

U.S. PACIFIC NORTHWEST

2023 HARVEST

SOFT WHITE WHEAT

QUALITY REPORT



Cover photo courtesy of the Idaho Wheat Commission



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Pacific Northwest EXECUTIVE SUMMARY

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The 2023 Pacific Northwest (PNW) soft white and club wheat crop started with good soil moisture and lower than average precipitation through the winter months. Drought conditions affected most areas starting in late spring. Mild temperatures and late season precipitation in the eastern regions slowed harvest in some areas. Total estimated production of 5.32 MMT is lower than last year's 6.58 MMT and the five-year average of 6.11 MMT. The overall crop graded as #1 with protein contents that are higher than last year and the five-year average for both soft white and club. Average test weight and thousand kernel weight were at or below the five-year average, and kernel hardness was lower. Farinograph, Alveograph, and SRC values all indicate very weak to medium gluten strength appropriate for the production of soft wheat flour products and those made with soft and hard wheat blends. End product tests show sponge cake volume and texture appropriate to protein content with good steamed bread and cookie performance. Overall baking quality is consistent with typical performance for soft wheat.

Photo courtesy of Shaver Transportation

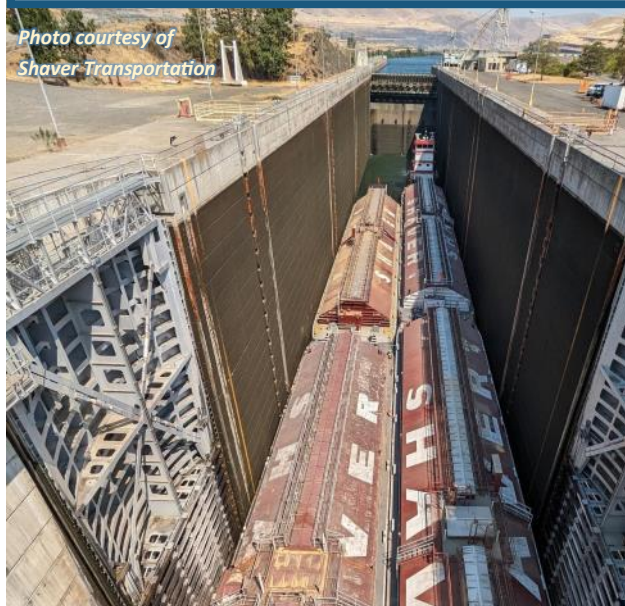


Photo courtesy of Oregon Wheat Commission





Pacific Northwest SOFT WHITE WHEAT CLASS & SUBCLASSES

U.S. soft white wheat grown in the Pacific Northwest includes the states of Idaho, Oregon, and Washington.

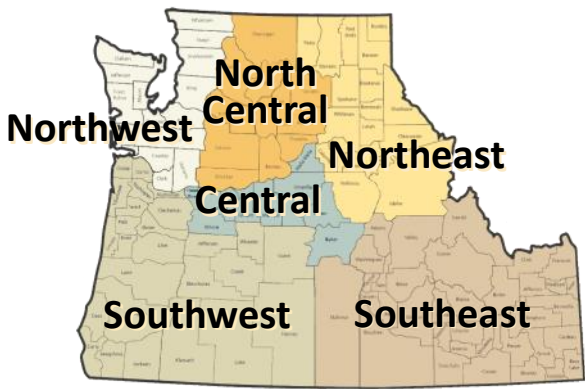


Pacific Northwest soft white wheat is valued for its white bran, low moisture content, and weak gluten characteristics. Consequently, SW is well suited for products such as cakes, cookies, pancakes, and snack foods. Soft white wheat with stronger gluten can be used in crackers, flat breads, and Chinese southern-type steamed breads by itself or in blends with hard wheat.

The soft white wheat class includes the subclasses of white club wheat and western white wheat. White club wheat has very weak gluten characteristics. Western white wheat is a blend of white club and soft white wheat. The amount of white club wheat in western white ranges from 10 to 90 percent. The minimum percentage of white club in western white is 10 percent; higher amounts are determined by contract specifications negotiated between buyers and sellers (typically 10-30%).

	Soft White		White Club	
	2023	5 Yr	2023	5 Yr
Test Weight (lb/bu)	60.2	61.1	60.7	60.7
Hectoliter Weight (kg/hl)	79.2	80.3	79.9	79.9
Grade	1SWH	1SWH	1WHCB	1WHCB
Dockage (%)	0.4	0.5	0.6	0.6
Whole Kernel Moisture (%)	9.1	9.1	8.6	8.3
Wheat Protein (% , 12% mb)	11.0	10.0	10.6	10.0
Wheat Ash (% , 14% mb)	1.39	1.40	1.26	1.31
1000 Kernel Weight (g, 14% mb)	32.5	34.4	29.9	30.7
Wheat Falling Number (seconds, 14% mb)	334	326	327	331
Flour Extraction (%)	70.3	71.8	72.1	73.9
Flour Ash (% , 14% mb)	0.46	0.43	0.48	0.44
Flour Wet Gluten (% , 14% mb)	28.9	22.5	—	—
Farinograph: Absorption (% , 14% mb)	51.2	52.0	—	—
Peak Time (minutes)	2.5	1.9	—	—
Stability Time (minutes)	3.0	2.5	—	—
Alveograph: L (mm)	110	100	79	75
W (10 ⁻⁴ joules)	92	83	34	33
Production (mmt)	5.11	5.86	0.21	0.25





Production Zones

Wheat Samples

At harvest, wheat samples were collected from a number of sources, including state and private grain inspection agencies and commercial wheat handling operations throughout the Pacific Northwest. Sample collection was based on wheat production in each location. For the 2023 harvest, Wheat Marketing Center (WMC) received and tested 385 SW and 65 WC samples from Idaho, Oregon, and Washington. Federal Grain Inspection Service (FGIS) graded and ran wheat protein on each sample. WMC conducted wheat, flour, solvent retention capacity (SRC), dough, and finished product tests on composites based on production zones and protein levels.

2023 SOFT WHITE AND WHITE CLUB WHEAT PRODUCTION (EST)		
Production Zone	Million Metric Tons (mmt)	Million Bushels
North Central	1.55	57.12
Northeast	1.70	62.61
Central	1.10	40.30
Southeast	0.69	25.41
Southwest	0.25	9.20
Northwest	0.03	0.95
Total	5.32	195.59

Source: USDA Small Grains Summary, NASS 9/29/23 and Washington Grain Commission 10/5/23.

2023 TOP VARIETIES SOFT WHITE WHEAT		
Idaho	Oregon	Washington
SY Ovation	UI Voodoo CL+	Piranha CL+
WB 1529	UI Magic	Norwest Tandum
LCS Shine	LCS Shine	VI Voodoo CL+
Norwest Tandum	Appleby CL+	LSC Shine
SY Assure	Stingray CL+	M-Press
M-Press	LCS Artdeco	Stingray CL+



Photo courtesy of Oregon Wheat Commission

Weather & Production

Across the Pacific Northwest (PNW), soil moisture was good for fall planting. The winter months and early spring saw lower than average precipitation, followed by drier conditions and cooler temperatures through the spring and into early summer. Drought conditions increased from late spring into harvest with late season rains emerging in the eastern regions leading to some harvest delays in those areas. Moderate temperatures with dry conditions through the summer during crop maturation resulted in lower test weights and higher proteins than last year. USDA estimates the total PNW SW production at 5.32 MMT, which is lower than the five-year average.



Wheat Quality

Production Zone	Wheat Protein Range 12% mb	Grade	Test Weight lb/bu	Dockage %	Whole Kernel Moisture %	Wheat Falling Number 14% mb sec	Wheat Ash 14% mb %	Thousand Kernel Weight 14% mb g	SKCS Kernel Hardness Index	Whole Meal Wet Gluten 14% mb %
North Central	8.5-9.4	1SWH	60.6	0.5	9.6	316	1.24	35.0	18	18.8
	9.5-10.4	1SWH	61.3	0.3	9.1	329	1.22	34.7	21	24.3
	10.5-12.0	1SWH	60.3	0.5	8.8	341	1.32	32.5	21	27.5
	>12.0	2SWH	59.1	0.7	9.0	349	1.39	29.7	17	31.0
	2023 Average	1SWH	60.4	0.5	9.0	337	1.30	32.9	20	26.3
	2022 Average	1SWH	60.9	0.5	8.3	353	1.38	34.4	30	22.0
	5 Year Average	1SWH	61.2	0.4	8.5	332	1.30	33.4	30	24.4
Northeast	9.5-10.4	1SWH	62.3	0.4	9.0	337	1.39	35.1	21	22.1
	10.5-12.0	1SWH	60.7	0.3	8.4	346	1.36	29.6	25	24.8
	>12.0	2SWH	59.7	0.3	8.8	367	1.41	29.5	20	32.2
	2023 Average	1SWH	61.1	0.3	8.8	349	1.38	31.8	22	25.9
	2022 Average	1SWH	61.2	0.4	9.2	353	1.47	35.0	29	19.6
	5 Year Average	1SWH	61.5	0.5	9.3	334	1.39	34.3	29	22.4
Central	10.5-12.0	1SWH	60.1	0.3	9.0	337	1.36	30.1	22	28.1
	>12.0	2SWH	59.0	0.4	8.6	349	1.45	27.8	21	33.1
	2023 Average	2SWH	59.7	0.3	8.8	342	1.40	29.2	22	30.1
	2022 Average	1SWH	61.6	0.6	8.7	333	1.45	35.1	27	17.1
	5 Year Average	1SWH	60.9	0.5	9.0	328	1.43	34.2	28	22.7
Southeast	<8.5	1SWH	60.9	0.2	10.0	323	1.53	36.2	18	10.0
	8.5-9.4	1SWH	60.0	0.3	10.4	313	1.58	39.6	16	14.5
	9.5-10.4	1SWH	61.0	0.5	10.1	321	1.48	37.5	23	20.5
	10.5-12.0	2SWH	59.1	0.3	9.8	316	1.57	35.0	19	22.7
	2023 Average	1SWH	60.3	0.4	10.1	318	1.54	37.4	20	18.2
	2022 Average	1SWH	60.2	0.4	9.6	322	1.60	35.8	24	21.8
	5 Year Average	1SWH	60.3	0.5	10.0	327	1.56	37.5	26	21.0
Southwest	<8.5	1SWH	61.4	0.3	10.4	333	1.35	38.6	24	15.8
	2023 Average	1SWH	61.4	0.3	10.4	333	1.35	38.6	24	15.8
	2022 Average	1SWH	60.2	0.8	11.6	345	1.52	33.0	26	19.5
	5 Year Average	1SWH	60.4	0.5	11.0	324	1.44	37.8	25	19.0
White Club Wheat	2023 Average	1WHCB	60.7	0.6	8.6	327	1.27	29.9	22	—
	2022 Average	1WHCB	60.6	0.8	7.8	356	1.36	30.2	31	24.2
	5 Year Average	1WHCB	60.7	0.6	8.3	331	1.31	31.7	30	21.1

Below from left to right: photos courtesy of Ben Maney of Umatilla County, Washington Grain Commission, and Idaho Wheat Commission





Flour Quality

Production Zone	Wheat Protein Range 12% mb %	Flour Yield %	Flour Ash 14% mb %	Flour Protein 14% mb %	Flour Color			Flour Wet Gluten 14% mb %	Flour Falling Number 14% mb sec	Amylograph Peak Viscosity BU
					L*	a*	b*			
North Central	8.5-9.4	71.0	0.42	7.7	92.8	-2.2	8.0	17.6	332	493
	9.5-10.4	72.4	0.43	9.0	93.2	-2.2	8.2	22.4	366	526
	10.5-12.0	69.5	0.43	10.0	93.0	-2.1	7.9	28.2	360	613
	>12.0	67.8	0.42	11.0	93.0	-1.9	7.2	31.3	391	683
	2023 Average	70.2	0.43	9.7	93.0	-2.1	7.9	26.1	364	588
	2022 Average	72.5	0.45	9.2	93.4	-2.1	8.0	23.9	379	598
	5 Year Average	71.6	0.44	9.3	92.8	-2.2	8.4	23.7	361	522
Northeast	9.5-10.4	71.2	0.41	9.1	92.8	-2.4	8.7	23.4	357	543
	10.5-12.0	70.5	0.47	9.6	93.1	-2.2	8.4	31.2	382	608
	>12.0	68.3	0.45	11.2	92.7	-2.1	7.9	37.8	411	644
	2023 Average	70.1	0.44	9.9	92.9	-2.2	8.4	29.9	380	592
	2022 Average	74.0	0.44	8.4	93.1	-2.2	8.1	18.3	359	573
	5 Year Average	72.9	0.45	8.7	92.7	-2.1	8.4	21.0	357	514
Central	10.5-12.0	74.4	0.44	9.4	93.0	-2.2	8.3	29.6	351	633
	>12.0	67.9	0.44	10.7	92.9	-2.1	7.7	36.4	402	668
	2023 Average	71.8	0.44	9.9	93.0	-2.2	8.1	32.3	372	647
	2022 Average	72.7	0.42	7.7	93.4	-2.1	7.3	15.1	364	541
	5 Year Average	71.8	0.45	8.7	92.8	-2.1	8.0	21.9	355	523
Southeast	<8.5	69.1	0.47	6.4	93.5	-2.4	8.3	19.9	350	528
	8.5-9.4	68.2	0.50	7.8	93.4	-2.1	7.4	24.9	346	469
	9.5-10.4	70.7	0.50	8.2	93.4	-2.1	7.8	26.0	351	479
	10.5-12.0	70.0	0.51	9.0	93.1	-2.1	8.0	28.6	368	454
	2023 Average	69.7	0.50	8.1	93.3	-2.1	7.8	25.7	353	475
	2022 Average	72.4	0.47	8.9	93.3	-2.1	7.8	17.6	365	527
	5 Year Average	73.2	0.48	8.9	92.8	-2.0	8.0	20.3	340	470
Southwest	<8.5	69.0	0.52	7.1	92.6	-2.5	9.6	20.7	369	559
	2023 Average	69.0	0.52	7.1	92.6	-2.5	9.6	20.7	369	559
	2022 Average	72.3	0.47	8.0	92.5	-2.1	7.5	22.9	343	499
	5 Year Average	73.1	0.49	7.7	92.4	-2.1	8.4	18.1	334	426
White Club Wheat	2023 Average	72.1	0.48	9.5	93.2	-2.0	7.8	—	346	512
	2022 Average	72.9	0.43	9.0	93.4	-2.0	7.1	14.5	378	580
	5 Year Average	73.9	0.45	9.1	92.8	-2.1	8.1	14.7	359	486





Solvent Retention Capacity (SRC)

Production Zone	Wheat Protein Range 12% mb %	Water 14% mb %	50% Sucrose 14% mb %	5% Lactic Acid 14% mb %	5% Sodium Carbonate 14% mb %	Gluten Performance Index
North Central	8.5-9.4	52	91	92	67	0.58
	9.5-10.4	51	98	98	69	0.59
	10.5-12.0	52	100	107	69	0.64
	>12.0	55	100	124	68	0.74
	2023 Average	52	98	106	69	0.63
	2022 Average	56	101	100	72	0.58
	5 Year Average	55	93	93	116	72
Northeast	9.5-10.4	53	96	99	68	0.60
	10.5-12.0	52	104	117	69	0.68
	>12.0	54	107	127	70	0.72
	2023 Average	53	102	113	69	0.66
	2022 Average	53	96	86	69	0.53
	5 Year Average	54	89	89	102	71
Central	10.5-12.0	53	100	116	69	0.69
	>12.0	53	103	122	71	0.70
	2023 Average	53	101	119	70	0.70
	2022 Average	53	94	87	69	0.54
	5 Year Average	55	90	90	105	72
Southeast	<8.5	53	96	76	69	0.46
	8.5-9.4	52	93	66	67	0.41
	9.5-10.4	51	99	86	69	0.51
	10.5-12.0	52	99	82	67	0.49
	2023 Average	52	97	78	68	0.47
	2022 Average	52	95	78	66	0.49
	5 Year Average	53	89	89	84	69
Southwest	<8.5	54	96	81	68	0.49
	2023 Average	54	96	81	68	0.49
	2022 Average	56	100	91	76	0.52
	5 Year Average	56	94	94	96	75
White Club Wheat	2023 Average	51	93	71	66	0.44
	2022 Average	55	93	71	67	0.44
	5 Year Average	52	92	92	77	73

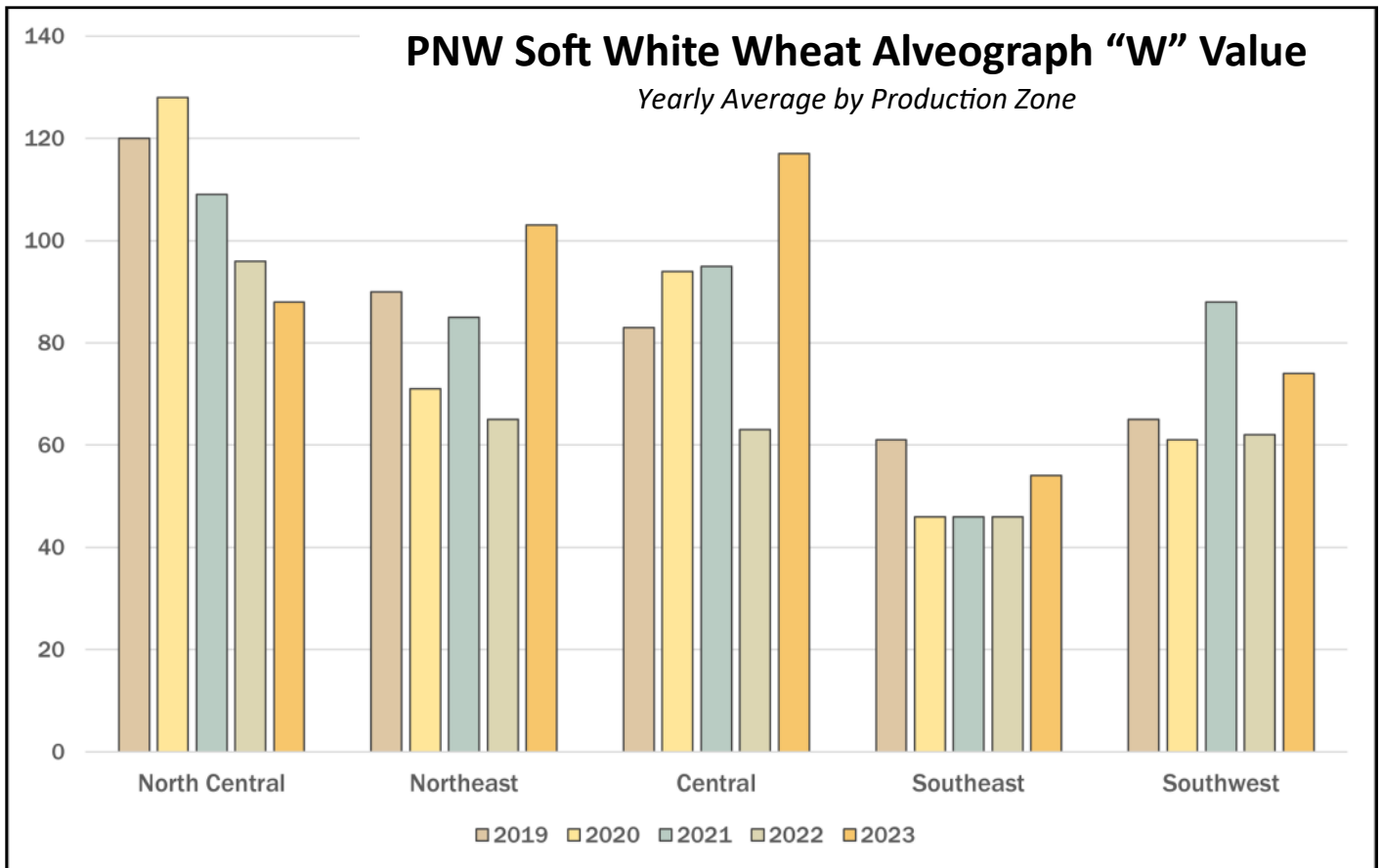
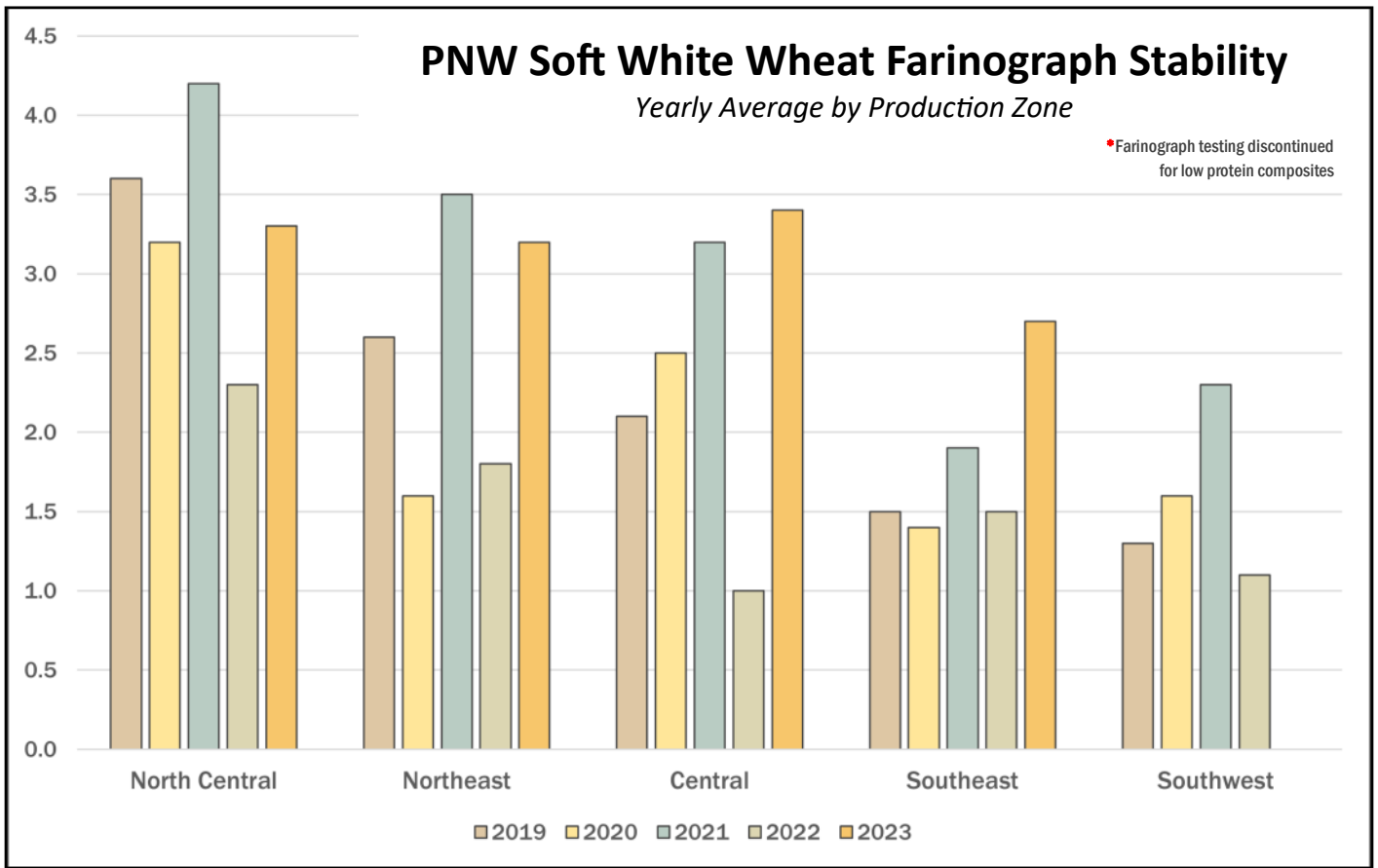




Physical Dough Properties

Production Zone	Wheat Protein Range	Farinograph			Alveograph			
	12% mb	Absorption 14% mb	Peak Time	Stability	P	L	P/L	W
	%	%	min	min	mm	mm		10 ⁻⁴ J
North Central	8.5-9.4	—	—	—	34	81	0.42	72
	9.5-10.4	51.2	2.3	3.0	34	85	0.40	72
	10.5-12.0	51.7	2.3	3.4	34	90	0.38	82
	>12.0	52.5	3.8	3.9	40	130	0.31	142
	2023 Average	51.7	2.6	3.3	35	94	0.38	88
	2022 Average	52.6	1.6	2.3	42	95	0.47	96
	5 Year Average	52.4	2.3	3.4	40	112	0.39	109
Northeast	9.5-10.4	50.8	2.0	3.1	34	105	0.32	86
	10.5-12.0	50.9	2.5	3.3	32	126	0.25	92
	>12.0	52.8	3.2	3.2	38	149	0.26	136
	2023 Average	51.4	2.5	3.2	35	124	0.28	103
	2022 Average	51.3	1.2	1.8	36	68	0.53	65
	5 Year Average	51.9	1.7	2.4	35	89	0.43	75
Central	10.5-12.0	50.2	1.7	3.7	36	132	0.27	121
	>12.0	51.9	2.6	3.0	35	138	0.25	111
	2023 Average	50.8	2.1	3.4	36	134	0.27	117
	2022 Average	50.5	1.2	1.0	32	73	0.44	63
	5 Year Average	51.2	1.7	2.4	33	104	0.35	83
Southeast	<8.5	—	—	—	31	42	0.74	40
	8.5-9.4	—	—	—	31	79	0.39	47
	9.5-10.4	51.5	1.4	2.7	37	74	0.50	66
	10.5-12.0	52.0	1.9	2.7	32	72	0.44	51
	2023 Average	51.7	1.6	2.7	33	72	0.48	54
	2022 Average	51.6	1.5	1.5	32	53	0.63	46
	5 Year Average	51.3	1.4	1.6	28	87	0.38	50
Southwest	<8.5	—	—	—	38	77	0.49	74
	2023 Average	—	—	—	38	77	0.49	74
	2022 Average	51.3	1.2	1.1	31	88	0.35	62
	5 Year Average	51.0	1.4	1.8	33	92	0.39	69
White Club Wheat	2023 Average	—	—	—	23	79	0.29	34
	2022 Average	50.0	1.1	1.1	25	49	0.51	33
	5 Year Average	50.1	1.3	1.2	22	74	0.36	33

Physical Dough Properties

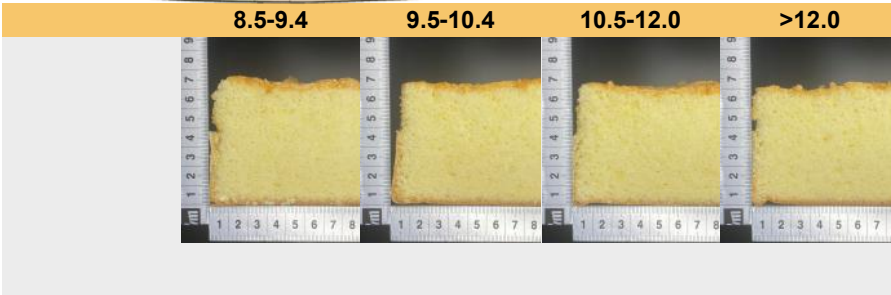




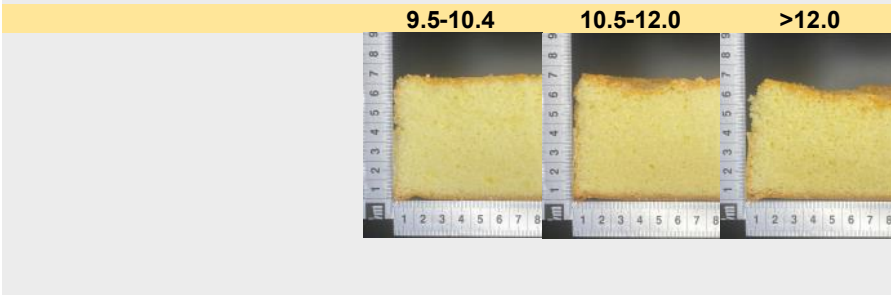
Finished Products: Sponge Cake

*Total score has been discontinued in favor of cake firmness. This parameter has the greatest impact on total score.

Production Zone	Wheat Protein Range	Sponge Cake	
	12% mb %	Volume cc	Firmness g Control is 242g



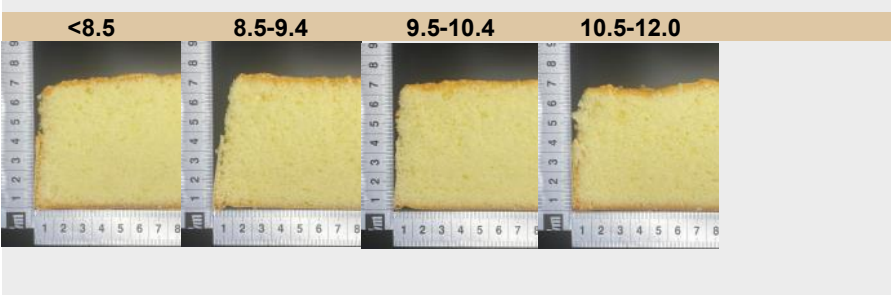
Production Zone	Wheat Protein Range	Volume cc	Firmness g
North Central	8.5-9.4	1101	290
	9.5-10.4	1073	322
	10.5-12.0	1060	296
	>12.0	1035	417
	2023 Average	1063	323
	2022 Average	1117	356
	5 Year Average	1099	—



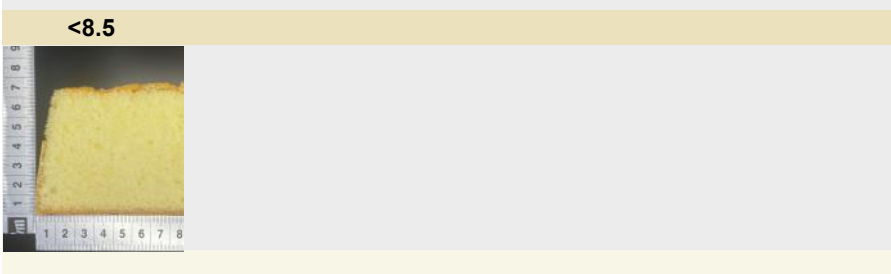
Northeast	9.5-10.4	1076	306
	10.5-12.0	1067	375
	>12.0	963	516
	2023 Average	1040	389
	2022 Average	1143	321
	5 Year Average	1121	—



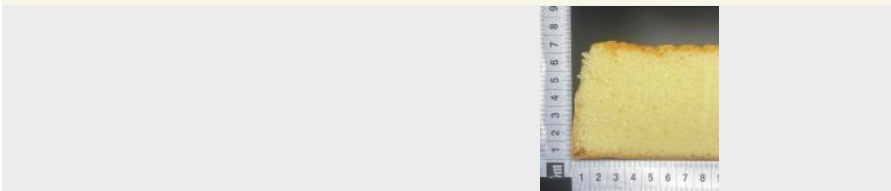
Central	10.5-12.0	988	405
	>12.0	990	557
	2023 Average	989	465
	2022 Average	1140	312
	5 Year Average	1113	—



Southeast	<8.5	1119	264
	8.5-9.4	1132	226
	9.5-10.4	1125	300
	10.5-12.0	1094	305
	2023 Average	1119	276
	2022 Average	1087	345
	5 Year Average	1117	—



Southwest	<8.5	1118	257
	2023 Average	1118	257
	2022 Average	1118	330
	5 Year Average	1127	—



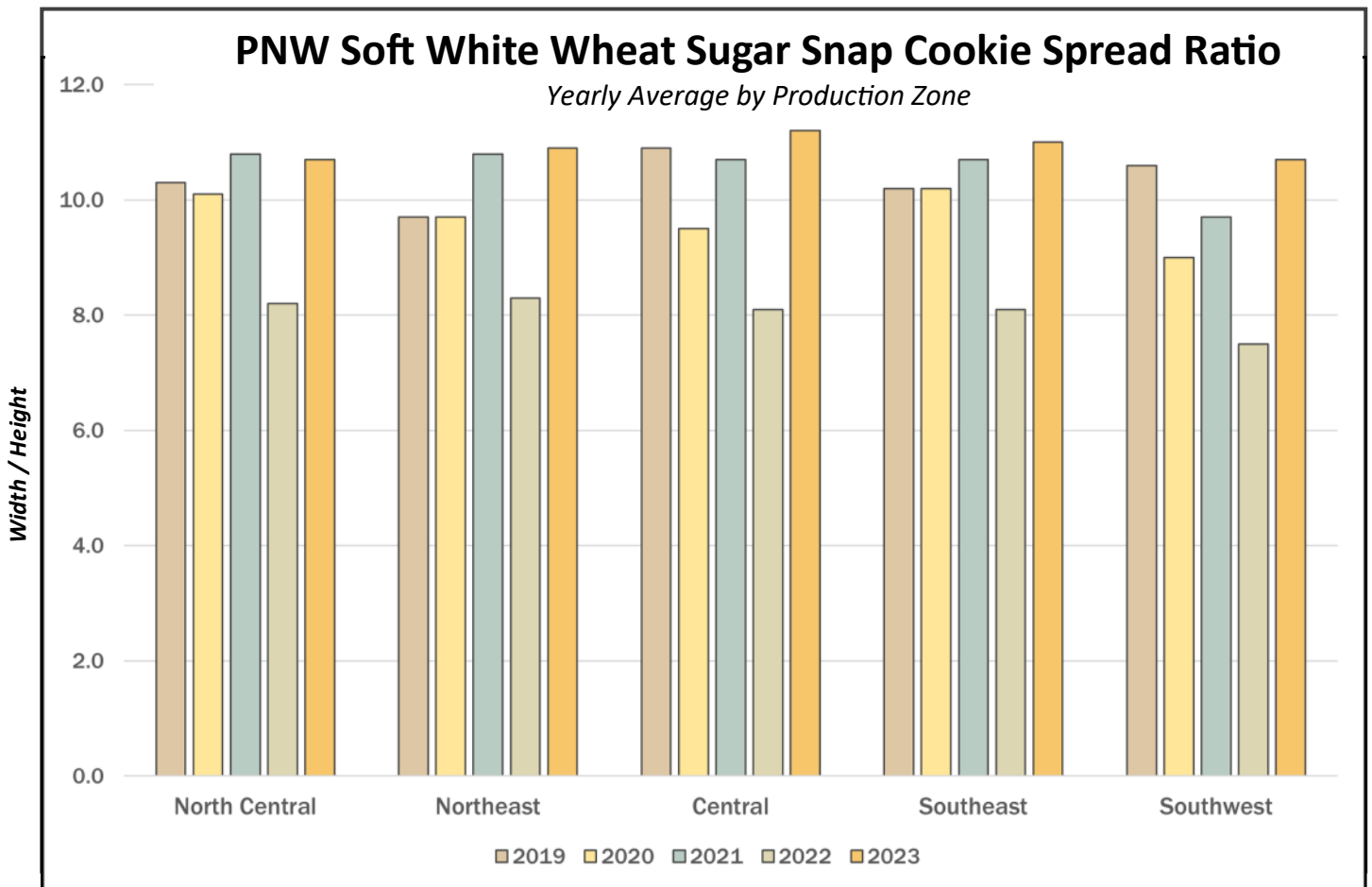
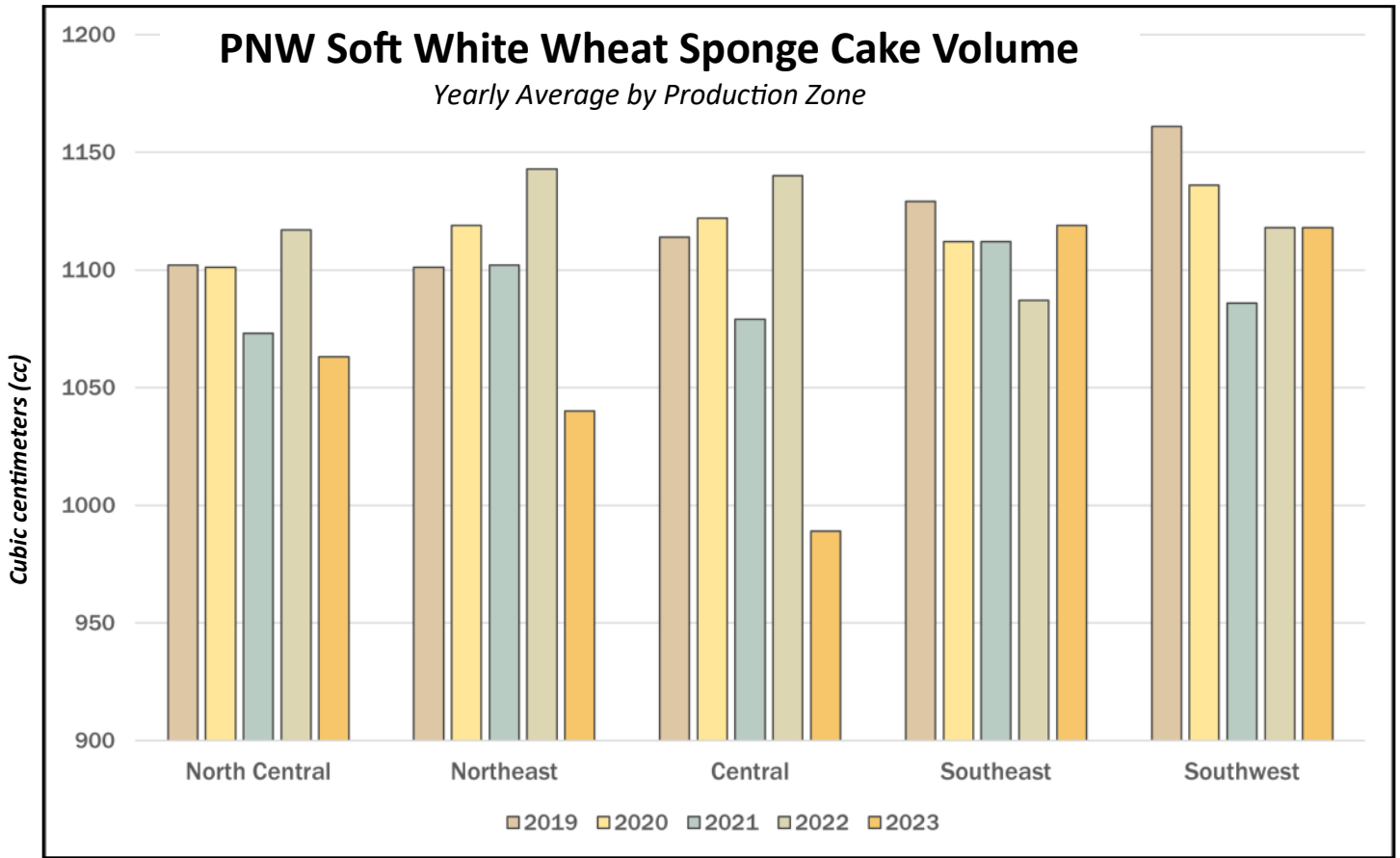
White Club Wheat	2023 Average	1143	284
	2022 Average	1150	296
	5 Year Average	1121	—



Finished Products: Sugar Snap Cookie

Production Zone	Wheat Protein Range	Sugar Snap Cookie		
	12% mb %	Spread cm	Spread Ratio width/height	Top Grain Score
North Central	8.5-9.4	8.8	10.7	3.0
	9.5-10.4	8.6	11.1	2.5
	10.5-12.0	8.7	10.5	1.0
	>12.0	8.5	10.3	0.5
	2023 Average	8.6	10.7	1.5
	2022 Average	8.2	8.2	4.5
	5 Year Average	8.7	9.8	4.2
Northeast	9.5-10.4	8.7	11.2	2.0
	10.5-12.0	8.6	11.5	1.5
	>12.0	8.4	9.9	1.0
	2023 Average	8.6	10.9	1.6
	2022 Average	8.2	8.3	4.0
Central	10.5-12.0	8.5	11.4	1.0
	>12.0	8.5	11.0	1.0
	2023 Average	8.5	11.2	1.0
	2022 Average	8.3	8.1	3.8
	5 Year Average	8.7	9.7	4.3
Southeast	<8.5	8.7	11.6	3.5
	8.5-9.4	8.7	11.2	3.5
	9.5-10.4	8.6	10.8	3.0
	10.5-12.0	8.6	10.7	3.5
	2023 Average	8.6	11.0	3.3
Southwest	<8.5	8.6	10.7	2.5
	2023 Average	8.6	10.7	2.5
	2022 Average	8.1	7.5	4.0
	5 Year Average	8.7	9.2	4.2
	White Club Wheat	2023 Average	8.7	12.4
2022 Average		8.7	9.9	5.0
5 Year Average		9.1	11.5	5.1

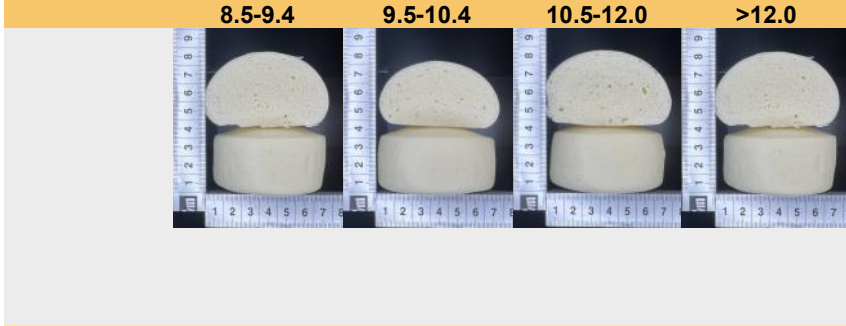
Finished Products



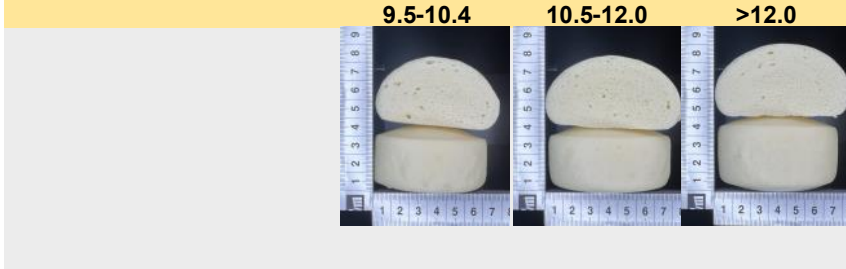


Finished Products: Steamed Bread

Production Zone	Wheat Protein Range	Chinese Southern Type Steamed Bread	
	12% mb %	Specific Volume cc/g	Total Score (Control is 70)



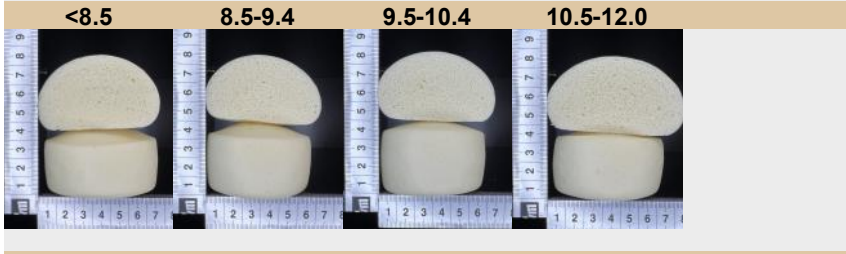
Production Zone	Wheat Protein Range	Specific Volume cc/g	Total Score (Control is 70)
North Central	8.5-9.4	2.46	69
	9.5-10.4	2.59	72
	10.5-12.0	2.65	69
	>12.0	2.72	68
	2023 Average	2.63	70
	2022 Average	2.64	70
	5 Year Average	2.11	67



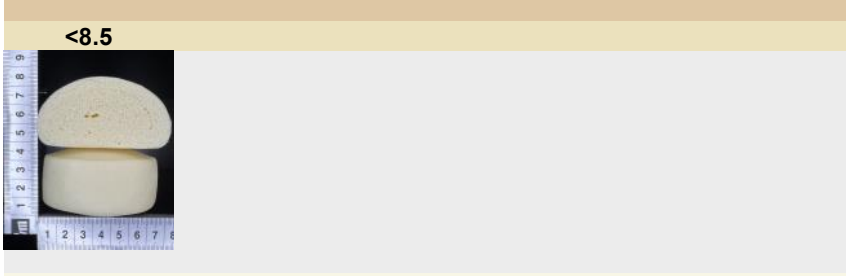
Production Zone	Wheat Protein Range	Specific Volume cc/g	Total Score (Control is 70)
Northeast	9.5-10.4	2.52	66
	10.5-12.0	2.65	68
	>12.0	2.60	67
	2023 Average	2.58	67
	2022 Average	2.54	68
5 Year Average	2.15	66	



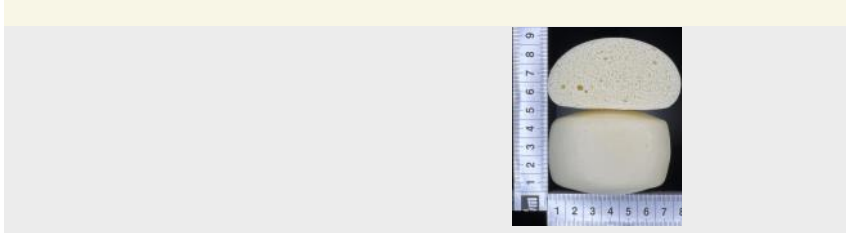
Production Zone	Wheat Protein Range	Specific Volume cc/g	Total Score (Control is 70)
Central	10.5-12.0	2.59	61
	>12.0	2.64	66
	2023 Average	2.61	63
	2022 Average	2.38	70
5 Year Average	2.13	67	



Production Zone	Wheat Protein Range	Specific Volume cc/g	Total Score (Control is 70)
Southeast	<8.5	2.38	70
	8.5-9.4	2.42	71
	9.5-10.4	2.50	70
	10.5-12.0	2.62	70
	2023 Average	2.49	70
	2022 Average	2.49	71
5 Year Average	2.12	64	



Production Zone	Wheat Protein Range	Specific Volume cc/g	Total Score (Control is 70)
Southwest	<8.5	2.52	68
	2023 Average	2.52	68
	2022 Average	2.52	69
	5 Year Average	2.04	65



Production Zone	Wheat Protein Range	Specific Volume cc/g	Total Score (Control is 70)
White Club Wheat	2023 Average	2.72	71
	2022 Average	2.86	69
	5 Year Average	2.30	62

Summary

These results were derived from composite samples from the 2023 Pacific Northwest soft white (SW) and white club (WC) wheat harvest. SW composites were prepared by production zone and protein levels. All WC samples were blended into one composite. The composite samples were analyzed for wheat quality, flour quality, solvent retention capacity, physical dough properties, and finished product characteristics. Please note that some production zones did not have low or high protein samples this year. Harvest results are summarized as follows:

Wheat Quality

Test Weight

- ◆ SW test weights are ≥ 60.0 pounds per bushel (lbs/bu) across all production zones except for a small number of higher protein composites. These higher protein composites include the $> 12.0\%$ protein composites in the Northeast and North Central and Central production zones and the 10.5 - 12.0% protein composite in the Southeast production zone, which have test weights of 59.7, 59.1, 59.0, and 59.1 lbs/bu, respectively.
- ◆ WC test weight is 60.7 lbs/bu.

Wheat Moisture

- ◆ SW wheat weighted average moistures are 10.4% or lower.
- ◆ WC wheat moisture is 8.6%.

Falling Number

- ◆ SW falling number values are ≥ 313 sec in all production zones.
- ◆ WC falling number is 327 sec.

Wheat Ash

- ◆ SW wheat ash weighted averages are between 1.30% to 1.54% (14% mb) and are lower than last year across all production zones.
- ◆ WC wheat ash average is 1.27% (14% mb).

Thousand Kernel Weight (TKW)

- ◆ SW TKW ranges from 27.8 g to 39.6 g across the production zones. TKW values tend to decrease as protein contents increase across all production zones.
- ◆ WC TKW is 29.9 g.

SKCS Kernel Hardness Index

- ◆ SW SKCS hardness weighted averages range from 20 to 24 across all production zones.
- ◆ WC SKCS hardness average is 22.

Whole Meal Wet Gluten

- ◆ SW weighted average whole meal wet gluten is 15.8% to 30.1% with lower values coming from lower protein composites across all production zones.
- ◆ WC whole meal wet gluten has been discontinued.

Flour Quality

Flour Yields

- ◆ SW weighted average flour yields range from 69.0% to 71.8%. These yields are based on tempered wheat weight and should not be compared to last year or the 5-year average, which were based on total product weight. Lower flour yields are more typical for higher protein composites that have a combination of lower test weight and TKW.
- ◆ WC flour yield is 72.1%.

Flour Ash

- ◆ SW straight grade flour ash values are $\leq 0.50\%$ (14% mb) for all protein composites across all production zones except for the Southeast $> 12.0\%$ and Southwest $< 8.5\%$ protein composites, which have straight grade flour ash values of 0.51% and 0.52% (14% mb), respectively.
- ◆ WC straight grade flour ash is 0.48% (14% mb).

Flour Color

- ◆ SW flour L* (whiteness) values exceed 92.6 across all protein composites and production zones. Weighted average values range from 92.6 to 93.3.
- ◆ WC flour L* is 93.2.

Wet Gluten

- ◆ SW wet gluten ranges from 17.6% to 37.8% with weighted averages of $\geq 20.7\%$ across all production zones. These values are typical for samples with very weak to medium gluten strength.
- ◆ WC wet gluten has been discontinued.

Flour Falling Number

- ◆ SW flour falling number weighted average values are all ≥ 353 sec.
- ◆ WC flour falling number is 346 sec.

Amylograph

- ◆ SW Amylograph peak viscosity weighted averages are all ≥ 475 BU.
- ◆ WC Amylograph peak viscosity is 512 BU.

Solvent Retention Capacity (SRC)

Water SRC

- ◆ SW water SRC values are $\leq 55\%$ for all protein composites across all production zones.
- ◆ WC water SRC is 51%.

Sucrose SRC

- ◆ SW sucrose SRC values are $\leq 100\%$ for most protein composites in most production zones. The exceptions are the $> 12.0\%$ protein composites in the Northeast and Central production zones as well as the 10.5 - 12.0% protein composite in the Northeast production zones with values of 107%, 103%, and 104%, respectively.
- ◆ WC sucrose SRC is 93%.

Lactic Acid SRC

- ◆ SW lactic acid SRC weighted averages range from 78% to 119%. These values are typical for very weak to medium gluten strength.
- ◆ WC lactic acid SRC is 71%, indicative of very weak gluten.

Sodium Carbonate SRC

- ◆ SW sodium carbonate SRC weighted average values are $\leq 70\%$ for all protein composites in all production zones.
- ◆ WC sodium carbonate SRC is 66%.

Gluten Performance Index (GPI)

- ◆ SW GPI weighted averages range from 0.47 to 0.70. This is in line with the lactic acid SRC results and indicates that gluten strength is very weak to medium.
- ◆ WC GPI is 0.44, which is typical for very weak gluten.

Physical Dough Properties

Farinograph

- ◆ SW Farinograph water absorption values are $\leq 52.8\%$ for all protein composites across all production zones with weighted average peak times and stabilities of ≤ 2.6 min and ≤ 3.4 min, respectively. Peak times and stabilities were longer for higher protein composites. Low water absorption values are desirable for products like cookies and crackers. Farinograph testing for low protein composites ($< 9.5\%$) have been discontinued.
- ◆ WC Farinograph testing has been discontinued.

Alveograph

- ◆ SW Alveograph P value weighted averages range from 33 mm to 38 mm with L value weighted averages of 72 mm to 134 mm and P/L ratio averages of 0.27 to 0.49. W value weighted averages range from 54 (10-4 J) to 117 (10-4 J). These values align with Farinograph data for gluten strength ranging from very weak to medium.
- ◆ WC Alveograph P, L, P/L and W values are 23 mm, 79 mm, 0.29 and 34 (10-4 J), respectively. These values are typical for very weak gluten strength.



Finished Products

Sponge Cake

SW sponge cake volume weighted averages range from 1040 cc to 1119 cc across all production zones with the exception of the Central production zone, which has a weighted average of 989cc. The Central production zone contains only higher protein composites (10.5 - 12.0% and $> 12.0\%$). Weighted averages for firmness values range from 257 g to 465 g which are generally softer for most production zones this year compared to 2022 weighted averages. The exceptions are the Central (465 g) and Northeast (389 g) production zones, both of which are weighted more heavily towards higher protein composites. Control cakes from a commercially milled short patent cake flour have an average volume of 1205 cc and a firmness value of 242 g. WC sponge cake volume is 1143 cc with a firmness value of 284 g, which is slightly softer than 2022.

Sugar Snap Cookies

SW cookie diameter weighted averages range from 8.5 cm to 8.6 cm, with spread ratios of 10.7 to 11.2 and top grain scores of 1.0 to 3.3. Weighted diameters and spread ratios are greater than 2022 and similar or better than the 5-year average, although top grains are poorer. All composites show fair to acceptable cookie quality.

WC has an average cookie diameter of 8.7 cm with a spread ratio of 12.4 and a top grain score of 5.5, all of which are similar to or better than 2022 and the 5-year average. These values are indicative of acceptable cookie quality.

Steamed Bread

SW steamed bread specific volume weighted averages are 2.49 g/cc or greater in all production zones with total scores ranging from 63 to 70. Scores of 60 or higher from Buhler laboratory mill straight grade flour are acceptable relative to a control score of 70.

WC steamed bread specific volume is 2.72 g/cc with a total score of 71.

In summary, the overall quality of the crop can be described as acceptable to good, characterized by very weak to medium gluten strength. WC and SW in the lower to mid-protein ranges show excellent potential in cakes, pastries, and other weak gluten applications while SW in the mid- to higher protein ranges show good potential in cookies, crackers, hard and soft wheat blends, and other moderate gluten strength applications.

Photo courtesy of
Washington Grain Commission

Wheat Marketing Center thanks the many individuals and organizations that provided samples for the 2023 Annual Pacific Northwest Crop Quality Survey, and recognizes with gratitude the project's funding partners:



www.idahowheat.org



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