U.S. WHEAT ASSOCIATES

Dependable People. Reliable Wheat.

SOFT RED WINTER WHEAT

2024 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 9.5 million metric tons (MMT), or about 350 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

2024 PRODUCTION

FOR THE MAJOR PRODUCING STATES (MILLION METRIC TONS)

	2024	2023	2022	2021	2020
Alabama	0.2	0.3	0.2	0.2	0.1
Arkansas	0.1	0.3	0.2	0.2	0.1
Georgia	0.1	0.1	0.2	0.2	0.1
Illinois	1.6	1.8	1.2	1.3	1.0
Indiana	0.6	0.8	0.5	0.6	0.5
Kentucky	0.9	1.1	0.8	0.8	0.6
Maryland	0.3	0.5	0.4	0.3	0.3
Michigan	0.6	0.8	0.6	0.8	0.6
Missouri	1.0	1.1	0.7	0.9	0.6
North Carolina	0.2	0.2	0.2	0.2	0.2
New York	0.5	0.8	0.7	0.5	0.6
Ohio	1.1	1.4	1.0	1.2	0.9
Pennsylvania	0.3	0.5	0.4	0.4	0.3
Tennessee	0.6	0.8	0.7	0.6	0.4
Virginia	0.2	0.3	0.3	0.2	0.2
Wisconsin	0.4	0.5	0.5	0.5	0.2
Surveyed-States Total*	**8.6**	**11.4**	**8.5**	**9.1**	**6.7**
East Coast-Exportable	0.7	1.0	0.8	0.8	0.7
Gulf-Exportable	6.1	7.8	5.3	5.9	4.2
Sixteen-State Total	**8.6**	**11.4**	**8.5**	**9.1**	**6.7**
Total SRW Production	**9.3**	**12.2**	**9.1**	**9.8**	**7.2**
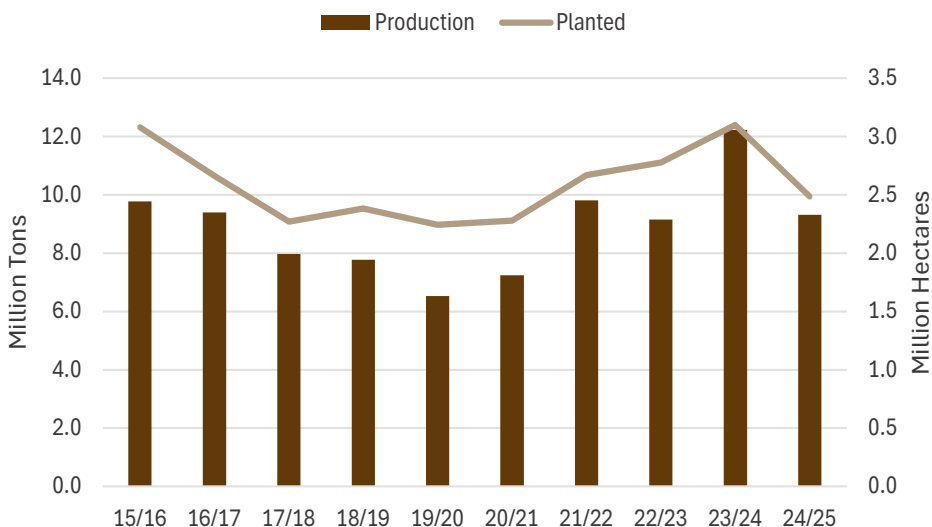
Based on August 2024 estimates from USDA's National Agricultual Statistics Service.

*Eleven states denoted by italics were surveyed accounting for 72% of 2024 SRW production.

Production / Planted chart

Legend: ■ Production — Planted

	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25

Left axis: Million Tons (0.0–14.0)
Right axis: Million Hectares (0.0–3.5)

SOFT RED WINTER
CROP SURVEY METHODS

SAMPLE COLLECTION AND ANALYSIS

Great Plains Analytical Laboratory, Kansas City, Missouri, collected, tested and analyzed 233 samples from elevators in 18 reporting areas across 11 states: 55 samples were from the East Coast states and 178 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 2024 U.S. SRW production. Of that, Gulf states account for 65% of production in the states surveyed and East Coast states represent the remaining 7%.

● GULF EXPORTABLE   ● EAST COAST EXPORTABLE

Great Plains Analytical Laboratory

11
STATES SURVEYED

72%
OF TOTAL SRW PRODUCTION REPRESENTED
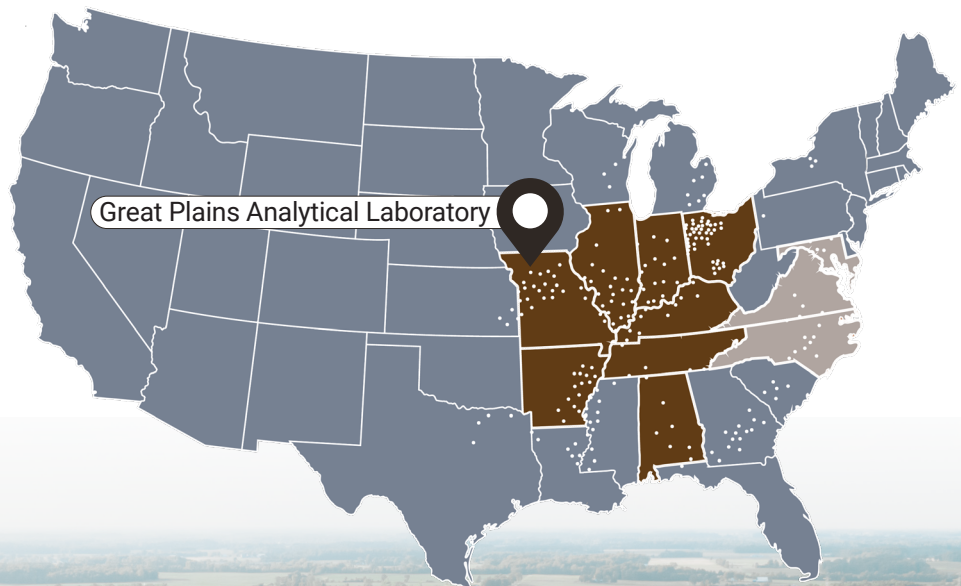
SOFT RED WINTER

2024 CROP HIGHLIGHTS

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### OVERVIEW

The U.S. soft red wheat (SRW) production region experienced excellent winter moisture followed by mid-season drought and heat, which reduced test weight and yield potential. Despite the environmental challenges, the crop exhibits good milling characteristics and is relatively free of higher DON. Processors will find a versatile crop with good qualities for cookies 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), 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 2024 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 6.14 million acres (2.48 million hectares) were seeded in the fall of 2023, down 17% seeded for the 2023 harvest and down 4% over the 5-year average. The largest SRW acreage decreases were in Alabama with a 41% decrease followed by Arkansas with a 39% decrease and Michigan with a 30% decrease. The reduction in acreage was attributed to lower wheat prices, in contrast to the higher prices for competing crops such as corn, sorghum, and soy. Additionally, delayed corn and soybean harvests in the SRW states affected fall wheat planting, leading to fewer planted acres. Planting started mid-September 2024 and kept a normal pace throughout: 68% of the SRW crop

SRW Harvest Progress
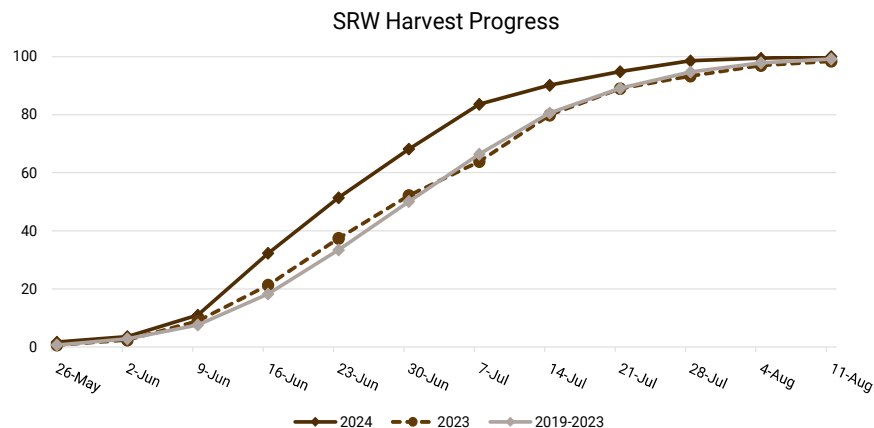
planted by late October and 98% by late November.

GROWING SEASON

By late November in the eleven SRW survey states, USDA estimated 84% of the crop had emerged and was rated 7% excellent, 63% good and 24% fair. As the crop went into dormancy, portions of all surveyed states saw abnormally dry to severe drought with isolated areas of Alabama and Tennessee in extreme to exceptional drought. Overall, the autumn of 2023 was warmer and drier than usual.

The U.S. experienced its warmest winter on record driven by a strong El Niño. Of the SRW surveyed states, Maryland and Virginia saw top-ten rankings for winter wetness, and Maryland, Virginia, Kentucky, Missouri, Illinois, Indiana, Ohio and Tennessee had their warmest winters. Overall, the SRW growing area received plentiful moisture through the winter.

As the SRW emerged from dormancy, conditions were better with more soil moisture and moderate temperatures. Moderate temperatures continued throughout the spring, pushing crop development. By early May, SRW conditions in the major growing

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

HARVEST

The 2024 SRW harvest started in mid-May in Alabama. Heavy showers and severe storms hit the central and eastern U.S. from late May to early June, followed by dry weather. July saw warmer and drier conditions than usual in the eastern U.S. Overall, above-normal temperatures throughout spring helped speed up the harvest, which progressed significantly faster than last year and the 5-year average.

PRODUCTION

SRW production is down from last year's bumper crop. For the 2024/25 marketing year is estimated at 342 million bushels (9.3 million metric tons (MMT)), down from 449 million bushels (12.2 MMT) in 2023 but above the 5-year average of 330 million bushels (9.0 MMT). The USDA forecasts that SRW exports are expected to be 110 million bushels (3.0 MMT).
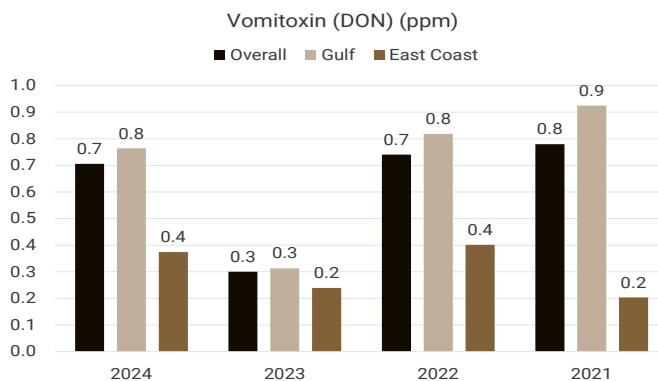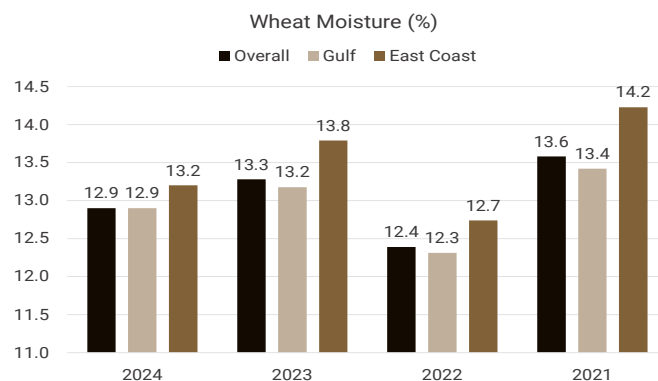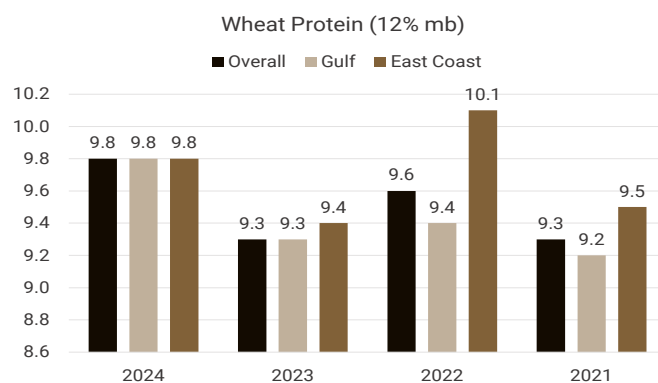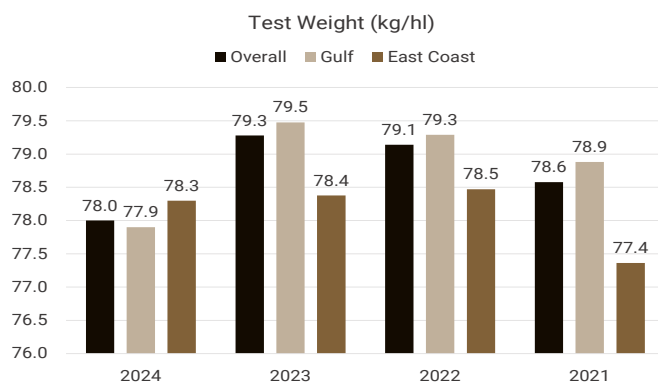
SOFT RED WINTER
2024 CROP HIGHLIGHTS

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GRADE DATA:

- The overall **GRADE** sample average for the 2024 SRW harvest survey is U.S. No. 2 SRW.

- **TEST WEIGHT** averages trended lower this year with the Overall and Gulf averages at 59.2 lb/bu (78.0 kg/hl) and the East Coast average at 59.5 lb/bu (78.3 kg/hl). The lower test weights likely reflect mid-season heat and dryness.

- **TOTAL DEFECTS** averages are higher this year with more damaged kernels seen in both Overall and Gulf averages although shrunken, broken, and foreign materials remained similar. On the East Coast, all categories—damaged kernels, shrunken and broken, and foreign materials—were higher than last year's numbers but in line with the 5-year average.

WHEAT NON-GRADE DATA:

- **WHEAT PROTEIN** (12% mb) of 9.8% for Overall, East Coast and Gulf, showing a consistently high protein content this year compared to last year's crop and the 5-year average. The higher protein content reflects expanding drought during the growing season.

- **WHEAT MOISTURE** in this year's crop is lower than 2023 and the 5-year averages, due hotter and drier conditions: Overall 12.9%, East Coast 13.8%, Gulf 13.2%.

- **WHEAT FALLING NUMBER** Overall average of 316 seconds is lower than in 2023 but higher than the 5-year average; the East Coast average is notably higher than last year and 5-year average due to better harvest conditions. The Gulf average is lower than last year but in line with the 5-year average, reflecting isolated adverse weather during harvest. In 2024, about 22% of samples had a falling number below 300 seconds, with only 5 out of 233 samples below 250 seconds. Overall, this year's falling number values indicate the crop is sound.

- **SINGLE KERNEL** values reflect that this year's crop is lighter and has slightly smaller diameters than last year, but similar to the 5-year average. Compared to last year, the East Coast kernels are softer, and Gulf kernels are similar.

Test Weight (kg/hl)
■ Overall   ■ Gulf   ■ East Coast

	2024	2023	2022	2021
Overall	78.0	79.3	79.1	78.6
Gulf	77.9	79.5	79.3	78.9
East Coast	78.3	78.4	78.5	77.4

Wheat Protein (12% mb)
■ Overall   ■ Gulf   ■ East Coast

	2024	2023	2022	2021
Overall	9.8	9.3	9.6	9.3
Gulf	9.8	9.3	9.4	9.2
East Coast	9.8	9.4	10.1	9.5

Wheat Moisture (%)
■ Overall   ■ Gulf   ■ East Coast

	2024	2023	2022	2021
Overall	12.9	13.3	12.4	13.6
Gulf	12.9	13.2	12.3	13.4
East Coast	13.2	13.8	12.7	14.2

Vomitoxin (DON) (ppm)
■ Overall   ■ Gulf   ■ East Coast

	2024	2023	2022	2021
Overall	0.7	0.3	0.7	0.8
Gulf	0.8	0.3	0.8	0.9
East Coast	0.4	0.2	0.4	0.2

SOFT RED WINTER

2024 CROP HIGHLIGHTS

- **VOMITOXIN (DON)** averages are higher than last year, but still below the USDA threshold of 2.0 ppm. Of the samples tested for DON, 66% of those from the Gulf and 59% from the East Coast had levels below 1.0 ppm.

FLOUR DATA:

- Laboratory Mill **FLOUR EXTRACTION** for Overall (70.1%), East Coast (68.8%) and Gulf (70.4%) are all higher than last year 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 2024 averages for Overall (560 BU) and Gulf (552 BU) are lower than 2023 and 5-year averages. The East Coast value of 605 BU is significantly higher than average and reinforces the higher falling numbers and lower amylase activity compared to last year.
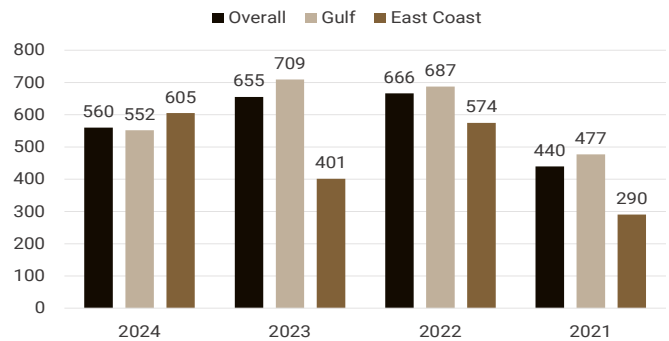
DOUGH PROPERTIES:

- **DOUGH PROPERTIES** suggest this crop is in a similar range of values compared to last year and the 5-year average and typical for SRW.

- **ALVEOGRAPH** data indicate that this year's crop has weaker gluten and is more extensible. Composite and Gulf have lower P, higher L, lower P/L and similar W values compared to last year, while the East Coast has lower P, significantly higher L, lower P/L and higher W values compared to last year. These data indicate the crop is good for crackers and blending.

END PRODUCTS:

- **COOKIE SPREAD FACTOR** values indicate the crop has acceptable spreadability (diameter to height ratio). The Gulf values are lower compared to last year and 5-year average but should be resolvable with minor formulation adjustments. The East Coast values are the same as last year and similar to the 5-year average.

- **LOAF VOLUME** averages are higher than last year and similar to 5-year averages, reflecting the higher protein and greater extensibility of this year's crop, and also indicates suitability for blending: Overall (634 cc), East Coast (672 cc) and Gulf (627 cc).

Amylograph Viscosity (65 g BU)

Legend: ■ Overall ■ Gulf ■ East Coast

Year	Overall	Gulf	East Coast
2024	560	552	605
2023	655	709	401
2022	666	687	574
2021	440	477	290

Wet Gluten (%)

Legend: ■ Overall ■ Gulf ■ East Coast

Year	Overall	Gulf	East Coast
2024	22.4	22.3	23.2
2023	20.5	20.5	20.5
2022	20.7	20.3	22.8
2021	19.9	20.1	19.4

Cookie Spread Factor (d/h)

Legend: ■ Overall ■ Gulf ■ East Coast

Year	Overall	Gulf	East Coast
2024	9.4	9.2	10.0
2023	9.7	9.6	9.9
2022	10.7	10.7	10.6
2021	10.6	10.5	10.8

Loaf Volume (cc)

Legend: ■ Overall ■ Gulf ■ East Coast

Year	Overall	Gulf	East Coast
2024	634	627	672
2023	602	606	587
2022	624	627	610
2021	602	602	603

SOFT RED WINTER

2024 CROP HIGHLIGHTS

SOLVENT RETENTION CAPACITY:

- **SRC** values for this crop indicate excellent quality for all typical applications.

- **WATER** values are same as last year and similar to the 5-year average and are suitably low for cookie and cracker applications: Overall (51%), East Coast (51%) and Gulf (51%).

- **SUCROSE** values, all similar to last year and 5-year averages, indicate cookies and crackers will benefit from reduced bake time and should not experience any excess water-holding issues: Overall (86%), East Coast (92%) and Gulf (85%).

- **LACTIC ACID** values for Composite and Gulf are the same or similar to last year and the 5-year average. The East Coast values are significantly higher than last year and slightly higher than the 5-year average. The Lactic Acid values are in good ranges for crackers.

- **SODIUM CARBONATE** values of 69% are similar to last year's results and indicate the starch damage is appropriately low for SRW.

- **GPI** values of 0.64 indicate this year's crop is good for blending.

SRC 100% Water (%)
■ Overall ■ Gulf ■ East Coast

Year	Overall	Gulf	East Coast
2024	51	51	51
2023	51	51	50
2022	51	52	50
2021	54	54	54

SRC 50% Sucrose (%)
■ Overall ■ Gulf ■ East Coast

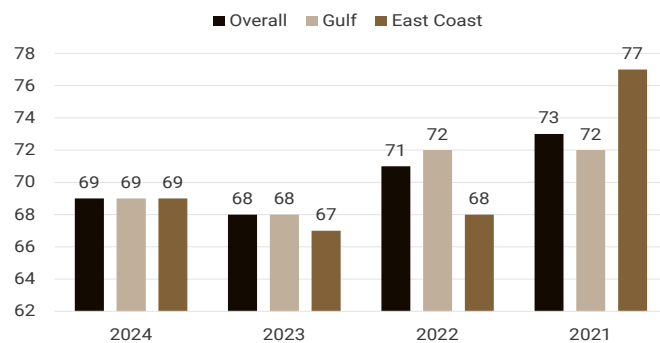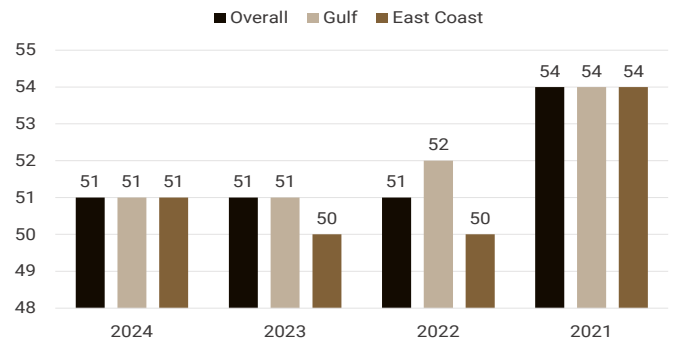| Year	Overall	Gulf	East Coast
2024	86	85	92
2023	85	86	84
2022	90	91	86
2021	95	93	100

SRC 5% Lactic Acid (%)
■ Overall ■ Gulf ■ East Coast

Year	Overall	Gulf	East Coast
2024	100	99	111
2023	99	99	96
2022	102	102	104
2021	106	104	112

SRC 5% Sodium Carbonate (%)
■ Overall ■ Gulf ■ East Coast

Year	Overall	Gulf	East Coast
2024	69	69	69
2023	68	68	67
2022	71	72	68
2021	73	72	77

SRC Gluten Performance Index (%)
■ Overall ■ Gulf ■ East Coast

Year	Overall	Gulf	East Coast
2024	0.65	0.64	0.68
2023	0.64	0.64	0.64
2022	0.64	0.63	0.67
2021	0.63	0.63	0.64

2024 SRW QUALITY DATA – BY EXPORT REGION

	Overall Average			East Coast Average*			Gulf Average*		
	2024	**2023**	**5-Year**	**2024**	**2023**	**5-Year**	**2024**	**2023**	**5-Year**
Wheat Grade Data									
Test Weight (lb/bu)	59.2	60.3	59.6	59.5	59.6	58.8	59.2	60.4	59.8
(kg/hl)	78.0	79.3	78.4	78.3	78.4	77.4	77.9	79.5	78.7
Damaged Kernels (%)	0.5	0.3	0.3	0.5	0.3	0.7	0.5	0.3	0.2
Foreign Material (%)	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.2	0.1
Shrunken & Broken (%)	0.6	0.6	0.6	0.6	0.4	0.7	0.6	0.6	0.6
Total Defects (%)	1.3	1.0	1.0	1.3	0.8	1.4	1.3	1.1	0.9
Grade	2	1	2	2	2	2	2	1	2
Wheat Non-Grade Data									
Dockage (%)	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.5	0.4
Moisture (%)	12.9	13.3	13.3	13.2	13.8	13.6	12.9	13.2	13.2
Protein (%) 12%/0% mb	9.8/11.1	9.3/10.6	9.4/10.7	9.8/11.1	9.4/10.7	9.6/10.9	9.8/11.1	9.3/10.6	9.3/10.6
Ash (%) 14%/0% mb	1.41/1.64	1.40/1.63	1.60/1.87	1.39/1.62	1.36/1.58	1.56/1.81	1.41/1.64	1.64/1.91	1.62/1.88
1000 Kernel Weight (g)	32.7	35.9	33.8	32.7	36.4	35.0	32.7	35.8	33.5
Kernel Size (%) lg/med/sm	86/13/01	89/10/01	87/12/01	85/14/01	90/09/01	88/12/01	86/13/01	89/10/01	87/12/01
Single Kernel: Hardness	25.1	24.5	23.1	22.3	24.6	23.7	25.6	24.5	23.0
Weight (mg)	33.4	36.4	34.3	33.3	37.0	35.3	33.4	36.3	34.1
Diameter (mm)	2.63	2.68	2.65	2.59	2.69	2.66	2.64	2.68	2.65
Sedimentation (cc)	13.5	12.6	11.1	12.9	12.7	11.8	13.6	12.6	10.9
Falling Number (sec)	316	320	310	317	293	290	316	326	315
DON (ppm)	0.7	0.3	0.7	0.4	0.2	0.3	0.8	0.3	0.8
Flour Data									
Lab Mill Extraction (%)	70.1	68.4	67.0	68.8	66.5	66.6	70.4	68.8	67.1
Color: L*	90.8	91.0	91.1	90.9	91.1	91.0	90.8	91.0	91.2
a*	-2.1	-2.2	-2.3	-2.1	-2.1	-2.3	-2.1	-2.2	-2.3
b*	9.2	8.7	9.0	9.0	8.1	8.8	9.2	8.8	9.1
Protein (%) 14%/0% mb	8.0/9.3	7.3/8.5	7.5/8.7	8.1/9.4	7.3/8.5	7.6/8.9	8.0/9.3	7.3/8.5	7.4/8.6
Ash (%) 14%/0% mb	0.43/0.50	0.42/0.49	0.42/0.49	0.42/0.49	0.38/0.44	0.42/0.49	0.43/0.50	0.43/0.50	0.42/0.48
Wet Gluten (%)	22.4	20.5	20.4	23.2	20.5	21.3	22.3	20.5	20.2
Falling Number (sec)	313	320	339	320	287	291	312	328	350
Amylograph Viscosity: 65g (BU)	560	655	566	605	401	410	552	709	605
Damaged Starch (%)	3.8	3.3	3.0	3.5	3.4	3.1	3.8	3.3	3.0
SRC: Water/50% Sucrose (%)	51/86	51/85	53/89	51/92	50/84	53/90	51/85	51/86	53/88
5% Lactic Acid/5% Na_2CO_3 (%)	100/69	99/68	104/71	111/69	96/67	105/72	99/69	99/68	103/71
Gluten Performance Index (GPI) (%)	0.65	0.64	0.65	0.68	0.64	0.65	0.64	0.64	0.65
Dough Properties									
Farinograph: Peak Time (min)	1.2	1.2	1.2	1.0	1.2	1.3	1.2	1.2	1.1
Stability (min)	1.9	1.7	1.6	1.4	1.6	1.8	2.0	1.7	1.6
Absorption (%)	52.7	52.5	52.1	52.0	52.4	52.5	52.8	52.5	52.0
Alveograph: P (mm)	41	51	41	40	50	43	41	52	41
L (mm)	90	57	71	97	56	72	89	57	70
P/L Ratio	0.45	0.90	0.59	0.41	0.89	0.60	0.46	0.90	0.58
W (10^{-4} J)	98	94	84	109	89	88	96	95	83
Extensograph (45 min): Resistance (BU)	206	219	187	245	204	181	199	222	189
Extensibility (cm)	14.5	14.8	15.7	15.2	15.3	16.4	14.4	14.7	15.5
Area (cm²)	51	55	51	64	53	52	49	56	50
Baking Evaluation									
Cookie Diameter (cm)	8.9	9.0	9.0	9.1	9.0	8.9	8.9	9.0	9.0
Spread Factor (d/h)	9.4	9.7	10.2	10.0	9.9	10.1	9.2	9.6	10.2
Pan Bread: Bake Absorption (%)	54.8	54.4	54.1	54.5	51.1	53.7	54.9	55.1	54.1
Loaf Volume (cc)	634	602	629	672	587	622	627	606	630
Specific Volume (mL/g)	4.59			4.87			4.54		
% Sampled Area Production	**100%**			**22%**			**78%**		

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

2024 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)	57.2	56.0	59.6	59.9	58.8	58.9	59.9	57.6	59.4	59.4	60.2
(kg/hl)	75.3	73.8	78.4	78.8	77.4	77.5	78.7	75.8	78.2	78.1	79.2
Damaged Kernels (%)	0.0	0.7	1.1	0.0	0.0	1.0	0.0	0.7	0.8	0.3	0.2
Foreign Material (%)	0.3	0.3	0.2	0.0	0.0	0.3	0.2	0.3	0.2	0.3	0.0
Shrunken & Broken (%)	0.3	0.7	0.8	0.5	0.4	0.7	0.5	0.4	0.7	0.6	0.6
Total Defects (%)	0.6	1.7	2.1	0.5	0.4	1.9	0.7	1.4	1.8	1.2	0.8
Grade	2	3	2	2	2	2	2	2	2	2	1
Wheat Non-Grade Data - from Individual Samples											
Moisture (%)	12.7	12.9	12.6	13.2	12.8	12.4	13.7	12.8	13.3	12.8	13.8
Protein (12% mb)	9.7/11.0	10.8/12.3	10.1/11.5	9.3/10.6	10.4/11.8	9.8/11.1	8.8/9.9	10.3/11.7	9.4/10.7	10.2/11.6	9.1/10.4
Ash (%) 0% mb	1.42/1.61	1.46/1.65	1.44/1.63	1.42/1.62	1.41/1.61	1.39/1.58	1.40/1.59	1.40/1.60	1.39/1.58	1.40/1.59	1.39/1.58
1000 Kernel Weight (g)	33.8	28.7	31.9	33.0	31.8	33.1	34.3	31.4	34.2	31.2	34.1
Falling Number (sec)	298	297	320	313	316	321	319	289	326	311	318
DON (ppm)	0.0	0.2	1.4	0.7	0.5	0.6	0.7	0.9	1.0	0.6	0.3
Wheat Non-Grade Data - from Area Composite Samples											
Dockage (%)	0.3	0.4	0.2	0.5	0.2	0.5	0.4	0.0	0.3	0.3	0.3
Moisture - %	12.8	13.0	12.6	13.1	12.4	12.2	14.1	12.9	13.5	12.8	13.8
Protein (%) 12% mb	9.9	10.8	10.2	9.5	10.8	9.9	8.3	10.4	9.6	10.4	9.1
Kernel Size (%) lg/med/sm	87/12/01	79/20/01	83/16/01	87/12/01	84/15/01	88/11/01	90/10/00	82/17/01	89/10/01	82/17/01	87/13/00
Single Kernel: Hardness	11.1	10.9	26.7	27.0	27.8	20.5	31.6	18.4	22.8	19.7	29.5
Weight (mg)	33.7	31.9	32.4	33.4	32.6	35.7	33.7	32.1	35.8	31.3	34.2
Diameter (mm)	2.59	2.60	2.61	2.64	2.63	2.72	2.63	2.61	2.67	2.53	2.61
Sedimentation (cc)	9.0	15.0	16.6	12.0	12.0	13.6	11.8	14.0	13.1	13.0	12.3
DON (ppm)	0.9	0.6	0.4	1.2	1.4	0.3	0.8	1.8	0.0	0.5	0.7
Flour Data											
Lab Mill Extraction (%)	67.5	70.3	70.6	70.4	70.7	70.9	69.9	69.5	70.1	67.4	70.6
Color: L*	90.2	90.9	90.7	91.1	90.5	90.8	91.2	90.6	91.2	90.7	90.8
a*	-1.9	-2.0	-2.0	-2.2	-2.0	-2.0	-2.2	-1.9	-2.0	-2.1	-2.2
b*	8.5	8.8	9.3	9.5	9.0	8.9	9.6	8.8	8.7	9.2	9.3
Protein (%) 14%/0% mb	7.5/8.7	8.7/10.2	8.4/9.8	7.4/8.7	8.4/9.7	8.1/9.5	7.2/8.3	8.2/9.6	7.8/9.1	8.5/9.9	7.6/8.9
Ash (%) 14%/0% mb	0.42/0.48	0.42/0.48	0.43/0.50	0.42/0.49	0.42/0.49	0.43/0.50	0.45/0.53	0.43/0.50	0.44/0.52	0.40/0.46	0.42/0.49
Wet Gluten (%)	20.5	23.5	23.3	23.3	23.8	21.1	20.1	23.6	23.1	24.0	20.8
Falling Number (sec)	301	318	309	309	316	318	314	298	337	308	326
Amylograph Viscosity: 65g (BU)	523	526	532	525	461	579	686	377	700	544	594
Damaged Starch (%)	2.1	3.8	4.2	4.2	3.4	3.5	3.9	4.2	4.2	3.2	3.3
SRC: GPI	0.69	0.73	0.67	0.62	0.65	0.62	0.60	0.74	0.63	0.73	0.64
Water	49	49	52	50	53	50	49	50	47	54	53
50% Sucrose	83	88	86	80	89	86	81	81	86	99	85
5% Lactic Acid	105	113	105	90	104	97	87	109	96	124	100
5% Na_2CO_3	69	67	72	64	71	69	66	66	67	70	71
Dough Properties											
Farinograph: Peak Time (min)	1.0	1.3	1.4	1.2	1.2	1.2	1.0	1.3	1.1	1.0	1.0
Stability (min)	1.4	1.7	2.4	1.9	2.3	2.4	1.1	1.8	1.8	1.3	0.9
Absorption (%)	51.4	51.8	52.3	52.5	54.1	52.8	53.6	51.5	51.8	51.8	53.2
Alveograph: P (mm)	39	33	39	34	50	42	41	35	37	39	50
L (mm)	92	159	92	97	72	99	70	115	109	94	79
W (10^{-4} J)	104	117	94	81	112	106	80	100	101	113	117
P/L Ratio	0.42	0.21	0.42	0.36	0.69	0.42	0.58	0.30	0.34	0.42	0.63
Extensograph: Resistance (BU)	230	183	223	156	228	205	146	247	227	268	212
(45 min) Extensibility (cm)	14.3	17.3	14.8	15.1	14.2	13.9	13.9	14.5	15.3	15.2	14.7
Area (cm²)	56	59	57	41	54	49	34	59	57	72	53
Baking Evaluation											
Cookie Diameter (cm)	9.0	9.1	8.9	8.9	8.7	8.9	8.8	9.0	9.1	9.1	9.0
Spread Factor (d/h)	9.7	10.2	9.2	9.4	8.7	9.7	9.1	9.2	10.3	10.1	9.1
Pan Bread: Bake Absorption (%)	54.0	55.0	54.4	54.5	56.0	55.3	54.8	54.5	54.0	54.5	55.6
Loaf Volume (cc)	628	669	632	608	640	629	605	674	656	700	614
Specific Volume (ml/g)	4.67	4.88	4.60	4.44	4.62	4.57	4.34	4.83	4.64	5.17	4.38

2024 SRW QUALITY DATA − BY AREA

	Alabama	Arkansas	Illinois E	Illinois W	Indiana S	Indiana N	Kentucky	Missouri E	Missouri W	Ohio S	Ohio N	Tennessee NE	Maryland E	Maryland W	North Carolina SE	North Carolina NE	Virginia W	Virginia E
Wheat Grade Data - from Area Composite Samples																		
Test Weight (lb/bu)	57.2	56.0	60.2	59.2	60.2	59.7	58.8	59.0	58.7	59.3	60.0	57.6	59.6	59.1	58.4	60.2	59.6	60.4
(kg/hl)	75.3	73.8	79.2	77.9	79.2	78.6	77.4	77.7	77.3	78.0	78.9	75.8	78.4	77.8	76.9	79.2	78.4	79.5
Damaged Kernels (%)	0.0	0.7	0.7	1.3	0.0	0.0	0.0	0.7	1.3	0.0	0.0	0.7	1.3	0.0	0.7	0.0	0.7	0.0
Foreign Material (%)	0.3	0.3	0.0	0.3	0.0	0.0	0.0	0.3	0.3	0.0	0.3	0.3	0.3	0.0	0.3	0.3	0.0	0.0
Shrunken & Broken (%)	0.3	0.7	0.6	0.9	0.4	0.6	0.4	0.7	0.6	0.3	0.5	0.4	0.8	0.6	0.7	0.5	0.8	0.5
Total Defects (%)	0.6	1.7	1.3	2.5	0.4	0.6	0.4	1.7	2.2	0.3	0.8	1.4	2.4	0.6	1.7	0.8	1.5	0.5
Grade	3	3	1	2	1	2	2	1	2	2	1	3	2	1	2	1	2	1
Wheat Non-Grade Data - from Individual Samples																		
Moisture (%)	12.7	12.9	12.5	12.7	12.8	13.4	12.8	12.2	12.6	13.0	13.9	12.8	13.2	13.6	12.6	13.0	14.2	13.6
Protein (12% mb)	9.7	10.8	10.0	10.2	10.4	8.8	10.4	9.7	10.0	9.1	8.7	10.3	9.1	10.0	10.9	9.6	9.4	9.0
Ash (%) 0% mb	1.42	1.46	1.41	1.45	1.35	1.46	1.41	1.41	1.36	1.34	1.41	1.40	1.37	1.41	1.52	1.29	1.33	1.41
1000 Kernel Weight (g)	33.8	28.7	33.4	31.1	29.7	34.7	31.8	33.6	32.6	34.0	34.3	31.4	34.1	34.3	29.7	32.5	33.2	34.5
Falling Number (sec)	298	297	317	321	297	321	316	319	325	314	320	289	325	328	301	319	326	315
DON (ppm)	0.0	0.2	1.6	1.4	0.5	0.8	0.5	0.8	0.3	1.3	0.6	0.9	1.0	1.0	0.8	0.4	0.6	0.2
Wheat Non-Grade Data - from Area Composite Samples																		
Dockage (%)	0.3	0.4	0.1	0.2	0.5	0.5	0.2	0.4	0.7	0.3	0.4	0.0	0.4	0.2	0.4	0.2	0.4	0.2
Moisture (%)	12.8	13.0	12.5	12.7	12.7	13.3	12.4	12.1	12.4	12.9	14.4	12.9	13.2	14.1	12.4	13.1	14.3	13.6
Protein (%) 12% mb	9.9	10.8	9.9	10.3	10.5	9.0	10.8	9.8	10.0	9.0	8.2	10.4	9.1	10.5	11.4	9.7	9.5	9.0
Kernel Size: Large (%)	87	78	84	82	84	89	85	89	86	88	90	82	88	90	79	85	86	87
Medium (%)	12	20	15	16	15	11	13	10	13	12	10	17	11	9	21	15	13	13
Small (%)	1	1	1	1	1	0	2	1	1	1	0	1	1	1	1	0	1	0
Single Kernel: Hardness	11.1	10.9	25.6	27.3	27.7	26.6	27.8	23.3	16.8	23.4	33.3	18.4	20.3	27.5	21.4	18.4	39.7	25.6
Weight (mg)	33.7	31.9	31.9	32.6	32.5	33.8	32.6	36.7	34.5	34.2	33.7	32.1	36.0	35.6	30.8	31.6	32.9	34.7
Diameter (mm)	2.59	2.60	2.61	2.61	2.62	2.65	2.63	2.72	2.71	2.69	2.62	2.61	2.69	2.64	2.53	2.53	2.62	2.60
Sedimentation (cc)	9.0	15.0	16.0	17.0	14.0	11.0	12.0	14.0	13.0	11.0	12.0	14.0	12.0	15.0	13.0	13.0	13.0	12.0
DON (ppm)	0.9	0.6	0.4	0.5	1.3	1.1	1.4	0.0	0.7	1.5	0.7	1.8	0.0	0.0	0.6	0.4	1.1	0.6
Flour Data																		
Lab Mill Extraction (%)	67.5	70.3	70.3	70.7	69.6	70.8	70.7	71.1	70.6	70.9	69.7	69.5	70.7	69.1	67.2	67.5	68.7	71.4
Color: L*	90.2	90.9	90.5	90.8	91.0	91.1	90.5	90.7	90.9	91.3	91.2	90.6	91.4	90.9	90.5	90.9	90.5	90.9
a*	-1.9	-2.0	-2.0	-2.1	-2.1	-2.2	-2.0	-1.9	-2.1	-2.2	-2.3	-1.9	-2.0	-1.9	-2.1	-2.2	-2.1	-2.2
b*	8.5	8.8	8.9	9.5	9.1	9.7	9.0	8.7	9.1	9.4	9.7	8.8	8.9	8.4	9.2	9.2	9.4	9.3
Protein (%) 14% mb	7.5	8.7	8.2	8.5	8.2	7.1	8.4	8.0	8.3	7.3	7.1	8.2	7.6	8.4	9.0	8.0	7.9	7.5
Ash (%) 14% mb	0.42	0.42	0.42	0.44	0.45	0.41	0.42	0.44	0.43	0.46	0.45	0.43	0.44	0.46	0.41	0.39	0.41	0.42
Wet Gluten (%)	20.5	23.5	22.9	23.5	26.0	22.0	23.8	20.1	22.4	22.3	19.7	23.6	21.1	26.9	25.3	23.0	21.5	20.5
Falling Number (sec)	301	318	310	309	307	310	316	321	315	302	316	298	342	327	294	319	322	328
Amylograph Viscosity: 65g (BU)	523	526	457	574	354	611	461	588	567	648	694	377	715	673	452	621	588	597
Damaged Starch (%)	2.1	3.8	3.0	4.9	4.9	3.8	3.4	3.4	3.8	4.6	3.8	4.2	3.8	4.9	3.0	3.4	2.1	3.8
SRC: GPI	0.69	0.73	0.62	0.69	0.66	0.60	0.65	0.64	0.60	0.59	0.60	0.74	0.62	0.65	0.71	0.75	0.66	0.63
Water	49	49	51	52	53	49	53	50	51	51	49	50	45	50	55	54	53	53
50% Sucrose	83	88	85	87	82	79	89	87	86	79	81	81	86	85	104	94	87	85
5% Lactic Acid	105	113	97	110	99	85	104	99	94	87	88	109	94	99	126	122	105	98
5% Na$_2$CO$_3$	69	67	71	72	67	63	71	68	71	67	65	66	66	68	73	67	71	70
Dough Properties																		
Farinograph: Peak Time (min)	1.0	1.3	1.1	1.5	1.5	1.0	1.2	1.2	1.2	1.2	1.0	1.3	1.1	1.2	0.9	1.0	1.1	1.0
Stability (min)	1.4	1.7	1.6	2.8	2.6	1.6	2.3	2.5	2.2	1.3	1.0	1.8	2.0	1.5	1.6	1.0	1.3	0.8
Absorption (%)	51.4	51.8	52.7	52.0	52.6	52.4	54.1	52.9	52.6	51.9	53.9	51.5	51.0	53.3	51.9	51.8	53.8	52.9
Alveograph: P (mm)	39	33	37	40	37	33	50	46	37	32	43	35	36	39	42	37	54	48
L (mm)	92	159	95	90	114	88	72	99	100	111	62	115	106	114	110	81	70	83
W (10⁻⁴ J)	104	117	83	100	99	72	112	120	88	76	81	100	100	103	131	97	120	116
P/L Ratio	0.42	0.21	0.39	0.44	0.32	0.38	0.69	0.46	0.37	0.29	0.69	0.30	0.34	0.34	0.38	0.46	0.77	0.58
Extensograph: Resistance (BU)	230	183	200	236	172	148	228	213	195	156	144	247	261	164	284	254	186	222
(45 min) Extensibility (cm)	14.3	17.3	14.6	14.9	16.0	14.7	14.2	14.2	13.5	14.7	13.7	14.5	13.4	18.8	15.3	15.2	16.0	14.2
Area (cm²)	56	59	50	61	48	37	54	52	44	39	33	59	57	56	78	67	54	53
Baking Evaluation																		
Cookie Diameter (cm)	9.0	9.1	8.6	9.0	8.9	8.9	8.7	9.0	8.9	9.0	8.8	9.0	9.2	9.1	8.9	9.2	8.8	9.1
Spread Factor (d/h)	9.71	10.15	8.81	9.44	9.66	9.33	8.68	9.69	9.63	9.69	8.97	9.22	10.52	9.80	10.21	9.97	8.79	9.24
Pan Bread: Bake Absorption (%)	54.0	55.0	55.0	54.0	55.5	54.0	56.0	55.0	55.6	54.0	55.0	54.5	53.5	55.0	55.0	54.0	56.0	55.5
Loaf Volume (cc)	628	669	637	629	619	603	640	604	663	575	611	674	629	704	684	713	642	603
Specific Volume (ml/g)	4.67	4.88	4.63	4.58	4.54	4.39	4.62	4.46	4.72	4.12	4.38	4.83	4.61	4.71	5.03	5.28	4.64	4.28

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.

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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.

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