U.S. WHEAT ASSOCIATES

Dependable People. Reliable Wheat.

SOFT RED WINTER WHEAT

QUALITY SURVEY

2023

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 6.1 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 grown predominantly 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 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:

Few mills are designed for only SRW as it is generally a wheat class used for specialty productions and blending. Advantages to milling SRW include reduced energy requirements due to fewer roller mills and purifiers needed for mill flows designed specifically for soft wheat. SRW requires less grinding capacity and greater sifting capacity compared to hard wheats, but combining the two can be accomplished with minimal impact.

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. SRW also tends to produce a finer flour particle size which produces a more viscous flour, better aeration during mixing, and a softer mouth feel for cakes.

BAKING ADVANTAGES:

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, cookies and some bread types. SRW can add extensibility to wheats that may have high resistance/extensibility ratios. 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 likely increase the rate of water absorption, decreasing mix time and improving production efficiencies.

As is the message with most U.S. wheat classes, blending SRW flour with other flour types gives 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 key 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

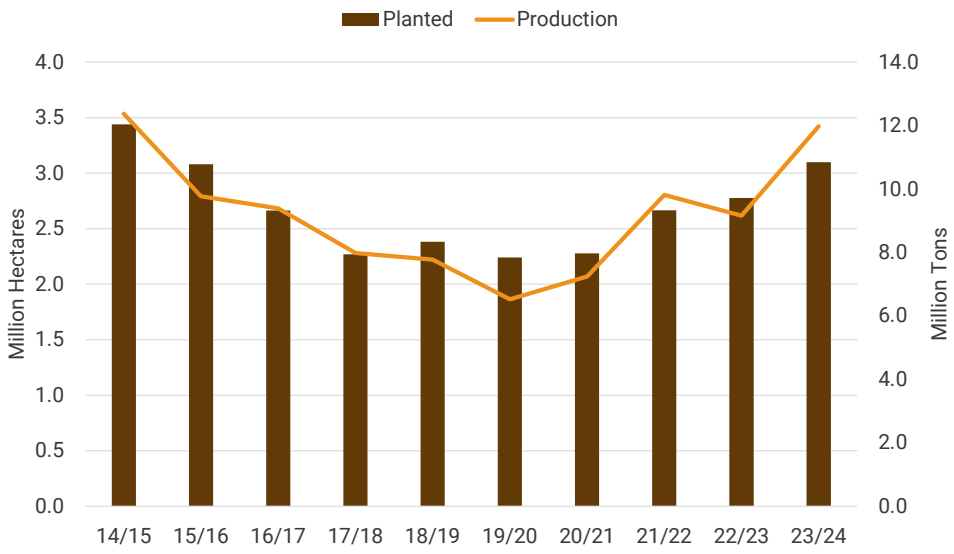
2023 PRODUCTION

FOR THE MAJOR PRODUCING STATES (MILLION METRIC TONS)

	2023	2022	2021	2020	2019
Alabama	0.3	0.2	0.2	0.1	0.2
Arkansas	0.2	0.3	0.2	0.1	0.1
Georgia	0.1	0.1	0.2	0.1	0.1
Illinois	1.8	1.5	1.3	1.0	1.0
Indiana	0.7	0.6	0.6	0.5	0.4
Kentucky	1.1	0.9	0.8	0.6	0.7
Maryland	0.4	0.3	0.3	0.3	0.3
Michigan	1.1	0.7	0.8	0.6	0.6
Missouri	1.1	1.0	0.9	0.6	0.7
North Carolina	0.2	0.2	0.2	0.2	0.1
New York	0.8	0.5	0.5	0.6	0.3
Ohio	1.1	0.9	1.2	0.9	0.6
Pennsylvania	0.4	0.3	0.4	0.4	0.3
Tennessee	0.8	0.6	0.6	0.4	0.4
Virginia	0.3	0.2	0.2	0.2	0.2
Wisconsin	0.4	0.5	0.5	0.2	0.3
Surveyed-States Total*	**8.6**	**7.0**	**7.0**	**5.3**	**4.8**
East Coast-Exportable	1.4	1.1	1.1	1.1	0.8
Gulf-Exportable	7.2	5.9	5.9	4.2	4.0
Sixteen-State Total	**11.0**	**8.8**	**9.1**	**6.8**	**6.1**
Total SRW Production	**12.0**	**9.2**	**9.8**	**7.2**	**6.5**

Based on August 2023 estimates from USDA's National Agricultual Statistics Service.

**Eleven states denoted by italics were surveyed accounting for 72% of 2023 SRW production.*



SOFT RED WINTER

CROP SURVEY METHODS

SAMPLE COLLECTION AND ANALYSIS

Great Plains Analytical Laboratory, Kansas City, Missouri, collected, tested and analyzed 232 samples from elevators in 18 reporting areas across 11 states: 46 samples were from the East Coast states and 186 from the Gulf states.

SAMPLE TESTING

Test weight, wheat moisture, wheat protein, 1000 kernel weight, wheat ash and wheat falling number were determined on individual samples, DON was 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," "East Coast" and "Gulf" values. Gulf states include Alabama, Arkansas, Illinois, Indiana, Kentucky, Missouri, Ohio, and Tennessee. East Coast states include Maryland, North Carolina and Virginia.

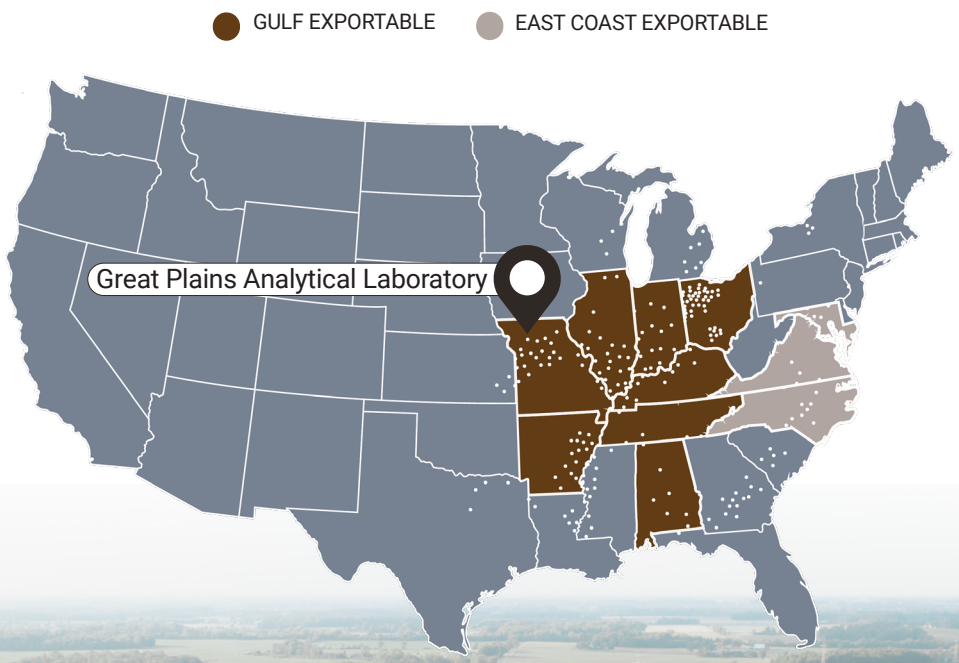
The states surveyed account for an estimated 72% of total 2023 U.S. SRW production. Of that, Gulf states account for 60% of production in the states surveyed and East Coast states represent the remaining 12%.

11

STATES SURVEYED

72%

OF TOTAL SRW PRODUCTION REPRESENTED



SOFT RED WINTER

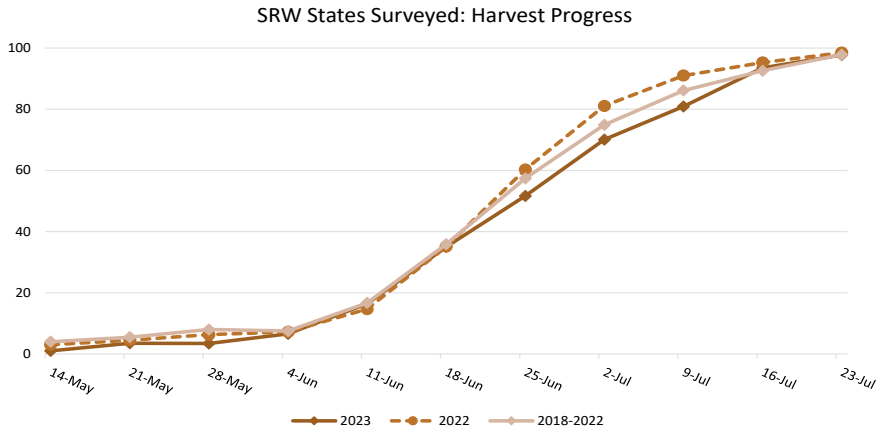
2023 CROP HIGHLIGHTS

OVERVIEW

The U.S. soft red wheat (SRW) production region experienced generally good growing conditions in the 2023 crop year. The crop is very sound with high test weight and falling number values, large kernel size, good milling characteristics, and is relatively free of DON. Processors will find a versatile crop with good qualities for cookies, cakes and crackers. With higher protein and good extensibility, the crop should also be valuable in blending for baking applications. There were pockets of higher enzymatic activity (lower falling numbers) from the East Coast exportable states, which will naturally find their way to the animal feed channels and not milling wheat. Overall, buyers should be extremely happy with the quality of the entire 2023 SRW crop. Buyers are encouraged to review their quality specifications to ensure they receive qualities that meet their needs for traditional soft wheat products or blending with stronger wheat.

PLANTING

USDA estimated 7.66 million acres (3.10 million hectares) were seeded in the fall of 2022, up 12% seeded for the 2022 harvest and up 26% over the 5-year average, making this the most planted acres since 2014. The largest SRW acreage increases were in Indiana with a 41% increase followed by Illinois and Missouri, each with a 32% increase. The acreage increases were attributed to higher prices, favorable planting weather and a timely spring crop harvest that favored winter wheat seeding. Planting started at a normal pace mid-September 2022, then progressed faster than average with 60% of the SRW crop planted by late October and 95% by late November.



GROWING SEASON

By late November in the eleven SRW survey states USDA estimated 84% of the crop had emerged and was rated 65% good to excellent and 96% fair to excellent. As the crop went into dormancy, portions of all surveyed states saw abnormally dry to moderate drought with isolated areas of Kentucky, Missouri, Tennessee and Arkansas in severe drought.

Apart from a late December polar vortex that briefly pushed record low temperatures into the central and southern United States, it was a generally mild winter from the Mississippi Valley eastward. Most of the SRW growing area received plentiful moisture through the winter and spring with only Maryland seeing a decrease in soil moisture.

By early May, SRW conditions in the major growing states were rated predominately fair to excellent, with less than 10% rated as poor or very poor. Crop conditions stayed high throughout the growing season, with limited disease and no notable pest pressure due to early season dryness.

HARVEST

The 2023 SRW harvest began mid-May in Alabama. By mid-June harvest was progressing in all states except Ohio and Maryland. It was unusually dry with below average temperatures across the entire SRW growing region, mid-May through mid-June. Weather patterns changed by mid-June with widespread rain causing harvest delays in North Carolina, Maryland and Ohio. Much of the growing region had below average temperatures in June and July with spikes of warmer weather. Harvest wrapped up by the end of July.

PRODUCTION

SRW production for the 2023/24 marketing year is estimated at 440 million bushels (12.0 million metric tons (MMT)), up from 337 million bushels (9.2 MMT) in 2022 and above the 5-year average of 298 million bushels (8.1 MMT). That would be the largest SRW production in 9 years and highest yield on record at 75 bushels/acre (5.0 tons/ha). The USDA forecast that SRW exports are expected to be 135 million bushels (3.7 MMT), the largest in 9 years, and projections put ending stocks at a 5-year high.

SOFT RED WINTER

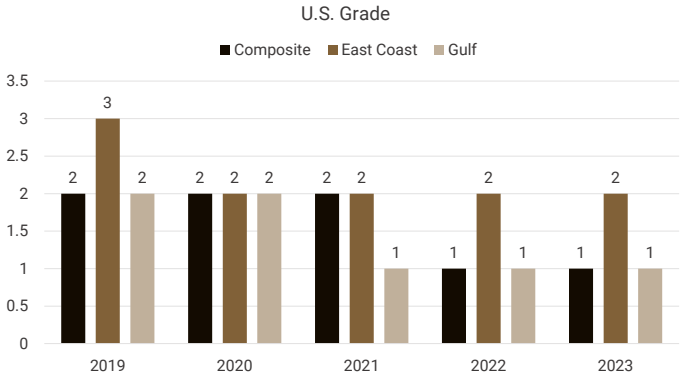
2023 CROP HIGHLIGHTS

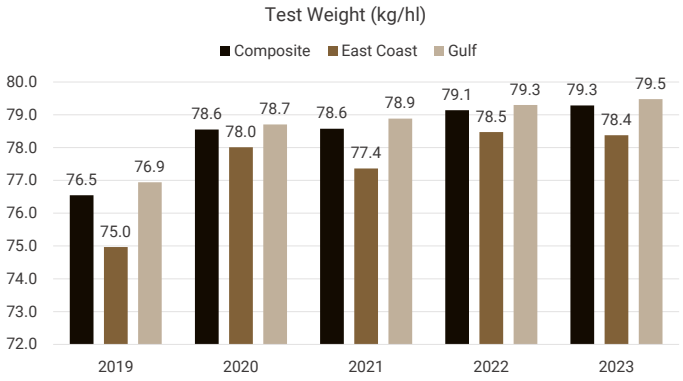
GRADE DATA:

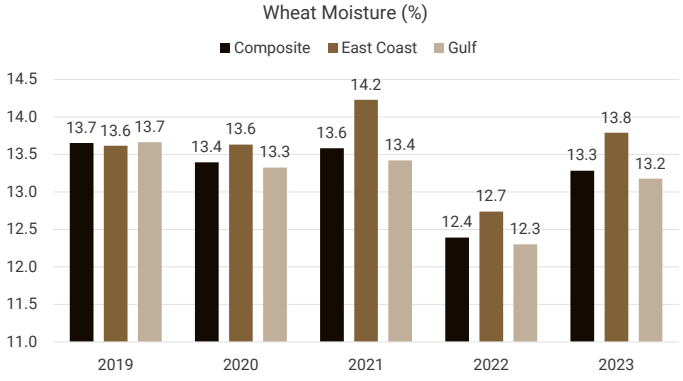
- **GRADE** - the overall sample average collected for the 2023 SRW harvest survey is U.S. No. 1 SRW; the Gulf average is U.S. No. 1 SRW, and the East Coast average is U.S. No. 2 SRW.
- **TEST WEIGHT** averages trended higher this year, indicative of sound wheat and a uniform crop. The Composite average is 60.3 lb/bu (79.3 kg/hl), Gulf average is 60.4 lb/bu (79.5 kg/hl) and East Coast is 59.6 lb/bu (78.4 kg/hl).
- **TOTAL DEFECTS** East Coast average of 0.8% is below last year's and well below the 5-year average, indicating that damaged and shrunken and broken kernels are unusually low in that portion of the crop.
- All other **GRADE FACTORS** are similar to or lower than 2022 and 5-year average values.

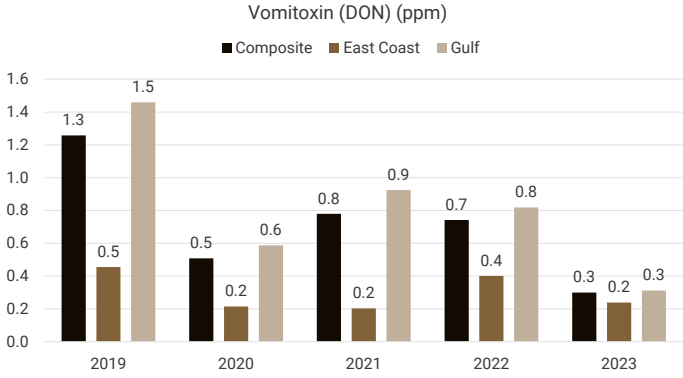
WHEAT NON-GRADE DATA:

- **WHEAT PROTEIN** (12% mb) content demonstrates a consistent crop with an average below last year's and the 5-year average: Composite 9.3%, East Coast 9.4%, Gulf 9.3%.
- **WHEAT MOISTURE** for this year's crop is higher than 2022 and the 5-year averages, due to moisture at harvest: Composite 13.3%, East Coast 13.8%, Gulf 13.2%.
- **WHEAT FALLING NUMBER** overall average of 320 seconds is below 2022 but above the 5-year average and indicates there is very little sprout damage in the crop; the lower East Coast average is due to rainfall at harvest. Approximately 25% of samples had a falling number below 300 seconds in 2023, and only 7 of 232 samples were below 250 seconds.
- **SINGLE KERNEL** values also reflect a consistent crop. Kernels are harder, heavier, and larger than last year's and 5-year averages.
- **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 (0.3 ppm), Gulf (0.3 ppm) and East Coast (0.2 ppm). Of the samples tested for DON, only two were above 1.0 ppm.









SOFT RED WINTER

2023 CROP HIGHLIGHTS

FLOUR DATA:

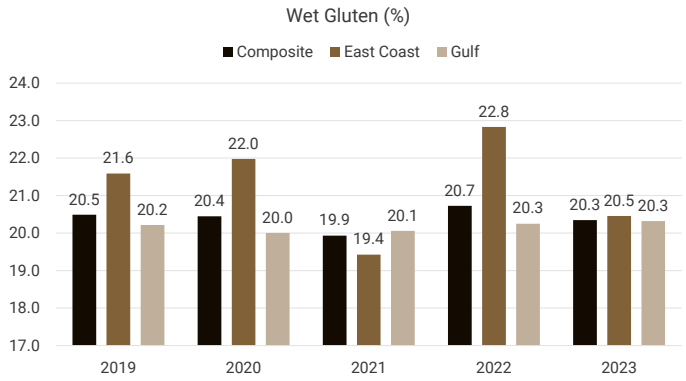
- **LABORATORY MILL FLOUR EXTRACTION** for Composite (68.4%), East Coast (66.5%) and Gulf (68.3%) are all higher or similar to 2022 and 5-year averages. The extraction rate from a laboratory mill is not optimized and will always be significantly lower than the rate obtained from a commercial mill.
- **AMYLOGRAPH VISCOSITY** indicates starch characteristics that are suitable for batter-based products. The 2023 averages for Composite (655 BU) and Gulf (709 BU) are very sound, reinforce the high falling numbers, and indicate very low levels of amylase activity. The East Coast value of 401 BU reflects this year's slightly lower falling number values.

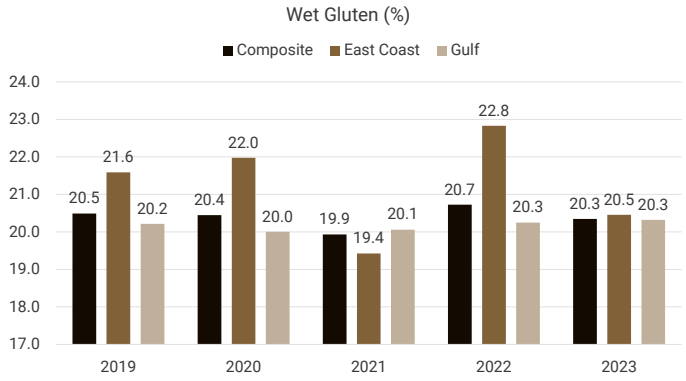
DOUGH PROPERTIES:

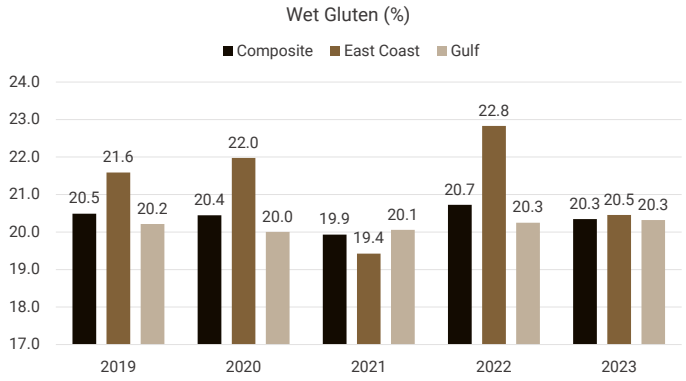
- **DOUGH PROPERTIES** suggest this crop is suitably weaker than the 5-year average and typical for SRW.
- **ALVEOGRAPH** data indicate a crop that is slightly less extensible than last year and is suitable for blending applications.

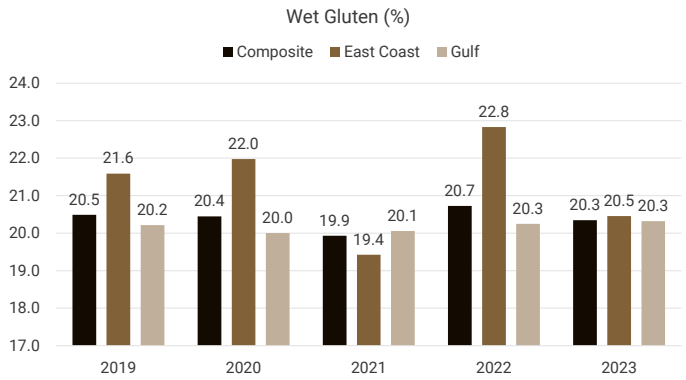
END PRODUCTS:

- **COOKIE DIAMETER** values are consistent across the crop and are higher than last year but similar to the 5-year average, indicating this crop has adequate spreadability.
- **LOAF VOLUME** averages are lower than last year and 5-year averages, and indicate this crop is suitable for blending: Composite (602 cc), East Coast (587 cc) and Gulf (606 cc).







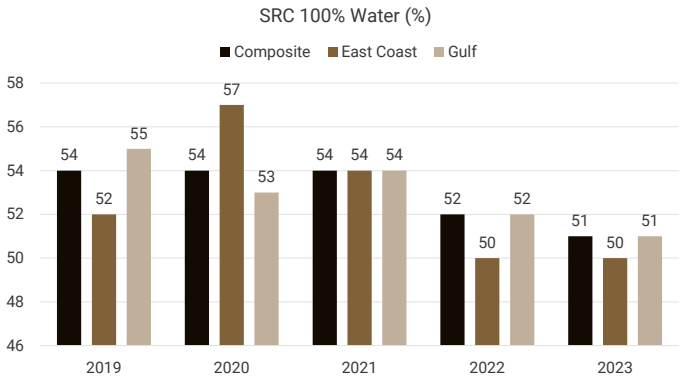


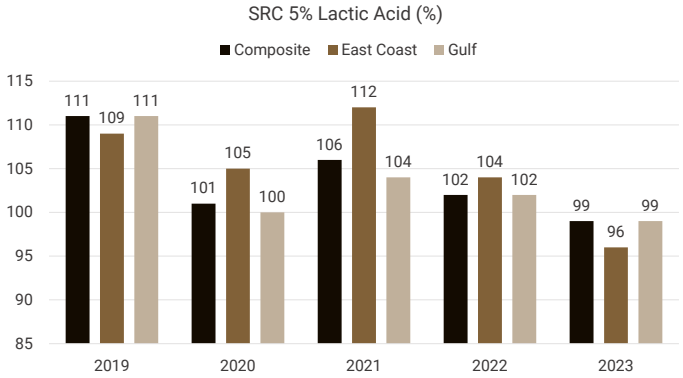
SOFT RED WINTER

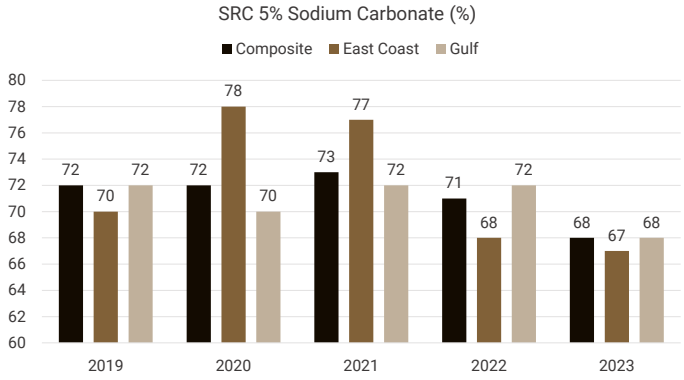
2023 CROP HIGHLIGHTS

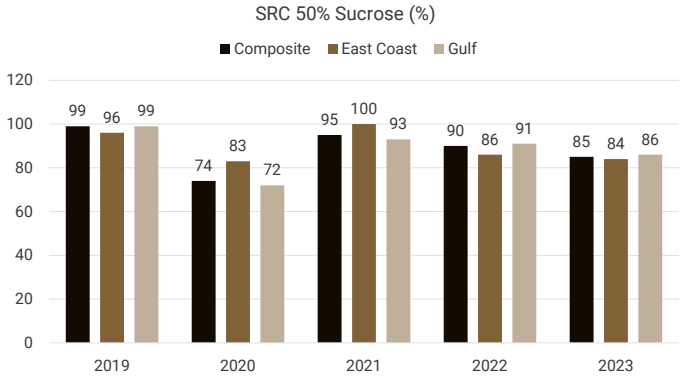
SOLVENT RETENTION CAPACITY:

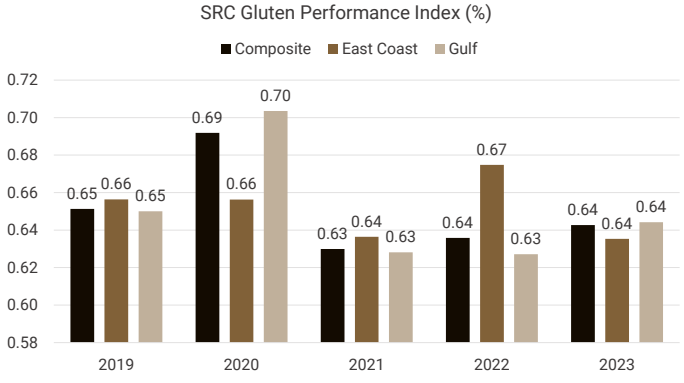
- **SRC** values for this crop indicate excellent quality for all typical applications.
- **GPI** values of 0.64 indicate this year's crop is good for blending.
- **SUCROSE** values, all lower than last year's and 5-year averages, indicate cookies and crackers will benefit from reduced bake time and should not experience any excess water-holding issues: Composite (85%), East Coast (84%) and Gulf (86%).
- **LACTIC ACID** values are all lower than last year's and 5-year averages and are good ranges for cookies: Composite (99%), East Coast (96%) and Gulf (99%).
- **SODIUM CARBONATE** East Coast value of 67% is similar to last year's 68%. The Composite and Gulf values of 68% are lower than last year's 72% and 73% respectively.











2023 SRW QUALITY DATA – BY EXPORT REGION

	Composite Average			East Coast*			Gulf*		
	2023	2022	5-Year	2023	2022	5-Year	2023	2022	5-Year
Wheat Grade Data									
Test Weight (lb/bu)	60.3	60.1	59.1	59.6	59.7	58.2	60.4	60.3	59.3
(kg/hl)	79.3	79.1	77.8	78.4	78.5	76.7	79.5	79.3	78.1
Damaged Kernels (%)	0.3	0.2	0.4	0.3	0.5	0.9	0.3	0.1	0.3
Foreign Material (%)	0.2	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.1
Shrunken & Broken (%)	0.6	0.6	0.6	0.4	0.5	0.7	0.6	0.6	0.5
Total Defects (%)	1.0	0.9	1.0	0.8	1.1	1.6	1.1	0.8	0.9
Grade	1	1	2	2	2	2	1	1	2
Wheat Non-Grade Data									
Dockage (%)	0.4	0.4	0.3	0.3	0.3	0.3	0.5	0.4	0.3
Moisture (%)	13.3	12.4	13.2	13.8	12.7	13.5	13.2	12.3	13.1
Protein (%) 12%/0% mb	9.3/10.6	9.6/10.9	9.5/10.8	9.4/10.7	10.1/11.5	9.8/11.1	9.3/10.6	9.4/10.7	9.5/10.8
Ash (%) 14%/0% mb	1.40/1.63	1.46/1.70	1.62/1.88	1.36/1.58	1.38/1.61	1.57/1.83	1.41/1.64	1.72/2.00	1.63/1.90
1000 Kernel Weight (g)	35.9	32.9	32.6	36.4	34.6	33.9	35.8	32.6	32.3
Kernel Size (%) lg/med/sm	89/10/01	85/14/01	85/14/01	90/09/01	87/13/00	84/14/01	89/10/01	85/14/01	85/14/01
Single Kernel: Hardness	24.5	23.4	21.7	24.6	24.1	21.8	24.5	23.3	21.6
Weight (mg)	36.4	32.5	33.7	37.0	34.4	34.7	36.3	32.1	33.4
Diameter (mm)	2.68	2.60	2.63	2.69	2.64	2.64	2.68	2.59	2.63
Sedimentation (cc)	12.6	11.1	10.8	12.7	12.1	11.6	12.6	10.9	10.6
Falling Number (sec)	320	327	311	293	336	292	326	325	315
DON (ppm)	0.3	0.7	0.8	0.2	0.4	0.5	0.3	0.8	0.9
Flour Data									
Lab Mill Extraction (%)	68.4	66.4	66.9	66.5	66.6	66.9	68.8	66.4	66.9
Color: L*	91.0	91.1	91.1	91.1	90.5	91.0	91.0	91.3	91.2
a*	-2.2	-2.4	-2.3	-2.1	-2.3	-2.3	-2.2	-2.4	-2.3
b*	8.6	9.3	9.1	8.1	9.3	8.9	8.8	9.3	9.1
Protein (%) 14%/0% mb	7.3/8.5	7.6/8.8	7.7/9.0	7.3/8.4	8.0/9.3	7.9/9.1	7.3/8.5	7.6/8.8	7.7/8.9
Ash (%) 14%/0% mb	0.42/0.49	0.41/0.48	0.43/0.50	0.38/0.44	0.41/0.48	0.43/0.50	0.43/0.50	0.41/0.48	0.42/0.49
Wet Gluten (%) (14% mb)	20.3	20.7	21.0	20.5	22.8	21.8	20.3	20.3	20.9
Falling Number (sec)	320	326	339	287	313	294	328	329	350
Amylograph Viscosity: 65g (BU)	655	666	548	401	574	404	709	687	586
Damaged Starch (%)	3.3	3.4	3.4	3.4	4.4	3.4	3.3	3.2	3.5
SRC: Water/50% Sucrose (%)	51/85	51/90	54/93	50/84	50/86	54/96	51/86	52/91	54/93
5% Lactic Acid/5% Na_2CO_3 (%)	99/68	102/71	107/74	96/67	104/68	110/75	99/68	102/72	106/73
Gluten Performance Index (GPI) (%)	0.64	0.64	0.64	0.64	0.67	0.65	0.64	0.63	0.64
Dough Properties									
Farinograph: Peak Time (min)	1.2	1.2	1.2	1.2	1.4	1.3	1.2	1.1	1.1
Stability (min)	1.7	1.6	1.7	1.6	2.0	1.8	1.7	1.5	1.6
Absorption (%)	52.5	51.2	52.0	52.4	52.2	52.6	52.5	51.0	51.9
Alveograph: P (mm)	45	36	38	43	41	41	46	35	37
L (mm)	64	82	79	73	91	79	62	80	79
P/L Ratio	0.70	0.44	0.48	0.59	0.45	0.51	0.73	0.44	0.48
W (10^{-4} J)	88	85	81	90	103	86	88	81	80
Extensograph (45 min): Resistance (BU)	219	200	179	204	194	170	222	202	182
Extensibility (cm)	14.8	15.3	15.8	15.3	16.6	16.5	14.7	15.0	15.6
Area (cm^2)	55	53	49	53	58	50	56	52	49
Baking Evaluation									
Cookie Diameter (cm)	9.0	8.9	8.9	9.0	8.8	8.8	9.0	8.9	9.0
Spread Factor (d/h)	9.7	10.7	10.1	9.9	10.6	9.9	9.6	10.7	10.2
Bake Absorption (%)	54.4	54.0	53.9	51.1	54.6	54.3	55.1	53.8	53.8
Bake Grain and Texture (1-10)	5.1	4.5	4.8	4.4	5.0	5.0	5.2	4.3	4.8
Loaf Volume (cc)	602	624	655	587	610	652	606	627	656
% Sampled Area Production	**100%**			**16%**			**84%**		

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

2023 SRW QUALITY DATA – BY STATE

	Alabama	Arkansas	Illinois	Indiana	Kentucky	Missouri	Ohio	Tennessee	Maryland	North Carolina	Virginia
Wheat Grade Data - from Area Composite Samples											
Test Weight (lb/bu)	59.6	58.8	61.0	60.7	60.2	60.7	59.9	59.7	59.9	58.8	61.0
(kg/hl)	78.4	77.4	80.2	79.9	79.2	79.9	78.8	78.6	78.8	77.4	80.2
Damaged Kernels (%)	0.0	0.0	0.0	0.2	0.0	1.0	0.1	0.7	0.0	0.3	0.7
Foreign Material (%)	0.3	0.3	0.2	0.1	0.3	0.2	0.0	0.3	0.0	0.1	0.0
Shrunken & Broken (%)	0.3	0.6	0.6	0.8	0.7	0.6	0.7	0.6	0.5	0.5	0.3
Total Defects (%)	0.6	0.9	0.8	1.1	1.0	1.9	0.7	1.6	0.5	0.9	1.0
Grade	2	2	1	1	1	1	1	2	1	2	1
Wheat Non-Grade Data - from Individual Samples											
Moisture (%)	13.0	12.6	12.8	14.0	12.9	12.6	14.4	13.5	14.4	13.2	14.3
Protein (12% mb)	9.5/10.8	10.2/11.5	9.3/10.6	8.7/9.9	9.6/10.9	10.0/11.4	8.5/9.6	9.3/10.6	9.1/10.3	9.7/11.0	8.9/10.1
Ash (%) 0% mb	1.52/1.72	1.44/1.64	1.44/1.64	1.44/1.64	1.41/1.61	1.45/1.65	1.27/1.44	1.36/1.54	1.33/1.51	1.36/1.55	1.38/1.57
1000 Kernel Weight (g)	36.6	31.7	36.7	36.4	36.3	34.7	35.1	36.4	37.6	35.4	37.5
Falling Number (sec)	322	314	345	312	330	336	294	330	298	286	303
DON (ppm)	0.2	0.3	0.2	0.1	0.4	0.2	0.2	0.7	0.1	0.4	0.4
Wheat Non-Grade Data - from Area Composite Samples											
Dockage (%)	0.6	0.4	0.4	0.5	0.5	0.5	0.5	0.7	0.2	0.3	0.6
Moisture - %	12.6	12.5	12.6	13.8	12.9	12.9	14.3	13.7	14.6	13.2	14.4
Protein (%) 12% mb	9.3	10.1	9.0	8.7	9.6	10.0	8.0	9.2	8.8	9.7	9.3
Kernel Size (%) lg/med/sm	88/12/00	83/16/01	92/08/00	90/10/00	92/08/00	88/12/00	89/11/00	88/11/01	94/05/01	87/12/01	92/8/00
Single Kernel: Hardness	19.6	20.9	24.5	23.1	25.6	24.9	29.2	14.3	32.5	20.5	24.9
Weight (mg)	38.3	32.7	37.3	35.8	35.7	35.6	35.5	40.2	36.8	36.1	39.3
Diameter (mm)	2.65	2.62	2.72	2.65	2.68	2.68	2.63	2.76	2.70	2.66	2.76
Sedimentation (cc)	10.0	14.0	13.1	11.7	18.0	12.7	8.2	10.0	14.8	11.5	12.9
DON (ppm)	0.9	0.4	0.2	0.1	0.6	0.1	0.2	1.0	0.1	0.3	0.3
Flour Data											
Lab Mill Extraction (%)	66.1	66.4	69.4	67.9	69.3	69.9	69.2	65.9	66.9	66.0	67.1
Color: L*	90.9	90.6	91.1	91.1	91.1	90.9	90.8	90.7	91.2	91.0	91.0
a*	-1.9	-1.9	-2.2	-2.3	-2.2	-2.1	-2.3	-2.0	-2.1	-2.1	-2.0
b*	7.8	7.7	8.7	9.2	8.8	8.7	9.3	8.1	7.9	8.2	8.0
Protein (%) 14%/0% mb	7.3/8.4	7.5/8.8	7.1/8.3	6.8/8.0	7.5/8.7	8.1/9.4	6.9/8.1	6.9/8.0	7.0/8.1	7.5/8.7	7.1/8.3
Ash (%) 14%/0% mb	0.44/0.51	0.43/0.50	0.41/0.48	0.41/0.48	0.43/0.50	0.44/0.51	0.45/0.53	0.37/0.43	0.36/0.42	0.37/0.43	0.44/0.51
Wet Gluten (%)	19.8	22.0	19.5	19.0	22.6	23.2	17.7	19.0	17.5	21.5	21.5
Gluten Index	74	88	96	88	93	87	83	99	95	87	88
Falling Number (sec)	330	301	342	320	328	344	308	299	290	276	308
Amylograph Viscosity: 65g (BU)	723	542	805	673	789	746	508	688	482	360	403
Damaged Starch (%)	2.5	3.4	3.2	3.1	3.4	3.0	3.8	3.4	3.4	3.3	3.7
SRC: GPI	0.64	0.64	0.65	0.63	0.67	0.64	0.62	0.66	0.69	0.62	0.59
Water	54	52	51	52	50	51	53	49	49	49	52
50% Sucrose	94	103	81	82	85	84	95	80	83	83	87
5% Lactic Acid	105	115	96	94	100	97	104	94	102	94	94
5% Na_2CO_3	71	77	68	67	63	67	73	64	65	67	71
Dough Properties											
Farinograph: Peak Time (min)	0.9	0.9	1.3	1.2	1.1	1.4	1.2	1.0	1.1	1.2	1.2
Stability (min)	1.0	1.7	2.0	1.5	1.7	2.4	1.3	1.3	1.3	1.9	1.2
Absorption (%)	51.7	50.8	52.4	52.8	52.8	53.3	52.3	51.4	53.7	51.8	52.2
Alveograph: P (mm)	38	41	48	50	44	45	44	45	54	39	40
L (mm)	71	58	61	56	69	64	61	61	62	80	70
W (10^{-4} J)	74	76	93	92	90	86	81	87	112	84	77
P/L Ratio	0.54	0.71	0.79	0.90	0.64	0.70	0.72	0.74	0.88	0.49	0.57
Extensograph: Resistance (BU)	192	288	230	228	252	195	198	208	224	199	194
(45 min) Extensibility (cm)	15.3	14.6	14.1	14.3	14.7	16.0	14.5	15.5	14.3	16.3	14.0
Area (cm^2)	49	73	54	54	63	56	49	57	52	57	46
Baking Evaluation											
Bake Grain and Texture (1-10)	4.0	5.0	5.5	5.0	5.0	5.0	5.8	4.5	4.6	4.5	4.0
Bake Absorption (%)	53.5	54.0	55.0	55.7	56.0	56.0	54.3	53.0	55.3	53.2	40.4
Loaf Volume (cc)	580	636	605	569	611	597	654	535	580	596	573
Cookie Diameter (cm)	9.1	9.2	8.9	9.0	8.9	8.9	9.1	9.0	8.8	9.0	9.0
Spread Factor (d/h)	11.8	10.8	8.8	9.8	9.9	8.8	10.2	10.3	9.5	10.2	9.6

2023 SRW QUALITY DATA – BY AREA

	Alabama	Arkansas	Illinois		Indiana		Kentucky	Missouri		Ohio		Tennessee	Maryland		North Carolina		Virginia	
			E	W	S	N		E	W	S	N	NE	E	W	SE	NE	W	E
Wheat Grade Data - from Area Composite Samples																		
Test Weight (lb/bu)	59.6	58.8	61.4	60.8	62.0	60.1	60.2	61.0	60.4	59.5	60.0	59.7	60.0	59.8	58.0	59.6	61.0	61.0
(kg/hl)	78.4	77.4	80.7	80.0	81.5	79.1	79.2	80.2	79.5	78.3	78.9	78.6	78.9	78.7	76.4	78.4	80.2	80.2
Damaged Kernels (%)	0.0	0.0	0.0	0.0	0.7	0.0	0.0	1.3	0.7	0.5	0.0	0.7	0.0	0.0	0.7	0.0	0.7	0.7
Foreign Material (%)	0.3	0.3	0.0	0.3	0.3	0.0	0.3	0.3	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.0	0.0
Shrunken & Broken (%)	0.3	0.6	0.5	0.6	0.8	0.8	0.7	1.1	0.0	0.5	0.7	0.6	0.6	0.4	0.4	0.5	0.4	0.3
Total Defects (%)	0.6	0.9	0.5	0.9	1.8	0.8	1.0	2.7	0.7	0.5	0.7	1.6	0.6	0.4	1.4	0.5	1.1	1.0
Grade	2	2	1	1	1	1	1	1	1	2	1	2	1	2	2	2	1	1
Wheat Non-Grade Data - from Individual Samples																		
Moisture (%)	13.0	12.6	12.7	12.8	12.9	14.6	12.9	12.7	12.5	14.8	14.3	13.5	14.9	13.6	13.1	13.2	14.0	14.4
Protein (12% mb)	9.5	10.2	9.5	9.2	9.4	8.4	9.6	9.7	10.4	8.5	8.5	9.3	8.9	9.4	10.3	9.1	9.1	8.8
Ash (%) 0% mb	1.52	1.44	1.49	1.42	1.52	1.41	1.41	1.45	1.45	1.36	1.25	1.36	1.37	1.26	1.41	1.31	1.38	1.38
1000 Kernel Weight (g)	36.6	31.7	37.7	36.1	37.1	36.0	36.3	35.2	34.0	37.1	34.7	36.4	38.2	36.5	33.3	37.4	39.0	37.0
Falling Number (sec)	322	314	348	344	348	295	330	335	339	297	293	330	311	274	257	313	321	296
DON (ppm)	0.2	0.3	0.1	0.3	0.3	0.0	0.4	0.3	0.1	0.2	0.2	0.7	0.2	0.1	0.3	0.5	0.2	0.5
Wheat Non-Grade Data - from Area Composite Samples																		
Dockage (%)	0.6	0.4	0.3	0.4	0.6	0.4	0.5	0.6	0.3	0.4	0.5	0.7	0.2	0.2	0.4	0.2	0.8	0.5
Moisture (%)	12.6	12.5	12.5	12.6	13.1	14.2	12.9	12.9	12.9	14.6	14.3	13.7	15.3	13.4	13.0	13.3	14.0	14.5
Protein (%) 12% mb	9.3	10.1	9.1	8.9	9.3	8.4	9.6	9.5	10.6	8.4	7.9	9.2	8.5	9.2	9.9	9.5	9.5	9.3
Kernel Size: Large (%)	88	84	90	93	92	88	92	89	86	91	88	88	94	94	85	89	92	92
Medium (%)	12	16	9	7	8	12	7	11	13	8	12	11	5	5	14	10	7	8
Small (%)	0	1	1	0	0	0	1	0	0	1	0	1	0	1	1	1	1	0
Single Kernel: Hardness	19.6	20.9	21.0	26.4	16.5	26.5	25.6	26.6	22.5	38.7	27.4	14.3	36.6	25.4	21.7	19.5	22.1	26.0
Weight (mg)	38.3	32.7	40.7	35.5	37.8	34.8	35.7	36.9	34.0	34.6	35.6	40.2	36.9	36.6	34.3	37.9	39.6	39.2
Diameter (mm)	2.65	2.62	2.85	2.65	2.70	2.63	2.68	2.70	2.66	2.66	2.63	2.76	2.70	2.70	2.59	2.73	2.77	2.75
Sedimentation (cc)	10.0	14.0	17.0	11.0	15.0	10.0	18.0	11.0	15.0	9.0	8.0	10.0	13.0	18.0	11.0	12.0	10.0	14.0
DON (ppm)	0.9	0.4	0.2	0.2	0.2	0.0	0.6	0.1	0.2	0.1	0.3	1.0	0.1	0.1	0.2	0.4	0.6	0.2
Flour Data																		
Lab Mill Extraction (%)	66.1	66.4	66.7	70.8	67.0	68.4	69.3	70.0	69.7	68.5	69.3	65.9	66.8	67.0	66.8	65.3	66.8	67.2
Color: L*	90.9	90.6	91.2	91.1	90.9	91.2	91.1	91.0	90.8	90.4	90.9	90.7	91.4	90.8	90.8	91.3	90.7	91.1
a*	-1.9	-1.9	-2.2	-2.1	-2.2	-2.3	-2.2	-2.1	-2.1	-2.0	-2.3	-2.0	-2.2	-2.1	-2.1	-2.1	-1.9	-2.1
b*	7.8	7.7	8.8	8.7	9.1	9.2	8.8	8.7	8.7	8.6	9.4	8.1	8.0	7.7	8.4	8.0	7.6	8.1
Protein (%) 14% mb	7.3	7.5	7.1	7.2	7.2	6.7	7.5	7.7	8.5	7.3	6.9	6.9	6.7	7.4	7.9	7.1	7.1	7.2
Ash (%) 14% mb	0.44	0.43	0.37	0.44	0.38	0.43	0.43	0.44	0.44	0.47	0.45	0.37	0.39	0.33	0.38	0.35	0.40	0.46
Wet Gluten (%)	19.8	22.0	19.1	19.7	20.5	18.2	22.6	22.2	24.4	15.7	18.1	19.0	16.5	19.0	24.0	19.2	20.2	22.0
Gluten Index	74	88	96	96	86	89	93	87	87	99	81	99	95	95	78	96	89	88
Falling Number (sec)	330	301	343	342	316	322	328	339	351	318	306	299	310	255	250	301	314	306
Amylograph Viscosity: 65g (BU)	723	542	1031	682	718	651	789	722	780	509	508	688	607	266	215	496	587	334
Damaged Starch (%)	2.5	3.4	3.8	3.0	3.4	3.0	3.4	3.4	2.5	3.8	3.8	3.4	3.0	4.2	3.8	3.0	2.5	4.2
SRC: GPI	0.64	0.64	0.62	0.67	0.62	0.64	0.67	0.63	0.66	0.57	0.63	0.66	0.68	0.71	0.63	0.62	0.61	0.58
Water	54	52	50	51	52	52	50	51	50	56	52	49	49	49	50	48	54	51
50% Sucrose	94	103	83	79	81	83	85	85	84	94	95	80	82	84	86	81	94	85
5% Lactic Acid	105	115	94	98	92	95	100	96	99	98	106	94	100	106	98	90	103	90
5% Na_2CO_3	71	77	69	67	67	67	63	68	67	77	73	64	65	64	70	65	75	70
Dough Properties																		
Farinograph: Peak Time (min)	0.9	0.9	1.2	1.3	1.1	1.3	1.1	1.3	1.6	1.2	1.1	1.0	1.2	1.0	1.4	1.1	1.0	1.2
Stability (min)	1.0	1.7	1.7	2.2	1.6	1.4	1.7	2.2	2.6	1.5	1.3	1.3	1.3	1.2	2.2	1.7	1.0	1.3
Absorption (%)	51.7	50.8	52.5	52.4	53.3	52.5	52.8	53.3	53.2	54.0	52.0	51.4	53.8	53.6	52.5	51.1	51.6	52.4
Alveograph: P (mm)	38	41	48	48	45	53	44	46	43	50	43	45	54	55	42	37	42	39
L (mm)	71	58	64	59	68	50	69	71	54	55	62	61	61	64	82	79	69	70
W (10^{-4} J)	74	76	98	90	90	93	90	93	76	88	80	87	110	115	90	79	84	74
P/L Ratio	0.54	0.71	0.75	0.81	0.66	1.06	0.64	0.65	0.80	0.91	0.69	0.74	0.89	0.86	0.51	0.47	0.61	0.56
Extensograph: Resistance (BU)	192	288	234	228	188	248	252	196	194	168	204	208	174	310	209	189	174	202
(45 min) Extensibility (cm)	15.3	14.6	14.3	14.0	15.0	13.9	14.7	15.5	16.6	14.2	14.6	15.5	15.5	12.3	17.0	15.7	14.7	13.8
Area (cm^2)	49	73	56	53	49	57	63	54	58	40	51	57	47	60	64	51	43	47
Baking Evaluation																		
Bake Grain and Texture (1-10)	4.0	5.0	4.5	6.0	5.0	5.0	5.0	5.0	5.0	5.0	6.0	4.5	5.0	4.0	4.5	4.5	4.0	4.0
Bake Absorption (%)	53.5	54.0	55.0	55.0	56.0	55.5	56.0	56.0	56.0	56.0	54.0	53.0	56.0	54.0	53.5	53.0	5.0	53.5
Loaf Volume (cc)	580	636	602	607	582	563	611	577	625	602	664	535	601	544	636	558	496	601
Cookie Diameter (cm)	9.1	9.2	9.0	8.9	8.9	9.1	8.9	9.0	8.8	8.8	9.2	9.0	8.9	8.8	9.1	9.0	9.1	9.0
Spread Factor (d/h)	11.8	10.8	10.3	8.0	9.9	9.8	9.9	8.1	9.8	10.3	10.2	10.3	9.3	9.8	9.8	10.6	10.7	9.2

N-North, S-South, E-East, W-West, NE-Northeast; Lg-Large, Med-Medium, Sm-Small; mb-moisture basis; NA-Not Available

ANALYSIS METHODS

SOFT RED WINTER LABORATORY TESTING

All quality data contained in this report is the result of testing and analysis conducted by Great Plains Analytical Lab in Kansas City, Missouri.

TEST:	METHODOLOGY:
WHEAT GRADE FACTORS	
Grade	Official U.S. Standards for Grain.
Test Weight	AACCI 55-10.01.
Damaged Kernels	Official U.S. Standards for Grain.
Foreign Material	Official U.S. Standards for Grain.
Shrunken and Broken	Official U.S. Standards for Grain.
Total Defects	Official U.S. Standards for Grain.
WHEAT NON-GRADE FACTORS	
Dockage	Official USDA procedures.
Moisture	AACCI 44-15.02. • Wheat: DICKEY-john GAC® 2500-UGMA Grain Analysis Computer. • Flour: air oven method.
Protein (12% mb)	AACCI 46-30.01 (Dumas combustion nitrogen analysis or CNA method).
Ash (14% mb)	AACCI 08-01.01 expressed on a 14% mb.
1000 Kernel Weight	Based on a 10 g clean wheat sample counted by an electronic counter, results converted to express weight by 1000 kernels
Kernel Size	Wheat is sifted with a RoTap sifter using Tyler No. 7 (2.82 mm) and No. 9 (2.00 mm) screens.
Single Kernel Characterization System (SKCS)	AACCI 54-31.01 using Perten SKCS 4100.
Sedimentation	AACCI 56-61.02, Zeleny.
Falling Number	AACCI 56-81.04; 2019 FGIS barometric pressure correction procedure; average value is a simple mean of sample results.
DON	Neogen ELISA.

SCAN THIS QR CODE for more information.

ANALYSIS METHODS

SOFT RED WINTER LABORATORY TESTING

TEST:	METHODOLOGY:
FLOUR FACTORS	
Laboratory Milling Extraction	AACCI 26-10.02, AACCI 26-21.02. Samples are milled on a Buhler Laboratory mill (MLU 202) using a 183-micron (µ) sieve.
Color	CIE 1976 L*a*b* color system. Minolta Chroma Meter with Granular-Materials attachment CR- A50 and CR-410 colorimeter.
Protein (14% mb)	AACCI 46-30.01 (Dumas CNA method).
Ash (14% mb)	AACCI 08-01.01 expressed on a 14% mb.
Wet Gluten	AACCI 38-12.02 expressed as-is.
Gluten Index	AACCI 38-12.02.
Falling Number	AACCI 56-81.04; 2019 FGIS barometric pressure correction procedure; average value is a simple mean of sample results.
Amylograph Viscosity	AACCI 22-10.01 modified to use 65 g flour (14% mb) and 450 ml distilled water with pins.
Damaged Starch	AACCI 76-30.02 (Enzymatic hydrolysis).
Solvent Retention Capacity	AACCI 56-11.02.
DOUGH PROPERTY FACTORS	
Farinograph	AACCI 54-21.02 (constant flour weight method) with 50 g bowl.
Alveograph	AACCI 54-30.02, Chopin-Alveolab.
Extensograph	AACCI 54-10.01; 45 min rest.
EVALUATION OF END-PRODUCTS	
Bread	AACCI 10-10.03 (“pup loaf” method); producing two loaves per batch using dry yeast and ascorbic acid. After mixing, the dough is divided into two equal portions, fermented for 160 min, molded and panned in pup loaf pans before proofing and baking. Loaf volume is measured immediately after baking by rapeseed displacement.
Sugar-Snap Cookies (Biscuits)	AACCI 10-50.05, macro-method.

U.S. WHEAT ASSOCIATES

Dependable People. Reliable Wheat.

ABOUT U.S. WHEAT ASSOCIATES: U.S. Wheat Associates (USW) is the industry's market development organization working in more than 100 countries. Its mission is to "develop, maintain, and expand international markets to enhance the profitability of U.S. wheat producers and their customers." USW activities are funded by producer checkoff dollarsmanaged by 17 state wheat commissions and through cost-share USDA Foreign Agricultural Service market development programs. For more information, visit www.uswheat.org or contact your state wheat commission.

NONDISCRIMINATION AND ALTERNATE MEANS OF COMMUNICATIONS: In all its programs, activities and employment, U.S. Wheat Associates (USW) prohibits discrimination on the basis of race, color, religion, national origin, gender, marital or family status, age, disability, political beliefs or sexual orientation (not all bases apply to all programs). Persons who require alternative means of communication of program information (Braille, large print, audiotape, language translation, etc.) should contact USW at 202-463-0999 (TDD/TTY – 800-877-8339, or from outside the U.S., 605-331-4923). To file a complaint of discrimination, write to Vice President of Finance, USW, 3103 10th Street, North, Arlington, VA 22201, or call 202-463-0999. USW is an equal opportunity provider and employer. USDA information can be found here: https://www.usda.gov/non-discrimination-statement. To file a program discrimination complaint at USDA, a complainant should complete a Form AD-3027, USDA Program Discrimination Complaint Form, which can be obtained online, at www.usda.gov/sites/default/files/documents/usda-program-discrimination-complaint-form.pdf

www.uswheat.org

© 2023 U.S. Wheat Associates. All rights reserved. The U.S. Wheat Associates logo is a registered mark of U.S. Wheat Associates.