



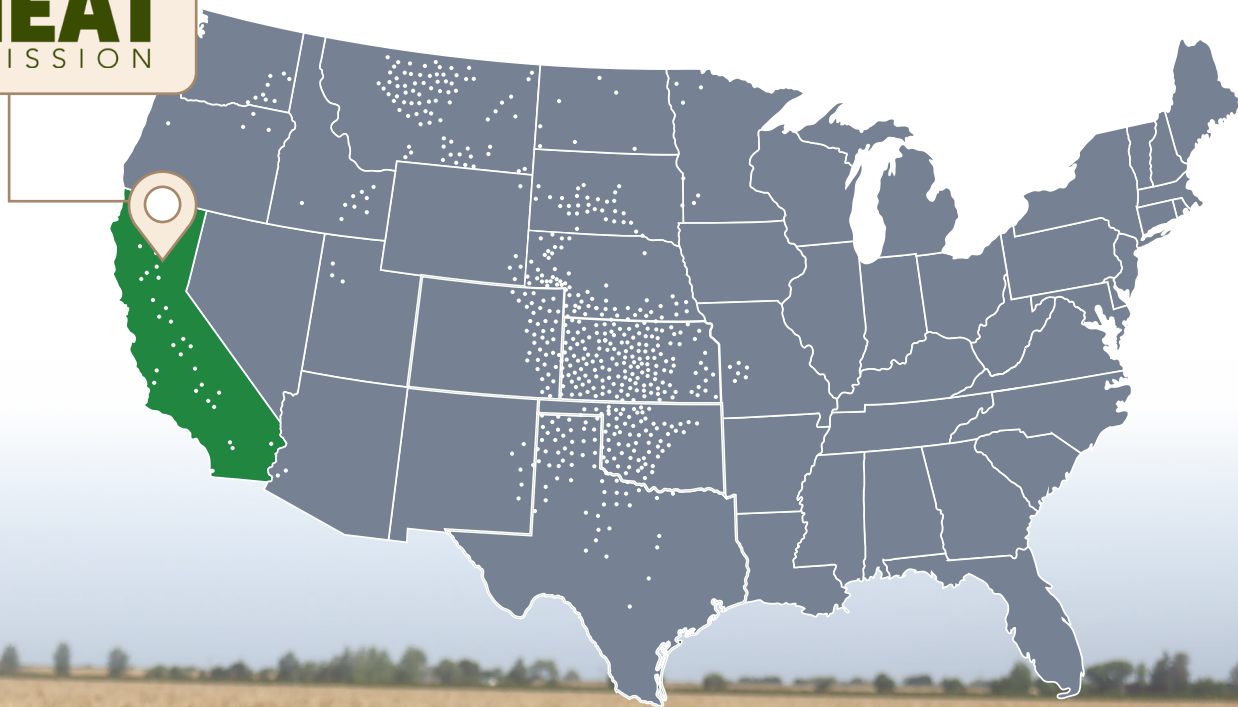
CALIFORNIA HARD RED WINTER

QUALITY SURVEY

2023

CALIFORNIA WHEAT COMMISSION

The California Wheat Commission Wheat Quality Laboratory, located in Woodland, California, began operating 30 years ago. It is capable of testing milling quality, chemical and physical analysis of wheat and flour, physical dough testing and semolina analysis. Final product testing is available for bread and cookie baking and noodle, tortilla and pasta analysis. The lab and its staff are respected in the domestic and international marketplace as a premiere source of technical information and assistance. The CWC is available to work for customers in the areas of quality assurance, problem solving, quality control training, product development and research.



CALIFORNIA HARD RED WINTER

California's wheat growing regions are defined by climate, value of alternative crops and distinct differences in variety selection. Most California hard wheat is planted from October to January and harvested in June and July. With the strong demand for new crop wheat in the domestic marketplace, importers are encouraged to express their interest in purchasing California wheat in early spring.

2023 WEATHER AND HARVEST

Precipitation totals for the 2022-23 season were much greater than average in the main wheat-growing regions of California (approximately 160% to 200%, depending on the location). For the period between October 1 and March 1, rainfall in the Sacramento and San Joaquin Valleys was 155% and 215% of normal, respectively, and rainfall during this period accounted for 73% and 75% (respectively) of the yearly total. Wet early-season conditions narrowed the planting window for crops in the Sacramento Valley and the northern San Joaquin Valley, and some crops were planted later than normal. In addition, geese predation was reported in areas around the Sacramento Valley and Delta region, and flooding negatively affected fields in the Delta region and the Tulare Lakebed. Cooler than average temperatures also factored into the growing season, with some crops weeks behind their normal

growth stages for equivalent dates in an average season. The generally cool springtime conditions and abundant rainfall totals led to higher-than-average yields alongside better-than-average grain quality in many locations around the state. In University of California trial locations, stripe rust and powdery mildew were observed on varieties with known susceptibility, but overall disease incidence was moderate.

2023 CROP SUMMARY

California hard wheat varieties are known for their low moisture and large and uniform kernel size. Because wheat is predominantly grown under irrigation, growers achieve high yields and consistent quality. Overall, the majority of the 2023 crop has medium protein. Consistent with other years, the 2023 crop has low moisture, high flour extraction and strong baking performance — all of which make California wheat suitable for blending.

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SAMPLES OF
HARD RED WINTER

collected from grain
elevators during
local harvest.

SAMPLE METHODOLOGY

SAMPLE TESTING

California Wheat Commission Laboratory and Federal Grain Inspection Service (FGIS) conducted test quality testing.

SAMPLE ANALYSIS

Official grade and non-grade factors and functionality tests were determined on each sample. Results are weighted averages. The methods are described in the Analysis Methods section of this booklet.

2023 HARVEST DATA

	Medium Protein ¹		High Protein ¹	
	2023 Avg	2022 Avg	2023 Avg	2022 Avg
WHEAT GRADE DATA:				
Test Weight (lb/bu)	65.3	63.1	64.5	62.3
(kg/hl)	85.8	82.9	84.7	81.9
Damaged Kernels (%)	0.0	0.0	0.0	0.1
Foreign Material (%)	0.1	0.0	0.0	0.1
Shrunken & Broken (%)	0.4	0.6	0.3	0.6
Total Defects (%)	0.4	0.6	0.3	0.8
Grade	1 HAD	1 HAD	1 HAD	1 HAD
WHEAT NON-GRADE DATA:				
Dockage (%)	1.2	1.1	0.8	1.1
Moisture (%)	9.9	9.6	10.0	9.7
Protein (%) 12%/0% mb	11.8/13.4	11.0/12.5	13.3/15.1	12.3/14.0
Ash (%) 14%/0% mb	1.46/1.69	1.39/1.62	1.49/1.73	1.42/1.65
1000 Kernel Weight (g)	40.5	40.9	42.2	44.3
Kernel Size (%) lg/md/sm	90/10/0	91/9/0	91/9/0	92/8/0
Single Kernel: Hardness	70	66	68	55
Weight (mg)	38.8	40.1	40.5	43.4
Diameter (mm)	2.97	3.05	3.05	3.1
Sedimentation (cc)	58.0	41.3	61.0	42.3
Falling Number (sec)	323	343	357	413
DON (ppm)	0.80	<0.5	<0.5	<0.5
FLOUR DATA:				
Lab Mill Extraction (%) ²	66.0	68.6	67.1	69.7
Color: L*	92.8	93.1	92.7	92.7
a*	-1.2	-1.3	-1.1	-1.3
b*	8.7	7.5	8.2	8.7
Protein (%) 14%/0% mb	10.5/12.2	9.7/11.2	11.8/13.7	11.0/12.8
Ash (%) 14%/0% mb	0.47/0.54	0.44/0.52	0.45/0.52	0.42/0.48
Wet Gluten (%)	24.3	26.6	30.0	29.7
Falling Number (sec)	346	392	401	427
Amylograph Viscosity: 65g (BU)	599	622	791	931
RVA: Pasting Temp (°C)/Peak Viscosity (cP)	73.5/2685	69.5/2838	72.5/2918	71.3/2520
Hot Paste Viscosity (cP)/Final Viscosity (cP)	2116/2800	1831/2752	2291/3070	2033/2935
Damaged Starch (%)	6.2	9.1	7.4	8.3
SRC: Water/50% Sucrose (%)	64/102	68/106	68/104	65/100
5% Lactic Acid/5% Na ₂ CO ₃ (%)	133/82	132/88	137/81	135/79
Gluten Performance Index (GPI) (%)	0.72	0.68	0.74	0.75
DOUGH PROPERTIES:				
Farinograph: Peak Time (min)	6.0	5.4	6.5	7.0
Stability (min)	10.3	11.0	16.0	14.6
Absorption (%)	60.1	64.7	61.4	62.9
Alveograph: P (mm)	87	108	90	92
L (mm)	106	75	142	112
P/L Ratio	0.82	1.44	0.63	0.84
W (10 ⁻⁴ J)	308	287	389	327
Extensograph (45/135 min): Resistance (BU)	577/706	493/573	552/597	462/710
Extensibility (cm)	18.5/17.4	20.7/19.5	21.5/18.1	15.7/14.0
Area (cm ²)	136/153	132/138	150/137	97/121
BAKING EVALUATION:				
Pan Bread: Bake Absorption (%)	60.0	64.5	61.5	63.7
Crumb Grain and Texture (1-10)	8.0	7.0	8.0	8.0
Loaf Volume (cc)	915	850	925	902

¹California HRW Protein Range: Med, 11.0 - 12.5%; High, >12.5%.

²2023 lab mill extraction is lower this year due to duller rolls.

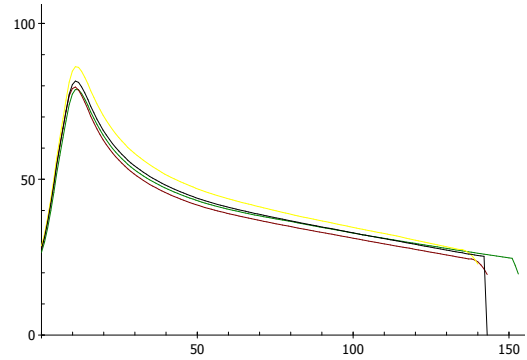
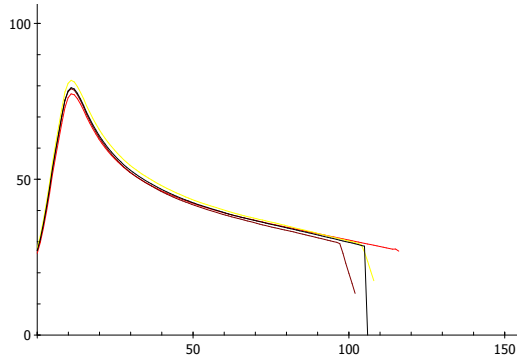


COMPOSITE DOUGH PROPERTIES

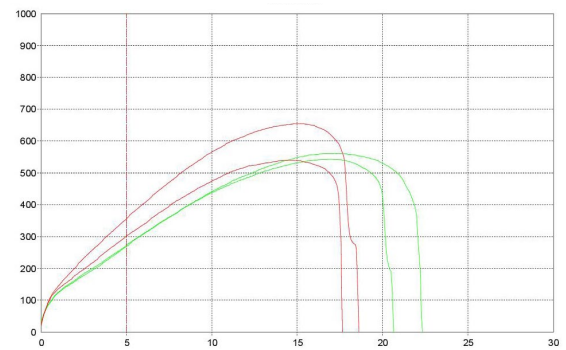
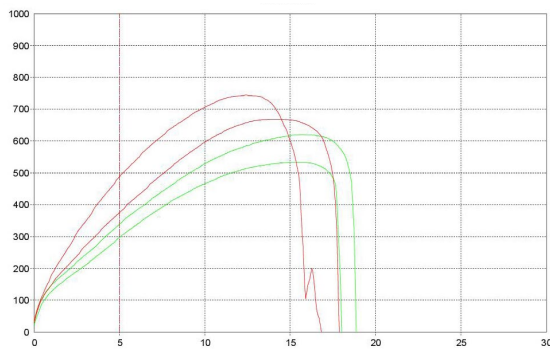
Medium Protein

High Protein

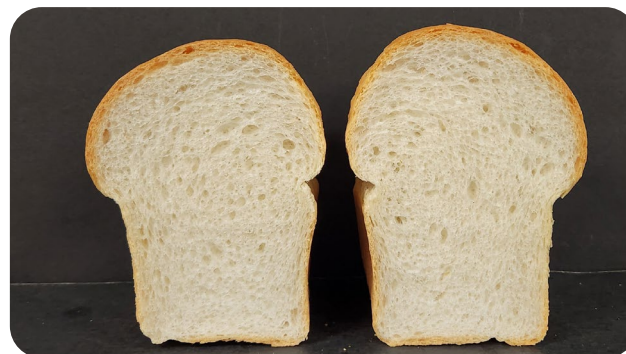
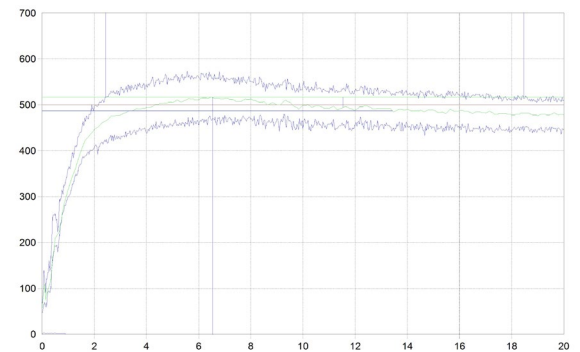
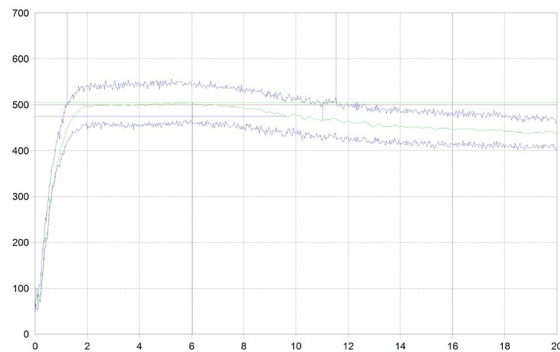
Alveograph



Extensograph



Farinograph



Medium Protein

High Protein

ANALYSIS METHODS

CALIFORNIA WHEAT COMMISSION LABORATORY TESTING

All quality data contained in this report is the result of testing and/or analysis conducted by the California Wheat Commission Laboratory.

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 44-15.01, Air oven method.
Protein (12% mb)	AACCI 46-30.01 expressed on a 12% mb. Dumas combustion nitrogen analysis (CNA) method, ground wheat.
Ash (14% mb)	AACCI 08-01.01 expressed on a 14% mb. Methodology is same for wheat and flour.
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	Cereal Foods World (Cereal Science Today) 5:(3), 71 (1960). Wheat is sifted with a RoTap sifter using U.S. No. 7 (2.82 mm) and No. 10 (2.00 mm) screens.
Single Kernel Characterization System (SKCS)	AACCI 54-31.01 using Perten SKCS 4100.
Sedimentation	AACCI 56-63.01, Micro sedimentation.
Falling Number	AACCI 56-81.04. Methodology is same for flour and wheat falling number.
DON	Neogen ELISA. All analysis is on ground wheat.



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ANALYSIS METHODS

CALIFORNIA WHEAT COMMISSION LABORATORY TESTING

TEST:	METHODOLOGY:
FLOUR FACTORS	
Laboratory Milling Extraction	Laboratory samples are cleaned and tempered according to AACCI 26-10.02. All extraction rates are calculated against total products on an “as is” mb. Brabender® Quadrumat Senior Mill using the Brabender® procedure.
Color	CIE 1976 L*a*b* color system. Minolta Chroma Meter with Granular-Materials attachment CR- A50 and CR-200 colorimeter.
Protein (14% mb)	AACCI 46-30.01 expressed on a 14% mb. Dumas combustion nitrogen analysis (CNA) method.
Ash (14% mb)	AACCI 08-01.01 expressed on a 14% mb. Methodology is same for wheat and flour.
Wet Gluten	AACCI 38-12.02 (Glutomatic procedure).
Falling Number	AACCI 56-81.04. Methodology is same for flour and wheat falling number.
Amylograph Viscosity	AACCI 22-10.01.
Damaged Starch	AACCI 76-30.02 (Enzymatic hydrolysis).
Solvent Retention Capacity	AACCI 56-11.02.
DOUGH PROPERTY FACTORS	
Farinograph	AACCI 54-21.02.
Alveograph	AACCI 54-30.02 (Chopin-Alveolab).
Extensograph	AACCI 54-10.01, modified 45 and 135-min rest.
EVALUATION OF END-PRODUCTS	
Bread	<p>AACCI 10-10.03 (“pup loaf” method).</p> <ul style="list-style-type: none"> Producing two loaves per batch. 200 g flour at 14% mb with optimized water absorption is mixed to optimum development with other ingredients (6% sugar, 3% shortening, 1.5% salt, 2.12% instant dry yeast and 0.02% Doh-Tone®) in a 200 g Swanson pin mixer with head speed of 100 to 120 rpm and 90 min fermentation. Loaf volume is measured 1 hour after baking. Grain and texture are scored on a scale of 1 to 10 with higher numbers indicating preferred quality.



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 dollars managed 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.

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