26/1.46	1.39/1.61	1.39/1.62	1.37/1.59	1.39/1.62	1.42/1.65	1.34/1.56	1.27/1.47	1.34/1.56	1.32/1.53	1.27/1.48			
1000 Kernel Weight (g)	34.7	36.2	33.5	33.6	35.0	32.4	33.8	37.1	35.2	36.6	34.0			
Wheat Falling Number (sec)	2/5	1/9	318	299	313	309	312	316	312	220	2/9			
		0.9	1.1	0.7	0.6	1.4	0.9	0.9	0.2	0.2	0.2			
WHEAT NON-GRADE DATA FROM	COMPOSITE	AREA SAIVI	PLES		0.0		0.1			0.0				
Dockage (%)	0.2	0.4	0.1	0.3	0.3	0.2	0.4	0.3	0.2	0.3	0.3			
$\frac{1}{2} \frac{1}{2} \frac{1}$	13.5	12.0	15.4	13.5	0.0	15.4	14.5	12.1	15.8	14.5	14.1			
Kernel Size (%) lg/med/sm	100/00/00	90/10/00	9.1 86/13/01	9.1 89/11/00	0.0 01/00/00	9.9 86/13/01	9.4 89/11/00	93/06/01	9.4	9.0 86/13/01	9.4 85/15/00			
Single Kernel Hardness	17.8	18.4	24 5	22.4	25.7	22.6	26.8	17 5	22 7	30 3	26.2			
Weight (mg)	37.6	35.4	34.2	34.4	35.0	33.1	33.9	38.0	32.2	35.7	32.2			
Diameter (mm)	2.75	2.70	2.65	2.67	2.67	2.61	2.64	2.71	2.58	2.65	2.54			
Sedimentation (cc)	8.0	12.0	9.7	8.0	8.0	9.4	10.7	10.0	10.0	14.0	11.4			
DON (ppm)	0.4	0.8	0.8	0.9	1.0	1.2	0.7	1.2	0.5	0.1	0.0			
FLOUR DATA														
Lab Mill Extraction (%)	66.4	67.3	65.8	65.6	68.0	66.7	65.1	65.1	65.1	65.4	65.9			
Flour Color - *L	91.7	89.7	91.3	91.6	91.2	91.3	91.0	91.5	91.6	90.9	91.1			
- *a	-2.4	-2.4	-2.3	-2.4	-2.3	-2.4	-2.4	-2.4	-2.2	-2.2	-2.4			
- *b	9.0	10.4	8.8	9.1	8.9	9.6	9.2	9.1	8.5	8.6	8.9			
Flour Protein (%) 14%/0% mb	6.6/7.7	7.8/9.0	7.3/8.5	7.3/8.5	7.4/8.5	7.7/9.0	7.2/8.4	7.1/8.2	7.2/8.3	7.8/9.1	7.7/9.0			
Flour Ash (%) 14%/0% mb	0.36/0.42	0.37/0.43	0.41/0.47	0.40/0.46	0.37/0.43	0.42/0.48	0.42/0.49	0.41/0.48	0.42/0.49	0.47/0.54	0.41/0.48			
Wet Gluten (%)	16.2	21.3	19.6	19.7	20.9	21.7	20.0	19.7	17.6	19.9	20.8			
Gluten Index	84.7	84.7	87.2	83.0	87.6	80.3	79.0	68.5	97.5	86.3	90.9			
Amulagraph (SEG)	209	158	532	278	280	280	205	300	517	244	217			
Starch Damage (%)	5.8	//	5/0	3 5	5.8	338 // 1	524 6.4	6.2	2.8	1/5	50			
SRC GPI	0.59	0.67	0.63	0.62	0.66	0.64	0.4	0.2	0.64	4.0 0.62	0.67			
Water	51	55	53	51	56	57	53	56	53	56	51			
50% Sucrose	95	104	90	90	96	100	90	93	93	103	102			
5% Lactic Acid	98	119	102	100	111	114	98	100	106	115	116			
5% Na ₂ CO ₃	71	74	73	71	72	76	69	75	73	81	71			
DOUGH PROPERTIES														
Farinograph Peak (min)	1.4	1.2	1.2	1.0	1.1	1.2	1.0	1.2	1.2	1.5	1.3			
Stability (min)	1.3	1.2	1.6	1.2	1.7	2.2	1.4	1.4	1.9	2.2	1.7			
Absorption (%)	50.8	53.7	53.1	52.7	51.8	52.5	50.7	52.0	51.0	53.3	51.6			
Alveograph P (mm)	40	34	51	46	49	43	35	44	38	48	36			
L (mm)	59	80	57	53	46	63	55	48	72	50	53			
W (10 ⁻⁴ joules)	78	70	94	78	84	83	57	72	87	78	64			
P/L	0.68	0.43	0.88	0.87	1.07	0.68	0.63	0.92	0.53	0.96	0.69			
Extenso Resistance (BU)	190	135	201	152	196	148	173	162	227	159	189			
Extensibility (cm)	13.7	18.6	15.6	15.4	14.7	16.8	15.7	16.3	14.7	17.1	17.0			
Area (sq cm)	44	46	56	41	50	45	48	46	59	49	60			
BAKING EVALUATION														
Bake Grain and Texture	5.5	4.0	4.3	4.3	4.5	5.0	4.2	3.5	4.5	4.7	4.1			
Absorption (%)	53.0	57.0	55.1	53.1	52.5	53.0	53.0	52.0	53.7	53.0	53.0			
Loar Volume (cc)	54/	556	606	596	615	649	604	544	589	605	615			
COOKIE Diameter (CM)	8.9	δ.δ 10.1	9.0	8.9 10 F	8.8 10.1	ð.ð	8.9 10 F	ð./	9.0	ð.ð	9.1			
Spreau Kaulo	10.2	10.1	10.7	10.5	10.1	10.9	10.5	10.3	11.3	10.4	11.4			

2021 SRW AREA SURVEY

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Sample Count		12	W 27	E	S	N 1C	10	W 1C	E 25	S		11	W	E	S	NE 12	W	E 12
WHEAT GRADE DATA FROM ARE			27 = SAME		13	10	10	10	25	12	39	11	D	14	11	13	3	13
Test Weight (lb/hu)	59.5	58.6	61 3	60.0	60.5	58.7	61.0	58.2	593	59.4	59.6	60.5	60.6	593	577	58 5	59.7	59.0
(kg/hl)	78.3	77.1	80.6	78.9	79.6	77.3	80.2	76.6	78.0	78.2	78.4	79.6	79.7	78.0	76.0	77.0	78.6	77.6
Damage - Total (%)	1.3	2.7	0.0	0.0	1.3	0.0	0.0	0.7	0.7	0.7	0.0	0.0	0.0	0.0	0.0	0.7	0.7	0.7
Foreign Material (%)	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.0	0.0	0.0	0.3	0.0	0.0
Shrunken and Broken (%)	0.3	0.6	0.4	0.6	0.8	0.3	0.4	0.7	0.6	0.8	0.4	0.4	0.4	0.4	0.6	0.7	0.8	0.8
Total Defects (%)	1.6	3.6	0.4	0.6	2.4	0.3	0.4	1.4	1.3	1.8	0.7	0.7	0.4	0.4	0.6	1.3	1.5	1.5
Grade	2	2	1	1	1	2	1	2	2	2	2	1	1	2	3	2	2	2
WHEAT NON-GRADE DATA FROI		VIDUAL	SAMP	LES														
Moisture (%)	13.3	12.2	13.4	13.8	13.7	13.3	13.0	13.2	13.3	13.6	14.1	12.2	12.9	13.8	14.8	14.7	13.5	14.4
Protein (%) 12% mb	8.4	10.0	9.2	9.2	9.4	9.3	8.9	10.0	9.7	9.3	9.2	8.9	9.4	9.2	10.2	9.3	9.7	9.6
Ash (%) 14% mb	1.26	1.39	1.40	1.38	1.52	1.28	1.39	1.46	1.39	1.37	1.33	1.27	1.44	1.29	1.36	1.28	1.16	1.32
1000 Kernel Weight (g)	34.7	36.2	34.0	32.8	32.8	34.1	35.0	31.2	33.2	32.9	34.0	37.1	36.0	34.8	35.6	37.5	31.5	35.0
Noneat Failing Number (sec)	275	1/9	323	309	308	293	313	314	306	310	312	316	315	311	242	201	293	2/3
					0.7	0.8	0.8	1.7	1.5	1.0	0.9	0.9	0.4	0.2	0.2	0.2	0.1	0.2
Dockage (%)					0.2	0.2	0.2	0.2	0.2	0.1	0.4	0.2	0.1	0.2	0.2	0.2	0.2	0.4
Moisturo (%)	12 5	12.0	12 5	12.2	12.0	0.5	12.0	12.2	12 5	12.0	14	0.5	12 /	0.2	0.2	0.5	0.2	0.4
Protein (%) 12% mb	80	99	9.0	93	8.8	93	8.8	10.4	9.6	9.0	95	89	95	9.4	99	93	9.6	9.4
Kernel Size Large (Over 7) (%)	95	89	88	84	85	90	91	83	88	85	89	93	91	89	80	91	78	87
Med (Over 9) (%)	0	10	11	15	15	9	9	16	11	14	10	6	9	10	18	9	21	13
Small (Thru 9) (%)	0	0	0	1	1	0	0	1	1	1	0	1	0	0	2	1	1	0
Single Kernel Hardness	17.8	18.4	27.4	19.6	28.6	18.8	25.7	27.9	18.9	29.5	26.3	17.5	28.0	19.9	33.6	27.5	25.1	26.6
Weight (mg)	37.6	35.4	32.8	36.5	32.9	35.3	35.0	32.5	33.5	30.3	34.6	38.0	32.3	32.1	34.7	36.5	29.9	33.1
Diameter (mm)	2.75	2.70	2.63	2.69	2.62	2.70	2.67	2.61	2.61	2.55	2.66	2.71	2.61	2.57	2.62	2.68	2.44	2.58
Sedimentation (cc)	8	12	9	11	8	8	8	10	9	9	11	10	12	9	14	14	10	12
DON (ppm)	0.4	0.8	0.6	1.0	0.8	1.0	1.0	1.2	1.1	1.6	0.6	1.2	1.0	0.2	0.2	0.1	0.0	0.1
FLOUR DATA																		
Lab Mill Extraction (%)	66.4	67.3	66.2	65.1	65.0	65.9	68.0	66.5	66.8	65.9	65.0	65.1	65.1	65.1	65.7	65.2	66.0	65.8
Flour Color - *L	91.7	89.7	91.3	91.3	91.4	91.7	91.2	91.3	91.3	91.4	90.9	91.5	91.4	91.6	90.7	91.0	91.0	91.2
- ~a *b	-2.4	-2.4	-2.3	-2.3	-2.4	-2.4	-2.3	-2.5	-2.4	-2.5	-2.3	-2.4	-2.2	-2.3	-2.0	-2.4	-2.5	-2.4
- D	9.0	10.4	8.8	8.8 7.1	9.1	9.0	8.9	9.9	9.4	10.0	9.0	9.1	8.2 7.2	8.0 7.1	8.3 0.1	8.9	9.5	8.6
Flour Ash (%) 14% mb	0.0	7.0 0.37	7.4 0.42	0.39	7.5 0.38	7.5 0.41	0.37	0.0	0.42	0.39	0.43	0.41	7.5 0.38	7.1 0.45	0.1	0.43	0.0	7.0
Wet Gluten (%)	16.2	21.3	20.2	18.5	20.2	19.5	20.9	24.0	20.2	21.6	19.7	19.7	20.0	16.3	20.6	19.3	22.6	20.1
Gluten Index	84.7	84.7	82.3	95.5	80.1	84.7	87.6	77.1	82.6	66.4	81.3	68.5	94.7	99.0	90.2	83.0	88.4	92.0
Falling Number (sec)	269	158	349	303	282	276	286	309	270	304	258	300	310	320	264	226	264	197
Amylograph (65g) (BU)	231	77	615	494	590	525	533	403	326	538	521	412	536	642	262	100	272	109
Starch Damage (%)	5.8	4.9	6.2	3.0	3.8	3.4	5.8	3.0	4.9	5.3	6.6	6.2	2.5	3.0	6.6	3.0	5.3	4.9
SRC: GPI	0.59	0.67	0.65	0.60	0.61	0.63	0.66	0.63	0.65	0.57	0.63	0.60	0.61	0.65	0.60	0.65	0.69	0.66
Water	51	55	52	56	54	49	56	50	62	52	53	56	53	53	57	55	51	50
50% Sucrose	95	104	89	93	91	89	96	91	107	93	90	93	94	92	104	102	89	108
5% Lactic Acid	98	119	102	102	100	100	111	101	123	94	99	100	104	107	112	117	112	117
5% Na ₂ CO ₃	/1	74	69	79	74	70	72	68	82	72	68	75	74	72	83	79	73	70
DOUGH PROPERTIES																		
Farinograph Peak (min)	1.4	1.2	1.3	1.1	1.1	1.0	1.1	1.4	1.1	1.1	1.0	1.2	1.2	1.1	1.6	1.5	1.2	1.4
Stability (min)	1.3	1.2	1.9	1.1	1.2	1.2	1.7	2.5	1.9	1.7	1.3	1.4	2.0	1.8	2.5	2.0	1.8	1.7
Absorption (%)	50.8	53.7	52.7	53.9	53.8	52.1	51.8	53.1	52.1	51.6	50.5	52.0	52.1 42	50.4 26	53.2	53.4	51.Z	51.8
Alveograph P (mm)	50	34 90	50	52	23	4Z 60	49	54	42	58	54	44	43	50 60	52	51	50	50
L(1111)	70	70		100	41	70	40	74	09	702	54	40	79	03	40	75	33	50
vv (10 Joules)	/8 0.69	/0	90	100	1 20	/8	84 1.07	0.91	88 0.61	/6	54 0.62	/2	99	δ1 052	δ2 1.09	15	/0	02 0 72
F/L Extenso Resistance (RLI)	190	125	208	188	139	160	196	139	154	159	176	162	205	238	1.00	148	208	181
Extensibility (cm)	13.7	18.6	16.1	14.7	16.5	14.8	14.7	16.6	16.9	15.4	15.8	16.3	16.0	14.1	17.1	17.1	15.9	17.5
Area (sg cm)	44	46	61	48	41	41	50	40	48	43	49	46	60	59	53	46	61	59
BAKING EVALUATION				-	_				-			-				-		
Bake Grain and Texture	5.5	4.0	4.5	4.0	4.0	4.5	4.5	5.0	5.0	5.0	4.0	3.5	4.5	4.5	5.5	4.0	4.5	4.0
Absorption (%)	53.0	57.0	54.0	57.0	54.0	52.5	52.5	53.0	53.0	53.0	53.0	52.0	55.0	53.0	53.0	53.0	53.0	53.0
Loaf Volume (cc)	547	556	626	573	619	582	615	648	649	617	602	544	584	592	621	592	631	609
Cookie Diameter (cm)	8.9	8.8	9.0	8.9	8.9	8.9	8.8	8.8	8.8	8.8	8.9	8.7	8.9	9.0	8.7	8.9	8.9	9.2
Spread Ratio	10.2	10.1	10.3	11.3	10.6	10.5	10.1	10.7	11.1	10.4	10.5	10.3	11.2	11.3	10.3	10.5	11.2	11.5

N-North: S-South: F-Fast: W-West: NF-Northeast: La-Larae. Med-Medium: Sm-Small: mh-moisture basis: NA-Not Available

COMPARISONS OF 2021 RESULTS For Selected Quality Factors





Falling Number and Amylograph





← Wheat Falling Number – Flour Falling Number ← Amylograph

COMPARISONS OF 2021 RESULTS For Selected Quality Factors





Dockage, Damage and Total Defects 4.0 3.5 3.0 -Dockage 2.5 Damage Percent 2.0 -Total 1.5 Defects 1.0 0.5 0.0 W Е S Ν w Е s Ν w Е s NE w Е AL AR II. IN KΥ MO он ΤN MD NC VA

AL-Alabama, AK-Arkansas, IL-Illinois, IN-Indiana, KY-Kentucky, MD-Maryland, MO-Missouri, NC-North Carolina, OH-Ohio, TN-Tennessee, VA-Virginia; N-North, S-South, E-East, W-West, NE-Northeast







AL-Alabama, AK-Arkansas, IL-Illinois, IN-Indiana, KY-Kentucky, MD-Maryland, MO-Missouri, NC-North Carolina, OH-Ohio, TN-Tennessee, VA-Virginia N-North, S-South, E-East, W-West, NE-Northeast

Test Weight





AL-Alabama, AK-Arkansas, IL-Illinois, IN-Indiana, KY-Kentucky, MD-Maryland, MO-Missouri, NC-North Carolina, OH-Ohio, TN-Tennessee, VA-Virginia N-North, S-South, E-East, W-West, NE-Northeast

Protein





AL-Alabama, AK-Arkansas, IL-Illinois, IN-Indiana, KY-Kentucky, MD-Maryland, MO-Missouri, NC-North Carolina, OH-Ohio, TN-Tennessee, VA-Virginia N-North, S-South, E-East, W-West, NE-Northeast

Falling Number





AL-Alabama, AK-Arkansas, IL-Illinois, IN-Indiana, KY-Kentucky, MD-Maryland, MO-Missouri, NC-North Carolina, OH-Ohio, TN-Tennessee, VA-Virginia N-North, S-South, E-East, W-West, NE-Northeast

Vomitoxin (DON)





AL-Alabama, AK-Arkansas, IL-Illinois, IN-Indiana, KY-Kentucky, MD-Maryland, MO-Missouri, NC-North Carolina, OH-Ohio, TN-Tennessee, VA-Virginia N-North, S-South, E-East, W-West, NE-Northeast

Solvent Retention Capacity (SRC)







AL-Alabama, AK-Arkansas, IL-Illinois, IN-Indiana, KY-Kentucky, MD-Maryland, MO-Missouri, NC-North Carolina, OH-Ohio, TN-Tennessee, VA-Virginia; N-North, S-South, E-East, W-West, NE-Northeast

Solvent Retention Capacity (SRC)





AL-Alabama, AK-Arkansas, IL-Illinois, IN-Indiana, KY-Kentucky, MD-Maryland, MO-Missouri, NC-North Carolina, OH-Ohio, TN-Tennessee, VA-Virginia; N-North, S-South, E-East, W-West, NE-Northeast

Sedimentation and Wet Gluten







AL-Alabama, AK-Arkansas, IL-Illinois, IN-Indiana, KY-Kentucky, MD-Maryland, MO-Missouri, NC-North Carolina, OH-Ohio, TN-Tennessee, VA-Virginia; N-North, S-South, E-East, W-West, NE-Northeast

Farinograph







AL-Alabama, AK-Arkansas, IL-Illinois, IN-Indiana, KY-Kentucky, MD-Maryland, MO-Missouri, NC-North Carolina, OH-Ohio, TN-Tennessee, VA-Virginia; N-North, S-South, E-East, W-West, NE-Northeast

Alveograph







AL-Alabama, AK-Arkansas, IL-Illinois, IN-Indiana, KY-Kentucky, MD-Maryland, MO-Missouri, NC-North Carolina, OH-Ohio, TN-Tennessee, VA-Virginia; N-North, S-South, E-East, W-West, NE-Northeast



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