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Hard Red Winter Wheat

Midwestern Harvest Survey

Most of the U.S. hard red winter (HRW) wheat is grown in the Great Plains area of the U.S. (Colorado, Kansas, Montana, Nebraska, Oklahoma, South Dakota and Texas). The weather in this vast region varies considerably and has a large effect on wheat quality. For the wheat harvested in 2000, the weather was characterized by adequate soil moisture for fall planting followed by mild winter conditions. The mild winter (little extreme cold and little snow cover) allowed certain diseases and pests to overwinter in some areas. Weather during the spring was variable, with hot, dry conditions in some areas and freezing temperatures in others. Hot, dry conditions occurred during crucial times in the wheat plant growing cycle, ultimately affecting agronomic yield and some quality factors. An early, rapid harvest began under very good conditions in May and June, with hot weather predominating July and August.

The harvest was smaller than was produced in the last three years, with processing quality comparable to or better than the 1999 crop in most parameters. Wheat protein content rose for the first time in three years, and compared to last year, moisture content was lower, falling number was much higher and test weight was unchanged. As a result of hot, dry spring conditions, average kernel size is smaller, resulting in reduced milling yield and farinograph absorption. Except for these two factors, the 2000 crop performs very well.

Survey Methods: Information on the 2000 HRW crop is based on testing by CII Laboratory Services of Kansas City, Missouri. More than 775 samples were collected in 20 crop production zones during harvest. Data on protein content, test weight, moisture, thousand-kernel weight, wheat ash, and falling number were recorded for individual samples. Samples were composited into three protein ranges (below 11.5%, 11.5% - 12.5%, and above 12.5%) within each crop production zone for the remaining tests. After FGIS established the grade on the composites, single kernel characteristics were determined and laboratory milling was carried out using a Buhler experimental mill (Model MLU-202). Milled composites were tested for flour and dough quality factors and baking performance. Data are weighted by production based on the USDA "Small Grains Summary" of 29 September 2000.

These data are presented as composite (overall) averages and the projected averages that can be expected at Pacific Northwest and Gulf of Mexico ports. Testing conforms to the American Association of Cereal Chemists Approved Methods (2000).

Milling and Flour Use: Commercial flour millers indicate the transition into new crop wheat this year was not as easy as in previous years because of the differences in kernel size. They report lower milling yield in this crop but good flour quality which is meeting their customers' requirements. More high protein wheat is available for customers requiring stronger flour.

The baking industries in the U.S. indicate the crop has processing characteristics similar to 1999 and notice a modest benefit from higher protein in terms of mixing strength and bake absorption. Private laboratories conducting HRW quality evaluations generally agree the 2000 crop has acceptable to good performance, with indications that loaf volume and bread quality scores are slightly improved over 1999. However, there are varying opinions among laboratories regarding rheological parameters.

Summary: The 2000 HRW crop is regarded as being of acceptable milling quality with acceptable to good baking performance. Protein quality is considered better than 1999, and more high protein wheat is available. Buyers should always specify important quality requirements. A range of protein contents is available to supply bakers of both traditional and non-traditional products.

The harvest data were compiled by personnel of the International Grains Program (IGP) at Kansas State University, Manhattan, Kansas with support from the Kansas State University Agricultural Experiment Station in addition to the Kansas, Colorado, Nebraska, Oklahoma, Texas, and South Dakota Wheat Commissions or Boards and U.S. Wheat Associates, Inc.

California Harvest Survey

Overall the 2000 California wheat crop was planted, grown and harvested under favorable weather conditions. While it would have been optimal to have more stress on the wheat in the final growing stages, the overall milling and baking qualities of the crop were excellent. California wheats are known for low moisture content, large kernels, and high milling extraction.

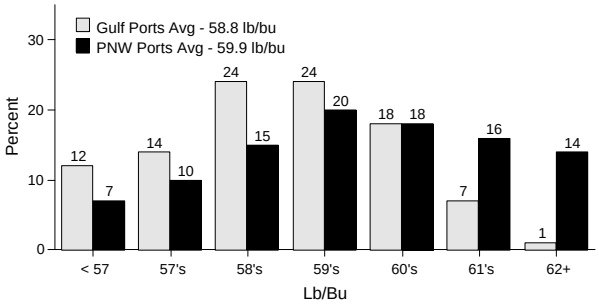
The varieties Brooks, Express, RSI-5 and Yecora Rojo accounted for over 70% of the California HRW 2000 crop. Brooks and Yecora will produce protein above 12.5%. Express usually will range in protein between 11.0-12.4%. It is not unusual for buyers of California HRW to request a specific variety or quality type in their specifications.

California red wheats are harvested in the months of June and July. With strong demand for new crop wheat in the domestic market, export buyers are encouraged to express interest in purchasing California wheat in early spring.

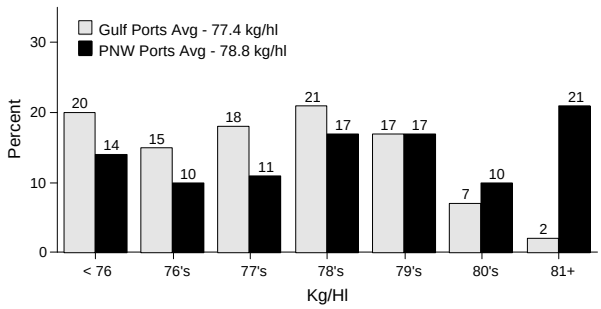
Export Cargo Survey

The export cargo data show the results of analysis of 495 individual sublot samples for marketing years 2000 and 1999. Of the 373 1999 samples, 307 are from Gulf ports and 66 from PNW ports. Of the 122 2000 samples (collected in July and August), 107 were drawn at Gulf ports and 15 at PNW ports. Samples were randomly selected from official Federal Grain Inspection Service samples. Grade data are the actual official grades on the individual sublots. Milling and baking analyses were conducted by CII Laboratory Services.

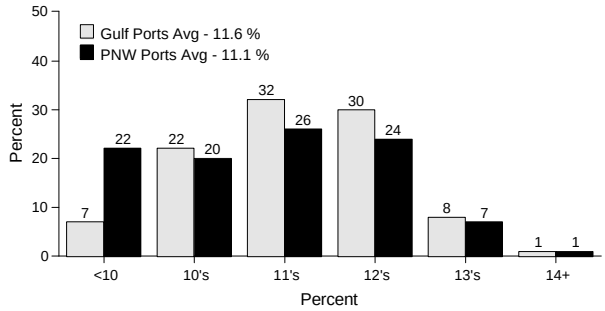
Test Weight



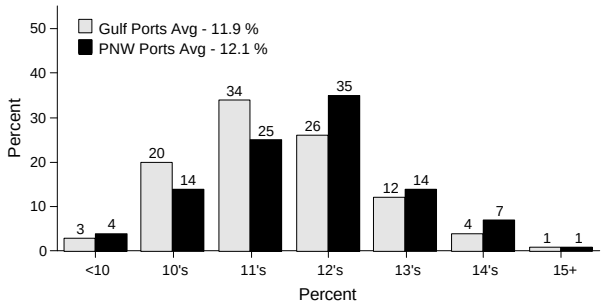
Hectoliter Weight



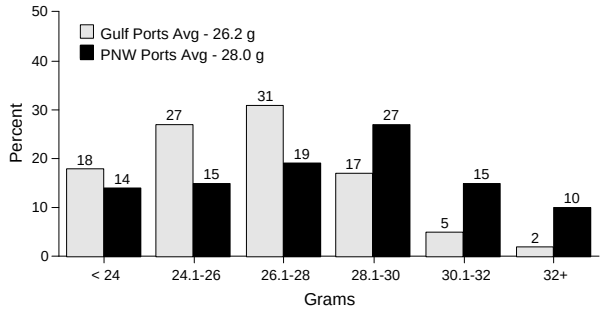
Wheat Moisture



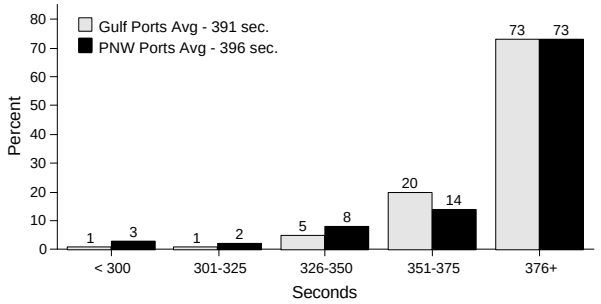
Protein (12% mb)



1000 Kernel Weight



Falling Number



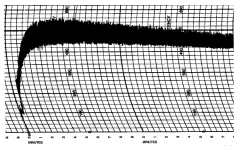
Hard red winter survey results are from eight states.

Midwestern

Composite Average Farinograms and Alveograms

Farinograms:

High Protein:



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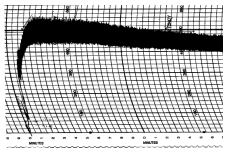
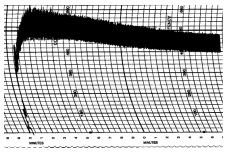
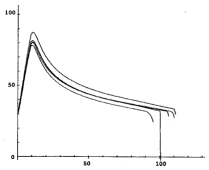


Low Protein:



Alveograms:

High Protein:



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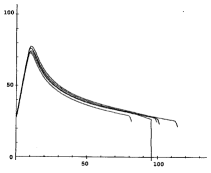

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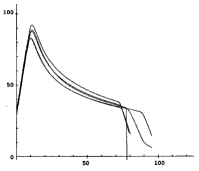


Hard Red Winter	Composite Average					
	2000 By Protein*				1999	5-Year
	Low	Med	High	Overall	Overall	Avg
Wheat Grade Data:						
Test Weight (lb/bu)	59.9	59.0	58.5	59.2	59.0	59.6
(kg/hl)	78.8	77.6	77.0	77.9	77.7	78.4
Damaged Kernels (%)	0.4	0.3	0.3	0.3	0.5	0.3
Foreign Material (%)	0.1	0.1	0.1	0.1	0.2	0.2
Shrunken & Broken (%)	1.4	1.5	1.4	1.4	1.1	1.3
Total Defects (%)	1.9	1.9	1.7	1.8	1.7	1.8
Grade	2 HRW	2 HRW	2 HRW	2 HRW	2 HRW	2 HRW
Wheat Non-Grade Data:						
Dockage (%)	0.7	0.7	0.8	0.8	0.6	0.7
Moisture (%)	11.9	11.5	11.1	11.5	12.1	11.9
Protein: 12% Moisture Basis (%)	10.8	12.0	13.4	12.0	11.4	12.1
0% Moisture Basis (%)	12.3	13.6	15.2	13.6	12.9	13.7
Ash: 14% Moisture Basis (%)	1.58	1.62	1.61	1.60	1.53	1.55
0% Moisture Basis (%)	1.84	1.88	1.88	1.86	1.78	1.80
1000 Kernel Weight (g)	28.0	26.3	25.3	26.7	29.3	28.8
Kernel Size (%) lg/md/sm	57/41/1	47/51/2	40/56/2	49/48/2		
Single Kernel: Hardness	76.0	75.8	76.0	75.7	65.0	71.3
Weight (mg)	28.9	27.4	26.4	27.6	31.1	29.6
Diameter (mm)	2.2	2.2	2.1	2.2	2.3	2.3
Sedimentation (cc)	31.9	40.9	50.6	40.3	35.2	40.4
Falling Number (sec)	390	396	394	393	352	368
Flour Data:						
Extraction Rate (%)	68.8	68.9	67.7	68.3	72.5	71.1
Color: L*	91.9	92.7	90.7	91.5	92.7	
a*	-3.1	-3.3	-3.4	-3.3	-3.4	
b*	9.7	9.9	9.9	9.8	9.6	
Protein: 14% Moisture Basis (%)	9.4	10.5	11.5	10.4	10.2	10.7
0% Moisture Basis (%)	10.9	12.2	13.4	12.1	11.8	12.4
Ash: 14% Moisture Basis (%)	0.50	0.51	0.50	0.50	0.48	0.48
0% Moisture Basis (%)	0.59	0.59	0.58	0.58	0.56	0.56
Wet Gluten (%)	23.7	27.2	30.4	26.8	25.5	27.8
Falling Number (sec)	392	425	422	410	362	387
Amylograph Viscosity 65 g (BU)	629	693	654	653	572	669
Starch Damage (%)	7.9	8.0	7.3	7.7		
Dough Properties:						
Farinograph:						
Peak Time (min)	5.0	5.7	6.0	5.5	5.1	5.8
Stability (min)	10.6	11.6	11.6	11.2	10.2	12.1
Absorption (%)	56.3	57.5	57.9	57.0	59.4	59.6
Alveograph: P (mm)	89	84	86	86	82	88
L (mm)	83	93	99	90	89	99
W (erg/gm)	257	269	291	271	247	287
Extensigraph: Resistance (cm)						
(45/135 min) Extension (cm)						
Area (sq cm)						
Baking Evaluation:						
Crumb Grain	6	7	7	7	7	7
Crumb Texture	6	7	7	7	7	7
Loaf Volume (cc)	766	830	880	818	809	803
% of Area Production:	37	30	33	100	100	100

* Low: Less than 11.5%; Med: 11.5 - 12.5%; High: 12.5% or greater

Harvest Data

Gulf Exportable Average						PNW Exportable Average					
2000 By Protein*				1999	5-Year	2000 By Protein*				1999	5-Year
Low	Med	High	Overall	Overall	Avg	Low	Med	High	Overall	Overall	Avg
59.7	58.2	58.0	58.8	58.8	59.4	60.7	59.4	59.6	59.9	59.6	60.0
78.6	76.6	76.4	77.4	77.4	78.2	79.9	78.1	78.4	78.8	78.6	79.0
0.4	0.4	0.3	0.3	0.6	0.4	0.4	0.3	0.4	0.4	0.4	0.4
0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
1.4	1.5	1.5	1.5	1.0	1.3	1.2	1.3	1.2	1.2	1.1	1.3
1.9	2.0	1.8	1.9	1.7	1.8	1.7	1.7	1.6	1.6	1.6	1.8
2 HRW	2 HRW	2 HRW	2 HRW	2 HRW	2 HRW	1 HRW	2 HRW	2 HRW	2 HRW	2 HRW	1HRW
0.6	0.7	0.9	0.7	0.5	0.7	1.0	0.8	0.7	0.9	0.6	0.8
12.0	11.4	11.3	11.6	12.2	12.0	11.5	11.5	10.6	11.1	11.5	11.5
10.9	11.9	13.4	11.9	11.4	12.1	10.7	12.0	13.4	12.1	11.3	12.1
12.4	13.5	15.2	13.5	13.0	13.7	12.1	13.6	15.2	13.8	12.9	13.7
1.59	1.62	1.66	1.62	1.52	1.60	1.54	1.56	1.51	1.53	1.53	1.53
1.85	1.88	1.93	1.88	1.77	1.80	1.79	1.82	1.75	1.78	1.78	1.78
27.6	25.8	24.5	26.2	29.3	28.6	29.9	27.1	27.1	28.0	29.3	29.4
55/42/1	46/52/2	36/59/2	47/50/2			65/34/1	51/47/2	47/50/2	54/44/2		
77.1	76.4	76.7	76.5	65.2	71.5	71.4	71.9	74.4	72.7	64.2	69.5
28.4	26.8	25.5	27.0	31.1	29.6	30.9	28.5	28.5	29.2	30.7	30.2
2.2	2.1	2.0	2.1	2.3	2.3	2.3	2.2	2.2	2.2	2.3	2.3
31.8	40.4	50.8	39.7	35.7	40.1	32.5	40.7	50.2	41.9	33.4	40.0
391	391	390	391	346	365	386	398	402	396	373	375
68.7	68.1	67.1	67.8	72.5	70.8	69.4	69.2	68.9	69.2	72.3	71.5
91.7	91.8	90.3	90.9	92.6		92.7	92.8	91.8	92.3	92.7	
-3.0	-3.2	-3.3	-3.1	-3.5		-3.6	-3.6	-3.5	-3.6	-3.4	
9.7	9.9	10.0	9.8	9.5		9.7	9.8	9.7	9.7	9.9	
9.4	10.4	11.5	10.3	10.2	10.7	9.5	10.5	11.6	10.6	10.2	10.8
10.9	12.1	13.4	11.9	11.8	12.4	11.0	12.2	13.5	12.3	11.8	12.5
0.51	0.52	0.51	0.51	0.49	0.50	0.46	0.46	0.47	0.47	0.46	0.46
0.60	0.61	0.59	0.60	0.56	0.60	0.54	0.53	0.55	0.54	0.54	0.53
23.5	26.9	30.0	26.3	25.3	27.6	24.4	27.2	31.2	27.9	26.1	28.3
393	416	420	406	353	381	389	439	424	418	390	403
652	698	718	681	566	678	530	657	507	559	590	632
8.0	8.0	7.2	7.7			7.6	7.8	7.8	7.7		
5.0	5.6	5.9	5.4	4.9	5.8	5.0	5.6	6.1	5.6	5.6	5.9
10.6	11.4	11.9	11.2	10.0	12.3	10.3	11.8	10.9	11.0	11.0	11.3
56.1	57.0	57.6	56.5	59.1	59.4	57.0	57.2	58.7	57.7	60.2	60.1
89	85	85	86	82	88	90	80	88	86	84	87
83	91	100	90	80	96	80	96	95	91	86	100
258	270	292	271	249	289	255	256	288	268	240	283
8.9/9.7	9.7/10.5	8.5/9.6	10.3/10.1			9.7/10.4	9.6/9.7	8.2/8.2	8.9/9.3		
18.2/15.1	18.6/17.3	19.8/19.9	18.6/15.8			18.0/15.5	18.0/16.8	18.2/17.4	18.4/15.3		
108/103	121/120	119/131	128/107			110/115	122/116	105/102	105/100		
6	7	8	7	7	7	7	8	7	7	8	7
6	7	7	7	7	7	7	7	7	7	8	7
757	821	882	809	807	803	800	829	877	839	815	801
43	27	30	100	100	100	31	30	39	100	100	100

California and Export Data

Hard Red Winter	California Harvest Data				Export Cargo Data			
	Medium Protein Average		High Protein Average		Gulf		PNW	
	2000	1999	2000	1999	2000	1999	2000	1999
Wheat Grade Data:								
Test Weight (lb/bu)	62.5	64.6	62.8	63.5	60.6	61.1	62.0	61.5
(kg/hl)	82.2	84.9	82.6	83.5	79.7	80.4	81.6	80.9
Damaged Kernels (%)	0.0	0.0	0.1	0.0	1.0	1.0	0.1	0.1
Foreign Material (%)	0.1	0.1	0.2	0.1	0.2	0.2	0.1	0.2
Shrunken & Broken (%)	0.6	0.4	0.5	0.6	1.6	1.7	1.3	1.7
Total Defects (%)	0.7	0.4	0.8	0.7	2.8	2.9	1.5	2.0
Grade	1 HRW	1HRW	1HRW	1HRW	1HRW	1HRW	1HRW	1HRW
Wheat Non-Grade Data:								
Dockage (%)	0.6	0.5	0.6	0.9	0.5	0.6	0.3	0.4
Moisture (%)	10.2	8.5	9.2	8.4	11.9	11.8	10.2	10.6
Protein: 12% Moisture Basis (%)	11.7	11.8	13.2	13.6	11.5	11.4	12.1	11.9
0% Moisture Basis (%)	13.3	13.4	15.0	15.5	13.0	13.0	13.8	13.5
Ash: 14% Moisture Basis (%)	1.49	1.48	1.46	1.46	1.59	1.53	1.48	1.49
0% Moisture Basis (%)	1.73	1.72	1.70	1.70	1.85	1.78	1.73	1.74
1000 Kernel Weight (g)	38.4	45.9	38.5	46.0	26.3	27.5	27.1	28.1
Kernel Size (%) lg/md/sm					58/41/2	63/35/2	55/43/1	61/37/1
Single Kernel: Hardness					*	68.6	*	71.5
Weight (mg)					*	30.5	*	31.0
Diameter (mm)					*	2.3	*	2.3
Sedimentation (cc)					28.3	27.7	35.8	33.2
Falling Number (sec)	334	390	354	398	400	421	439	413
Flour Data:								
Extraction Rate (%)	69.3	70.6	70.3	70.9	70.6	71.2	70.9	70.6
Color: L*					92.7	92.6	92.6	92.4
a*					-2.7	-3.0	-2.5	-3.2
b*					8.9	9.3	9.7	9.9
Protein: 14% Moisture Basis (%)	10.5	10.3	11.5	12.1	10.1	10.0	11.0	10.6
0% Moisture Basis (%)	12.2	12.0	13.4	14.1	11.8	11.7	12.7	12.3
Ash: 14% Moisture Basis (%)	0.46	0.44	0.46	0.40	0.51	0.49	0.48	0.47
0% Moisture Basis (%)	0.53	0.51	0.53	0.47	0.59	0.57	0.56	0.54
Wet Gluten (%)	26.9	27.2	30.4	31.5	25.4	25.5	28.8	27.9
Falling Number (sec)	334	390	354	398	417	462	470	456
Amylograph Viscosity 65 g (BU)					494	683	558	592
Starch Damage (%)								
Dough Properties:								
Farinograph:								
Peak Time (min)	8.3	7.7	10.7	13.8	6.4	6.0	5.6	5.5
Stability (min)	13.2	16.1	13.5	21.1	12.5	12.7	10.0	9.9
Absorption (%)	65.8	63.8	66.8	64.7	57.8	58.6	61.3	61.5
Alveograph: P (mm)					94	93	100	103
L (mm)					80	78	91	76
W (erg/gm)					267	255	287	271
Extensigraph: Resistance (cm)								
(45/135 min) Extension (cm)								
Area (sq cm)								
Baking Evaluation:								
Crumb Grain					6.9	7.0	7.3	7.3
Crumb Texture					7.2	7.2	7.5	7.5
Loaf Volume (cc)	849	832	907	913	854	828	900	846
Number of Samples					107	307	15	66

* Data not yet available.

Hard Red Winter Production by Crop Year

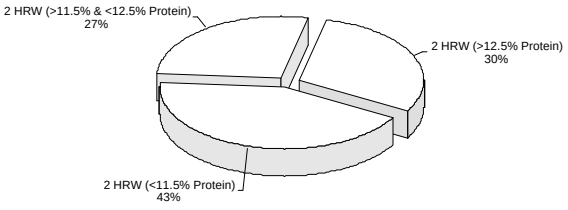
for the major HRW growing region
(million metric tons)

	2000	1999	1998	1997	1996
Kansas	9.47	11.77	13.47	13.65	6.95
Oklahoma	3.89	4.10	5.41	4.62	2.53
Texas	1.80	3.33	3.71	3.24	2.05
Colorado	1.85	2.81	2.71	2.35	1.92
Nebraska	1.62	2.22	2.25	1.91	2.00
Montana	1.21	1.00	1.33	1.50	1.72
South Dakota	1.46	1.61	1.66	0.94	1.51
California	0.67	0.79	0.62	0.76	1.03
Eight-State Total	**21.96**	**27.62**	**31.17**	**28.96**	**19.71**
Total HRW Production	**22.96**	**28.60**	**32.10**	**29.89**	**20.72**

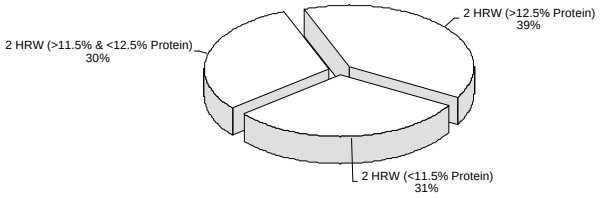
Based on USDA crop estimates of September 29, 2000.

Protein Distribution

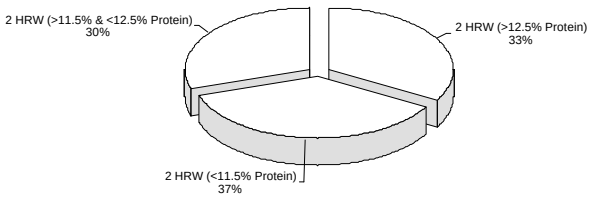
Gulf Exportable



PNW Exportable



Overall



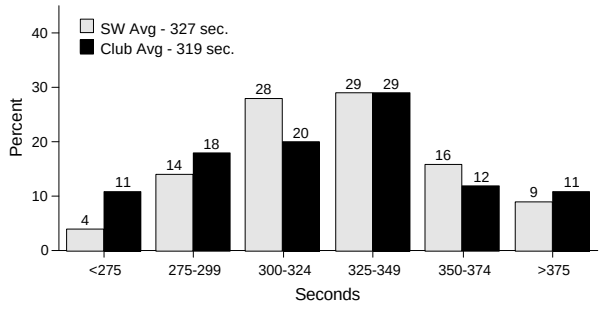
Pacific Northwest Soft White Wheat

Harvest Survey

Weather and Harvest: Growing conditions in Oregon and Washington were very dry in fall 1999 and spring 2000. Much of the Idaho wheat was irrigated, so wheat was less affected. Timely summer rainfall during grain filling was good, which resulted in plump kernels with high test weight. Mostly dry harvest conditions prevailed and the soft white crop had little sprout damage.

Wheat and Grade Data: The average test weight for the 2000 soft white (SW) crop was 1.1 lb/bu higher than last year and 0.9 lb/bu higher than the five-year average. Club wheat test weight was slightly higher than last year and the five-year average. Total defects of SW were slightly higher than last year and the five-year average, but those of club were slightly lower than last year and the five-year average. All final composite samples were graded No. 1. Both the moisture and protein contents of the 2000 crop SW and club wheat were lower than last year and the five-year average. The 2000 SW crop also had greater 1000-kernel weight and kernel diameter than last year. Sedimentation volumes were less than last year due to lower protein contents. Falling number values were slightly lower than last year, but were still above 300 seconds, indicating little sprout damage.

Falling Number

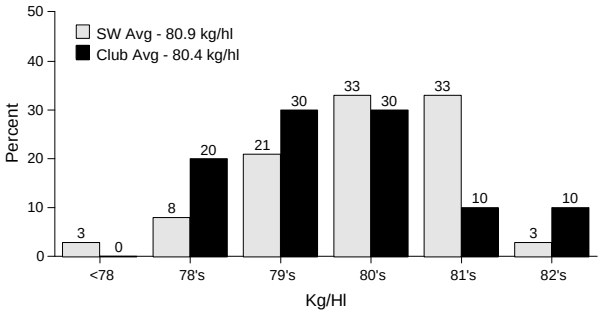


Flour, Dough and Bake Data: Compared to the 1999 crop, flour extractions for the 2000 SW and club wheat decreased 2.8 and 2.6 percentage points, respectively, in spite of having higher test weights, 1000-kernel weights and larger kernel sizes, which usually indicate better milling characteristics. Flour protein and wet gluten values were lower, reflecting the lower wheat protein. Falling number values and amylograph viscosities indicated negligible sprout damage. Farinograph data showed the same absorptions and similar mixing properties to last year and the five-year average for SW, but club had lower absorptions and weaker mixing characteristics than last year and the five-year average. Alveograph data for SW showed lower extensibility ("L") and overall strength ("W") than last year, but values were similar to the five-year average. Alveograph for club indicated lower maximum overpressure ("P"), "L", and "W" than last year and the five-year average. Extensigraph data showed higher resistance to extension and lower extensibility than last year and the five-year average. Sponge cake volume, appearance, and crumb grain scores for SW and club were greater than last year and similar to the five-year average. Cookie spread for both SW and club was the largest in the last five years.

Chinese Southern-Type Steamed Bread: Each flour was made into southern-type steamed bread and compared with a Chinese commercial southern-type steamed bread flour. Specific volumes increased with the protein content for SW. SW had better performance than club in steamed bread making. High protein SW showed steamed bread quality close to the control flour.

Summary: The 2000 SW and white club crop appears to have superior end-use quality. The major changes in the 2000 crop are the lower protein and moisture contents relative to the 1999 crop. Low moisture content has the potential for increasing millers' profitability. Baking tests in sponge cakes and sugar-snap cookies showed improvement from the 1999 crop. High protein SW wheat showed steamed bread quality close to the control flour.

Hectoliter Weight



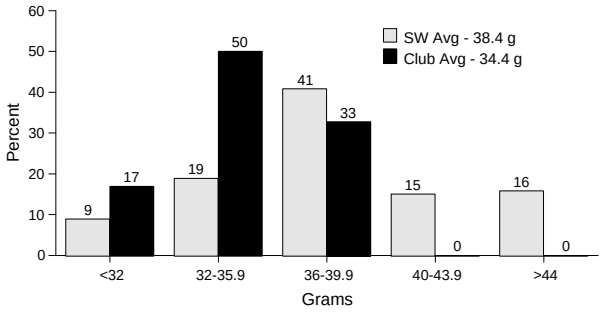
Wheat quality testing and data analyses were conducted by the Wheat Marketing Center, Portland, Oregon. Laboratory testing was according to American Association of Cereal Chemists Approved Methods (2000). Survey samples were collected from producers under the management of the National Agricultural Statistics Services, USDA, and represent a statistical sampling of the crop.

The wheat commissions of Idaho, Oregon and Washington, U.S. Wheat Associates, Inc, and the U.S. Department of Agriculture supported this program.

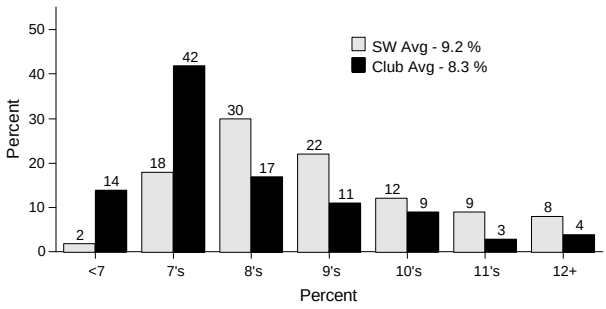
Export Cargo Survey

The Pacific Northwest white wheat export cargo data show the results of analyses of individual sublot samples including 90 drawn from the 1998 crop (October 1998-September 1999) and 60 from the 1999 crop. The samples were randomly selected from official Federal Grain Inspection Service samples. Grade data are the actual grades on the individual sublots. Milling and processing analyses were conducted by the Wheat Marketing Center, Portland, Oregon.

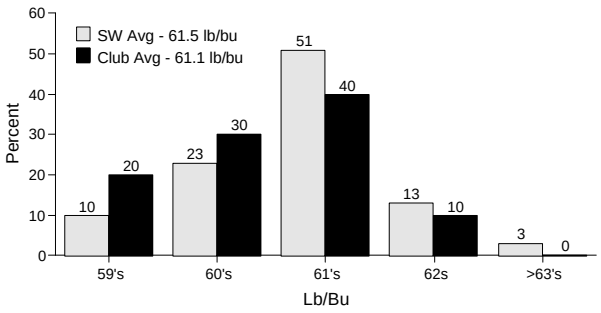
1000 Kernel Weight



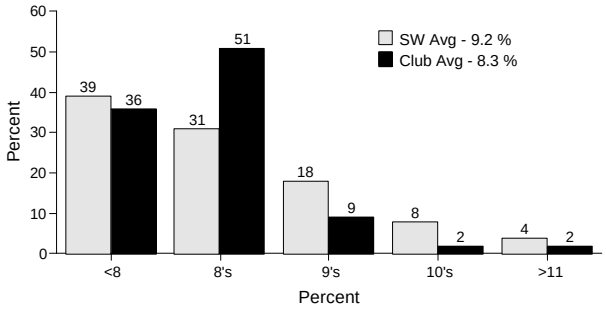
Protein (12% mb)



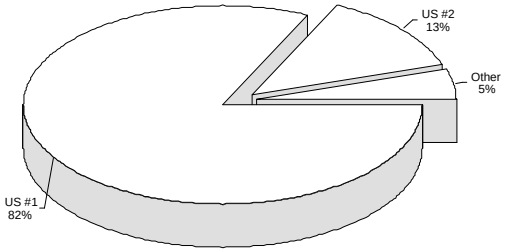
Test Weight



Wheat Moisture



2000 SW Grade Distribution



Pacific Northwest Soft White Wheat Production

by crop year in major white wheat producing states
(million metric tons)

	2000		1999		1998		1997		1996	
	SW	CLUB	SW	CLUB	SW	CLUB	SW	CLUB	SW	CLUB
Washington	3.48	0.41	2.78	0.19	3.60	0.33	3.72	0.32	4.36	0.47
Oregon	1.23	0.11	0.87	0.03	1.43	0.09	1.59	0.08	1.80	0.09
Idaho	1.89	0.07	1.86	0.02	2.01	0.02	2.47	0.02	2.69	
Three-state Total	6.60	0.59	5.51	0.24	7.04	0.44	7.78	0.42	8.85	0.56
Three-state Total Soft White Wheat	7.19		5.75		7.48		8.20		9.41	
Total Soft White Wheat Production	8.03		6.57		8.11		9.04		9.66	

Based on USDA crop estimates of September 29, 2000.

Pacific Northwest Harvest Data

Soft White	2000 Soft White By Protein*				Club	1999		5-Year Avg	
	Low	Med	High	All	Avg	SW	Club	SW	Club
Wheat Grade Data:									
Test Weight (lb/bu)	61.6	61.8	61.2	61.5	61.2	60.4	61.0	60.6	61.1
(kg/hl)	80.9	81.3	80.5	80.9	80.4	79.5	80.2	79.7	80.3
Heat Damage (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Damaged Kernels (%)	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0
Foreign Material (%)	0.4	0.2	0.4	0.3	0.1	0.0	0.1	0.1	0.2
Shrunken & Broken (%)	0.6	0.9	1.3	0.8	1.1	0.8	1.8	0.8	1.2
Total Defects (%)	0.9	1.1	1.6	1.1	1.2	0.9	1.9	1.0	1.3
Grade	1 SWH	1 SWH	1 SWH	1 SWH	1WHCB	1 SWH	1WHCB	1 SWH	1WHCB
Wheat Non-Grade Data:									
Dockage (%)	0.5	0.3	0.5	0.4	0.7	0.4	0.6	0.5	0.7
Moisture (%)	9.3	9.2	9.2	9.2	8.3	10.1	9.5	9.6	9.2
Protein: 12% Moisture Basis (%)	8.1	9.6	11.5	9.2	8.3	10.5	10.0	9.7	8.9
0% Moisture Basis (%)	9.2	10.9	13.0	10.5	9.4	11.9	11.4	10.9	10.1
Ash: 14% Moisture Basis (%)	1.35	1.36	1.45	1.37	1.24	1.35	1.25	1.41	1.30
0% Moisture Basis (%)	1.56	1.58	1.68	1.60	1.45	1.57	1.45	1.64	1.51
1000 Kernel Weight (g)	39.1	39.1	36.0	38.4	34.4	37.5	32.5	37.4	33.9
Kernel Size (%) lg/md/sm									
Single Kernel: Hardness	39.2	40.2	32.3	38.0	39.2	33.0	39.0		
Weight (mg)	39.1	39.1	36.0	38.4	34.4	37.5	32.5		
Diameter (mm)	2.7	2.7	2.5	2.7	2.5	2.5	2.3		
Sedimentation (cc)	10.6	14.4	21.9	14.0	11.4	19.5	13.4	14.7	11.7
Falling Number (sec)	317	327	351	327	319	339	337	331	333
Flour Data:									
Extraction Rate (%)	67.7	65.9	65.4	66.7	68.8	69.5	71.4	67.7	69.0
Color: L*	92.4	92.3	92.2	92.3	92.4	92.6	92.3		
a*	-2.9	-2.7	-2.5	-2.8	-2.6	-2.7	-2.4		
b*	8.2	8.0	7.2	7.9	7.3	7.6	7.0		
Protein: 14% Moisture Basis (%)	6.6	7.9	9.5	7.6	6.9	8.8	8.6	8.0	7.3
0% Moisture Basis (%)	7.7	9.1	11.1	8.8	8.0	10.2	10.0	9.3	8.5
Ash: 14% Moisture Basis (%)	0.36	0.35	0.39	0.36	0.37	0.39	0.40	0.39	0.40
0% Moisture Basis (%)	0.42	0.40	0.46	0.42	0.43	0.45	0.48	0.45	0.46
Wet Gluten 14% mb (%)	15.9	20.8	25.3	19.2	11.5	25.4	15.6	21.3	15.3
Falling Number (sec)	337	326	355	338	340	334	347		
Amylograph Viscosity 65 g (BU)	463	458	710	514	533	580	645	544	590
Starch Damage (%)	2.8	2.5	2.2	2.6	2.4				
Dough Properties:									
Farinograph:									
Peak Time (min)	1.1	1.5	1.6	1.3	0.9	1.5	1.3	1.6	1.1
Stability (min)	1.6	3.0	3.1	2.3	0.9	2.6	1.4	3.1	1.5
Absorption (%)	50.0	50.4	49.2	49.9	47.4	49.9	49.5	49.9	48.6
Alveograph: P (mm)	41	37	33	38	23	41	32	40	29
L (mm)	67	110	174	101	56	123	80	97	64
W (erg/gm)	78	95	120	91	30	122	56	97	46
Extensigraph: Resistance (cm)	3.2	4.9	5.1	4.1	2.0	3.9	1.4	4.0	1.8
(45 min) Extension (cm)	12.0	15.5	20.1	14.7	11.5	17.2	16.6	15.5	14.0
Area (sq cm)	35	62	77	51	20	56	20	51	22
Baking Evaluation:									
Sponge Cake: Volume (cc)	1126	1107	1144	1124	1169	1088	1150	1143	1172
Score	51	50	49	50	53	46	51	54	54
Cookie Diameter (cm)	8.7	8.7	8.6	8.7	8.9	8.4	8.5	8.5	8.7
Chinese Southern-Type Steamed Bread Evaluation:									
Specific Volume (ml/g)	3.06	3.23	3.39	3.18	3.27				
Total Score	62.5	65.7	67.9	64.5	60.4				
% of Area Production:	52	27	21	100	100	100	100	100	100

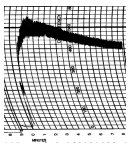
Export Cargo Data

Soft White	1999	1998
Wheat Grade Data:		
Test Weight (lb/bu)	61.2	61.2
(kg/hl)	80.4	80.5
Heat Damage (%)	0.0	0.0
Damaged Kernels (%)	0.2	0.2
Foreign Material (%)	0.1	0.2
Shrunken & Broken (%)	1.0	1.0
Total Defects (%)	1.4	1.3
Grade	1 SWH	1 SWH
Wheat Non-Grade Data:		
Dockage (%)	0.4	0.5
Moisture (%)	10.2	8.8
Protein: 12% Moisture Basis (%)	10.1	9.4
0% Moisture Basis (%)	11.5	10.7
Ash: 14% Moisture Basis (%)	1.30	1.37
0% Moisture Basis (%)	1.51	1.59
1000 Kernel Weight (g)	36.5	38.0
Kernel Size (%) lg/md/sm	82/18/1	86/14/1
Single Kernel: Hardness	32.0	33.4
Weight (mg)	36.7	39.1
Diameter (mm)	2.5	2.6
Sedimentation (cc)	18.2	13.2
Falling Number (sec)	364	375
Flour Data:		
Extraction Rate (%)	69.9	68.9
Color: L*	92.4	92.6
a*	-2.6	-2.6
b*	7.4	7.3
Protein: 14% Moisture Basis (%)	8.4	7.8
0% Moisture Basis (%)	9.7	9.0
Ash: 14% Moisture Basis (%)	0.39	0.37
0% Moisture Basis (%)	0.45	0.43
Wet Gluten 14% mb (%)	21.1	20.3
Falling Number (sec)	381	380
Amylograph Viscosity 65 g (BU)	516	592
Starch Damage (%)		
Dough Properties:		
Farinograph:		
Peak Time (min)	1.5	1.3
Stability (min)	2.5	2.5
Absorption (%)	49.9	49.8
Alveograph: P (mm)	40	44
L (mm)	109	82
W (erg/gm)	111	99
Extensigraph: Resistance (cm)		
(45 min) Extension (cm)		
Area (sq cm)		
Baking Evaluation:		
Sponge Cake: Volume (cc)	1113	1149
Score	40	49
Cookie Diameter (cm)	8.4	8.4
Chinese Southern-Type Steamed Bread Evaluation:		
Specific Volume (ml/g)		
Total Score		
Sample Count:	60	90

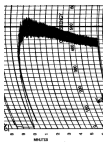
Composite Average Farinograms and Alveograms

Farinograms:

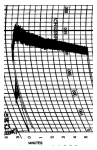
High Protein:



Medium Protein:

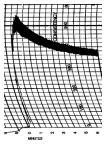


Low Protein:



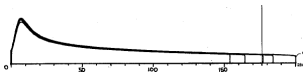
Average Protein:

Club:

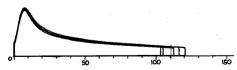


Alveograms:

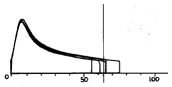
High Protein:



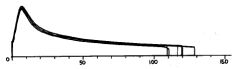
Medium Protein:



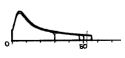
Low Protein:



Average Protein:



Club:



Hard Red Spring Wheat

Harvest Survey

Weather and Harvest: The 2000 hard red spring wheat (HRS) production season was aided by excellent planting conditions, nearly ideal precipitation and generally favorable weather during harvest. As a result, the favorable weather conditions led to increased production over 1999. Disease pressures were light and reported only in isolated areas. Protein levels were higher than last year and above long-term averages. However, the last 10% to 15% of the HRS crop was affected by wet conditions which resulted in some quality loss, especially test weights, falling numbers and bleaching.

The 2000 HRS planting season began in early April, progressed steadily with very few delays and was completed during the first week of June. As a result, the HRS crop was able to progress ahead of normal.

Early crop development was nearly ideal due to timely precipitation coupled with seasonal temperatures. There were isolated areas where excessive precipitation drowned the wheat plants and caused isolated plant diseases. As the HRS crop neared maturity, generally favorable temperatures and precipitation continued. Portions of the western Dakotas and Montana experienced crop stress as the HRS crop matured due to lack of moisture and high temperatures.

Harvest of the 2000 HRS crop began in late July. Warm and dry weather allowed 50% completion by mid-August which was ahead of the previous year's pace and of the five-year average. By early September, nearly 85% of the HRS crop had been harvested, which remained ahead of the five-year average. The remaining harvest stalled after September 4, particularly in northern North Dakota, because of a prolonged period of wet weather. The regional HRS harvest was completed by the end of September due to favorable weather during the latter part of the month.

Samples and Methods: Sample collection and analysis was conducted by the Department of Cereal Science, North Dakota State University, Fargo, North Dakota. The four-state HRS wheat growing region from which samples were collected is depicted in the accompanying map. A total of 789 HRS samples were collected from growers and grain elevators in Minnesota (105), Montana (180), North Dakota (387) and South Dakota (117). Samples were segregated by wheat protein content and were assigned to levels within each export region. Samples were then composited into three protein ranges for each export region: less than 13.5%, 13.5-14.5%, and greater than 14.5%. The methods are described in the Analysis Methods section of this booklet.

Wheat and Grade Data: Test weights on average for the 2000 crop are higher than last year and the five-year average. The average wheat protein content is higher than last year and is the highest it has been in the past five years. The percentage of vitreous kernels is higher than last year with the average grade of 1NS for the region. The average amount of damaged kernels is slightly higher than last year but lower than the five-year average. There are isolated areas with some fusarium head blight (scab) but there is considerably less than there was a few years ago. The average falling number is higher than last year and the five-year average. However, there are some isolated areas in the northern part of the HRS growing region with some sprout damaged wheat.

Flour and Baking Data: Flour extraction using the Buhler experimental mill is slightly higher than last year and equal to the five-year average. The wet gluten values for the 2000 crop are on average higher than last year. Dough properties on average as measured with the farinograph are somewhat weaker than last year and the five-year average. However, the farinogram absorption is higher than the 1999 crop average. Alveogram data indicate dough characteristics more extensible than the five-year average. The baking data show that the average bake absorption is higher than last year and the long-term average. Average loaf volume for the region is slightly lower than last year but higher than the five-year average. Crumb grain and texture is rated as slightly better than last year's crop.

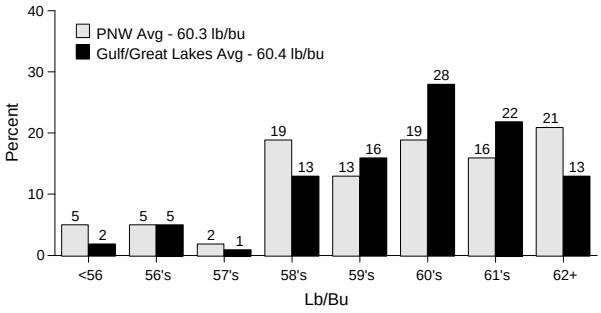
Summary: Compared to the five-year averages, the 2000 HRS crop has higher wheat protein content, higher test weight and a lower percentage of damaged kernels. There are isolated areas in the northern part of the growing region that have experienced some sprouting. Fusarium head blight was present to a minor extent but less than in the previous five or six years.

Average dough mixing properties of the 2000 crop as measured with the farinograph are somewhat weaker than the five-year average. There are areas in the region that are stronger in terms of mixing characteristics than other areas. Overall bread-baking performance, including absorption and loaf volume, is considered good. The 2000 HRS wheat crop is rated as average to good quality, but care must be exercised in wheat purchasing due to some sprout and scab damage in certain areas. Quality differences do exist between the west and east export regions.

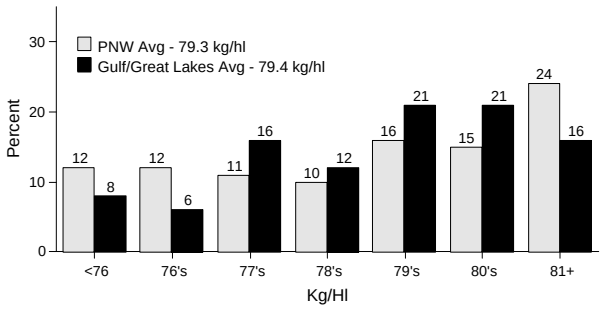
Export Cargo Survey

The export cargo survey shows the results of analysis of 170 individual sublot samples for crop year 1999 (collected from October through August) and 187 for crop year 1998. Of the 170 1999 samples, 98 were collected from PNW ports, 43 from the Lakes and 29 from Gulf ports. The samples were randomly selected from official Federal Grain Inspection Service samples. Grade data are the official grades on the individual sublots. Milling and baking analyses were conducted by North Dakota State University.

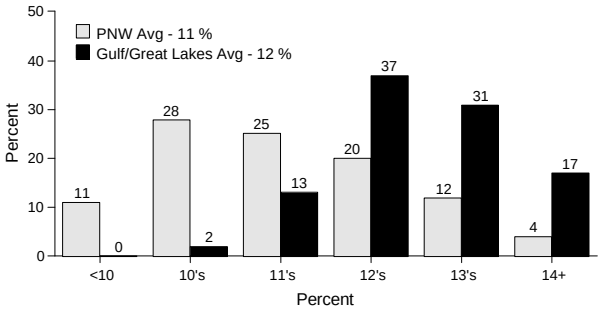
Test Weight



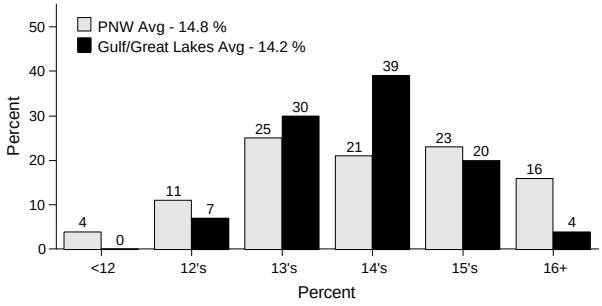
Hectoliter Weight



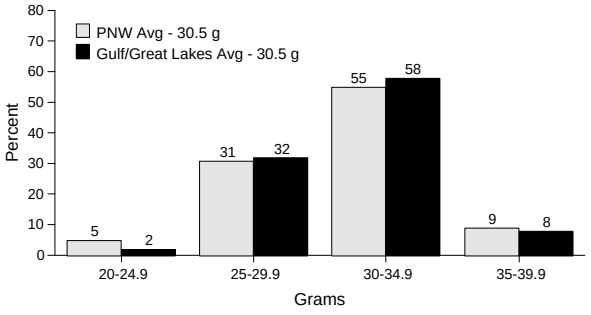
Wheat Moisture



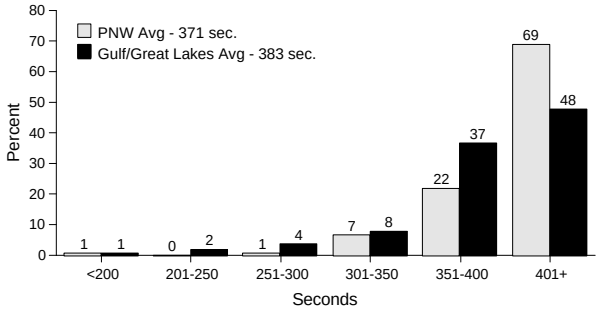
Protein (12% mb)

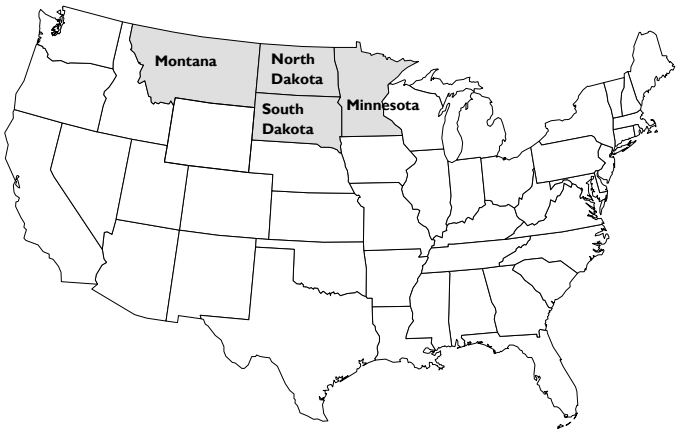


1000 Kernel Weight



Falling Number



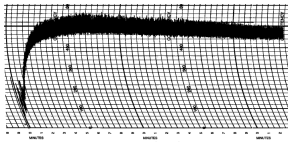


Hard red spring survey results are from four states.

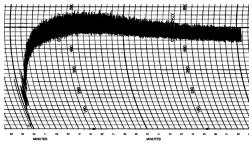
Composite Average Farinograms and Alveograms

Farinograms:

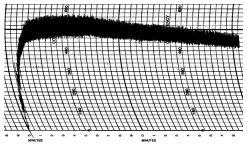
High Protein:



Medium Protein:

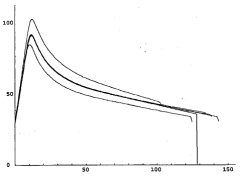


Low Protein:

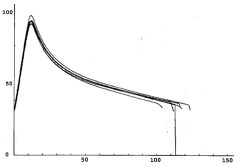


Alveograms:

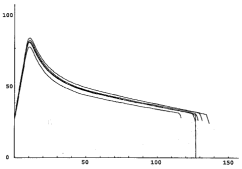
High Protein:



Medium Protein:



Low Protein:



Hard Red Spring	Composite Average					
	2000 By Protein*				1999	5-year
	Low	Med	High	Overall	Overall	Avg
Wheat Grade Data:						
Test Weight (lb/bu)	61.2	60.4	59.9	60.4	59.3	60.0
(kg/hl)	80.5	79.5	78.8	79.4	78.1	78.9
Damaged Kernels (%)	0.5	0.4	0.6	0.5	0.4	0.8
Foreign Material (%)	0.0	0.0	0.0	0.0	0.0	0.0
Shrunken & Broken (%)	1.4	1.4	1.3	1.4	1.4	1.6
Total Defects (%)	1.9	1.8	1.9	1.9	1.8	2.4
Vitreous Kernels (%)	58	72	73	69	61	74
Grade	1NS	1NS	1NS	1NS	1NS	1NS
Wheat Non-Grade Data:						
Dockage (%)	1.1	1.0	1.3	1.1	1.6	2.3
Moisture (%)	11.9	11.9	11.4	11.6	12.4	12.3
Protein: 12% Moisture Basis (%)	12.5	14.1	15.7	14.4	14.1	14.0
0% Moisture Basis (%)	14.2	16.0	17.9	16.4	16.0	15.9
Ash: 14% Moisture Basis (%)	1.66	1.67	1.67	1.67	1.68	1.67
0% Moisture Basis (%)	1.93	1.94	1.94	1.94	1.96	1.94
1000 Kernel Weight (g)	31.2	31.5	29.6	30.6	30.3	31.0
Kernel Size (%) lg/md/sm	67/28/5	65/30/5	58/36/5	65/31/4	58/36/6	
Single Kernel: Hardness	77.9	81.0	79.1	79.5	82.0	
Weight (mg)	31.4	30.0	30.0	30.3	31.2	
Diameter (mm)	2.4	2.3	2.4	2.3	2.4	
Sedimentation (cc)	41.0	54.0	61.0	54.0	50.5	
Falling Number (sec)	375	403	363	379	313	372
Flour Data:						
Extraction Rate (%)	70.2	69.4	68.3	69.1	68.6	69.1
Color: L*	90.4	90.3	90.2	90.3	90.2	
a*	-1.6	-1.5	-1.4	-1.4	-1.5	
b*	9.5	9.5	9.5	9.5	9.6	
Protein: 14% Moisture Basis (%)	11.6	12.8	14.4	13.2	12.9	12.9
0% Moisture Basis (%)	13.5	14.9	16.7	15.3	15.0	15.0
Ash: 14% Moisture Basis (%)	0.47	0.48	0.49	0.48	0.46	0.45
0% Moisture Basis (%)	0.55	0.56	0.57	0.56	0.54	0.52
Wet Gluten (%)	31.1	35.5	40.2	36.5	34.7	34.9
Falling Number (sec)	392	408	397	400	345	389
Amylograph Viscosity: 65g (BU)	551	629	566	584	404	551
100g (BU)	1950	2165	1917	2009	1493	2661
Starch Damage (%)	7.2	7.1	6.1	6.7		
Dough Properties:						
Farinograph:						
Peak Time (min)	6.5	7.2	8.1	7.5	8.7	10.0
Stability (min)	11.7	12.4	15.2	13.5	15.6	16.8
Absorption (%)	64.0	65.5	65.9	65.3	64.5	63.5
Classification	5.0	5.5	5.9	5.6	6.1	6.1
Alveograph: P (mm)	103	101	98	100	100	90
L (mm)	111	115	126	119	103	106
W (erg/gm)	385	388	417	400	378	331
Extensigraph: Resistance (cm)	8.7/11.0	7.8/8.2	7.8/8.4	8.0/8.9	8.0	
(45/135 min) Extension (cm)	21.2/19.9	23.2/22.4	24.9/25.4	23.5/23.1	23.3	
Area (sq cm)	130/150	127/128	141/158	134/146	136	
Baking Evaluation:						
Absorption (%)	62.5	64.0	64.4	63.8	63.0	62.0
Crumb Grain and Texture	8.2	8.0	8.2	8.2	8.1	8.1
Loaf Volume (cc)	957	1031	1062	1027	1035	1004
% Area Production:	23	34	43	100	100	100

* Low: Less than 13.5%; Med: 13.5 - 14.5%; High: 14.5% or greater

Data

PNW Average						Gulf/Great Lakes Average					
2000 By Protein*					5-year	2000 By Protein*					5-year
Low	Med	High	Overall	1999	Avg	Low	Med	High	Overall	1999	Avg
61.5	60.7	59.5	60.3	59.9	60.5	60.9	60.2	60.3	60.4	59.0	59.7
80.9	79.8	78.3	79.3	78.7	79.6	80.1	79.2	79.3	79.4	77.6	78.5
0.3	0.3	0.1	0.2	0.1	0.2	0.7	0.4	1.0	0.7	0.6	1.2
0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.8	2.0	1.8	1.9	1.5	2.0	1.0	0.9	0.9	0.9	1.3	1.3
2.2	2.4	1.9	2.1	1.6	2.3	1.7	1.3	1.9	1.6	1.9	2.5
81	80	90	85	76	82	37	65	58	56	50	68
1DNS	1DNS	1DNS	1DNS	1DNS	1DNS	1NS	1NS	1NS	1NS	1NS	1NS
1.1	1.0	1.4	1.2	1.4	1.9	1.1	1.0	1.2	1.1	1.6	2.5
10.9	11.3	10.4	10.8	11.8	11.4	12.7	12.4	12.2	12.4	12.8	12.7
12.5	14.2	16.2	14.8	14.4	14.1	12.5	14.0	15.3	14.2	13.9	14.1
14.2	16.1	18.4	16.8	16.3	16.0	14.2	15.9	17.4	16.1	15.8	16.0
1.65	1.65	1.66	1.65	1.65	1.59	1.67	1.68	1.68	1.68	1.71	1.72
1.92	1.92	1.93	1.92	1.92	1.85	1.94	1.95	1.95	1.95	1.99	2.00
31.7	32.2	29.1	30.5	30.1	30.8	30.7	30.8	30.0	30.5	30.4	31.1
63/32/5	63/32/5	49/43/8	58/36/6	57/36/7		71/24/5	67/28/5	68/28/4	68/28/4	60/34/6	
79.0	81.0	78.0	79.0	83.5		77.0	81.0	80.0	79.8	80.9	
32.4	30.1	29.8	30.5	31.9		30.6	29.9	30.2	30.2	30.7	
2.5	2.3	2.3	2.3	2.5		2.3	2.3	2.4	2.3	2.4	
40.0	53.0	62.0	54.0	56.7	52.0	41.0	54.0	61.0	54.0	46.0	45.8
403	410	336	371	307	374	351	396	387	383	316	372
69.6	69.1	67.5	68.4	68.5	69.0	70.7	69.7	69.0	69.7	68.6	69.2
90.5	90.4	90.2	90.4	90.6		90.4	90.3	90.1	90.2	90.0	
-1.5	-1.4	-1.3	-1.4	-1.4		-1.6	-1.5	-1.5	-1.5	-1.6	
9.2	9.2	9.2	9.2	9.0		9.7	9.8	9.8	9.8	10.0	
11.6	13.0	15.0	13.7	13.3	13.0	11.6	12.6	13.8	12.8	12.6	12.8
13.5	15.1	17.4	15.9	15.5	15.1	13.5	14.7	16.0	14.9	14.7	14.9
0.48	0.48	0.50	0.49	0.46	0.43	0.47	0.48	0.48	0.48	0.47	0.46
0.56	0.56	0.58	0.57	0.53	0.50	0.55	0.56	0.56	0.56	0.55	0.53
31.2	35.6	41.5	37.5	35.3	34.9	31.1	35.4	39.1	35.8	34.4	35.0
426	413	390	405	336	390	361	404	404	395	350	388
710	730	420	570	414	572	410	540	695	569	385	543
2830	2430	1700	2165	1626	2864	1170	1930	2110	1829	1364	2570
7.4	7.0	6.3	6.8			7.0	7.1	5.8	6.6		
6.0	7.5	10.0	8.4	10.4	13.8	7.0	7.0	6.5	6.8	7.5	7.6
13.0	14.0	20.0	16.8	20.0	23.5	10.5	11.0	11.0	10.9	12.7	13.0
65.1	66.3	67.3	66.5	65.6	64.4	63.1	64.7	64.7	64.3	63.7	62.9
5.0	6.0	7.0	6.3	7.1	7.1	5.0	5.0	5.0	5.0	5.3	5.5
117	104	101	106	113	102	90	99	96	96	91	83
92	113	128	115	102	102	127	116	124	121	104	107
385	400	448	420	421	380	385	377	390	384	343	300
9.3/12.1	8.4/9.1	8.1/8.6	8.5/9.6	8.6		8.1/10.0	7.2/7.4	7.6/8.3	7.5/8.3	7.6	
21.9/19.1	24.7/23.0	24.5/27.9	23.9/24.5	22.8		20.5/20.7	21.9/21.8	25.3/23.1	22.9/22.0	23.7	
142/157	146/147	146/183	145/168	141		120/143	111/112	136/136	122/128	132	
63.6	64.8	65.8	65.0	64.1	62.9	61.6	63.2	63.2	62.8	62.2	61.3
8.5	8.0	8.5	8.4	8.3	8.3	8.0	8.0	8.0	8.0	7.8	8.1
925	1065	1120	1058	1043	1002	985	1000	1010	1000	1035	1009
25	25	50	100	100	100	22	41	37	100	100	100

Export Cargo Data

Hard Red Spring	PNW Average		Great Lakes Average		Gulf Average	
	1999	1998	1999	1998	1999	1998
Wheat Grade Data:						
Test Weight (lb/bu)	60.7	60.8	60.2	60.6	60.0	60.4
(kg/hl)	79.9	80.0	79.2	79.7	78.9	79.5
Damaged Kernels (%)	0.5	0.2	1.4	1.2	1.7	1.7
Foreign Material (%)	0.2	0.2	0.2	0.1	0.2	0.2
Shrunken & Broken (%)	1.7	2.1	1.7	1.7	1.8	1.8
Total Defects (%)	2.4	2.5	3.2	3.1	3.7	3.6
Vitreous Kernels (%)	82.5	81.8	53.4	58.8	56.9	58.9
Grade	1DNS	1DNS	2NS	2NS	2NS	2NS
Wheat Non-Grade Data:						
Dockage (%)	0.5	0.6	0.6	0.6	0.8	0.8
Moisture (%)	11.4	10.3	12.5	12.1	12.8	12.0
Protein: 12% Moisture Basis (%)	14.1	14.2	14.2	14.4	13.9	13.9
0% Moisture Basis (%)	16.1	16.1	16.2	16.3	15.8	15.8
Ash: 14% Moisture Basis (%)	1.53	1.59	1.67	1.70	1.65	1.68
0% Moisture Basis (%)	1.78	1.85	1.95	1.98	1.91	1.96
1000 Kernel Weight (g)	32.7	32.0	30.4	31.8	30.5	31.6
Kernel Size (%) lg/md/sm	59/35/6	57/36/7	58/35/7	60/33/6	59/34/7	58/35/7
Single Kernel: Hardness	79.2	79.4	78.0	79.2	75.2	77.5
Weight (mg)	32.6	32.0	30.3	31.8	30.5	31.6
Diameter (mm)	2.4	2.5	2.4	2.5	2.4	2.4
Sedimentation (cc)						
Falling Number (sec)	380	441	333	409	329	412
Flour Data:						
Extraction Rate (%)	69.7	69.0	70.5	70.2	70.6	70.0
Color: L*	90.2	90.6	89.9	90.1	90.0	90.3
a*	-1.3	-1.3	-1.4	-1.3	-1.4	-1.3
b*	8.5	8.6	9.1	9.2	9.3	9.1
Protein: 14% Moisture Basis (%)	13.1	13.1	13.0	13.2	12.7	12.7
0% Moisture Basis (%)	15.2	15.2	15.1	15.3	14.8	14.8
Ash: 14% Moisture Basis (%)	0.47	0.45	0.50	0.48	0.50	0.47
0% Moisture Basis (%)	0.55	0.52	0.58	0.56	0.58	0.55
Wet Gluten (%)	34.9	34.4	34.6	36.3	34.1	34.1
Falling Number (sec)	434	486	366	445	367	449
Amylograph Viscosity: 65g (BU)	575	690	387	564	388	592
100g (BU)						
Starch Damage (%)						
Dough Properties:						
Farinograph:						
Peak Time (min)	10.7	18.4	8.4	7.5	7.2	8.0
Stability (min)	20.6	26.1	13.1	13.7	11.6	13.9
Absorption (%)	66.9	64.9	65.5	63.2	64.4	62.5
Classification	6.8	7.5	5.5	5.5	5.1	5.5
Alveograph: P (mm)	131	110	101	83	102	85
L (mm)	81	90	91	98	90	95
W (erg/gm)	389	363	319	278	312	280
Extensigraph: Resistance (cm)						
(45/135 min) Extension (cm)						
Area (sq cm)						
Baking Evaluation:						
Absorption (%)	65.5	63.4	64.0	61.7	62.9	61.0
Crumb Grain and Texture	8.2	8.2	8.3	8.2	8.3	8.1
Loaf Volume (cc)	996	1007	981	1002	987	974
Sample Count:	98	139	43	48	29	64

Hard Red Spring Production by Crop Year

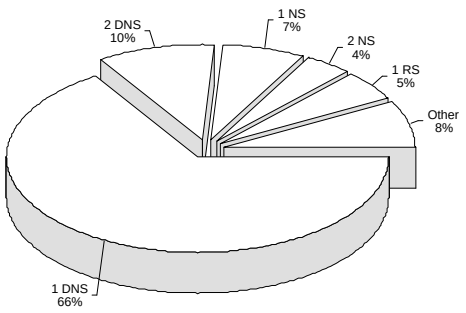
for the major producing states
(million metric tons)

	2000	1999	1998	1997	1996
Minnesota	2.60	2.12	2.14	2.05	2.86
Montana	2.11	2.94	2.94	3.24	2.90
North Dakota	6.55	4.57	5.75	5.72	8.53
South Dakota	1.63	1.63	1.61	1.71	2.27
Four-State Total	**12.89**	**11.26**	**12.44**	**12.71**	**16.56**
Total HRS Production	**13.84**	**12.19**	**13.24**	**13.37**	**17.17**

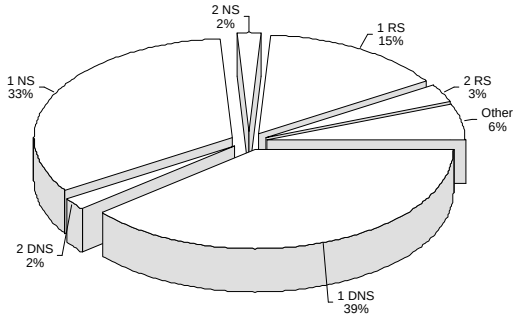
Based on USDA crop estimates of September 29, 2000.

Grade Distribution

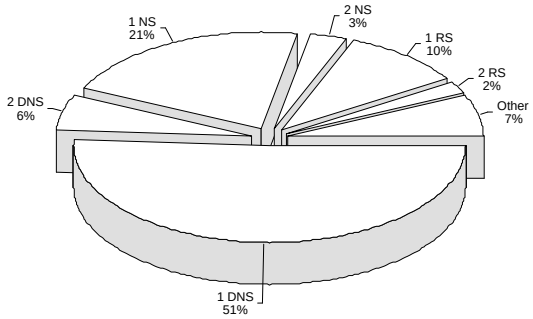
PNW



Gulf/Great Lakes



Overall



Soft Red Winter Wheat

Harvest Survey

Soft red winter wheat (SRW) is grown over a wide geographic region of the eastern United States. Because the growing region is so large, weather patterns are quite diverse, which results in variations in quality in SRW wheat. During the 1999/2000 growing season, weather patterns ranged from hot and dry in early to mid-May to cool and wet in late May and early June. Weather for harvest was primarily good. However, some regions received rain after wheat had ripened resulting in areas with sprout damage. Wheat diseases were noted in some areas, primarily the northern portion of the SRW area. The quality of the 2000 crop is consistent with the 1999 crop with the exception of some areas of lower test weight and falling number wheat where sprouting occurred.

SRW Survey: For the 2000 SRW survey, 349 samples were collected in seven key production states: Arkansas, Illinois, Indiana, North Carolina, Virginia, Missouri and Ohio. Samples were collected in each state at two different times reflecting early and late harvest conditions. Quality analysis was conducted by CII Laboratory Services, Kansas City, Missouri. Data from these samples are reported as Composite Average and are further separated into areas labeled "East Coast" and "Gulf Ports." All data are weighted by production based on the USDA "Small Grains Summary" of 29 September 2000 for the SRW states surveyed.

Mennel Data: Information about the SRW crop is also provided through a voluntary survey of U.S. mills conducted by Mennel Milling Company.

Summary: The 2000 SRW crop has similar moisture, lower average protein content and very slightly lower average test weight than the 1999 crop. Most grade factors show the crop to be well within the limits for U.S. No. 2 SRW. There is a small presence of scab in the northern portion of the SRW growing region. While most of the SRW growing region is not affected, many millers impose a 2 ppm level for DON on incoming wheat. Millers reported an easy transition period into the new crop, similar to last year with good milling yields. From the northern portion of the SRW area, lower flour protein is yielding superior cakes with excellent volume. Cookie spread ratios are similar to last year. The flour from this crop has very good functionality.

(continued on p. 21)

Winter Wheat Production

in major soft red winter wheat producing states
(million metric tons)

	2000	1999	1998	1997	1996
Alabama	0.13	0.12	0.10	0.10	0.10
Arkansas	1.62	1.40	1.25	1.07	1.82
Georgia	0.29	0.26	0.28	0.42	0.46
Illinois	1.43	1.65	1.57	1.81	1.14
Indiana	0.96	0.92	0.97	0.99	0.74
Kentucky	0.65	0.67	0.67	0.62	0.76
Louisiana	0.27	0.13	0.11	0.12	0.15
Maryland	0.34	0.33	0.29	0.39	0.32
Michigan	0.98	1.13	0.84	0.88	0.65
Mississippi	0.35	0.22	0.18	0.20	0.31
Missouri	1.34	1.20	1.56	1.59	1.33
North Carolina	0.75	0.77	0.76	0.93	0.71
Ohio	2.18	1.96	2.02	1.87	1.41
South Carolina	0.25	0.26	0.21	0.41	0.33
Tennessee	0.57	0.52	0.41	0.44	0.48
Virginia	0.35	0.37	0.30	0.47	0.40
16-State Total	**12.46**	**11.92**	**11.53**	**12.31**	**11.11**
Total SRW Production*	**12.81**	**12.36**	**12.05**	**12.85**	**11.49**

** Total SRW production includes only the class Soft Red Winter. The production estimates for individual states, while predominately SRW, may include other classes of winter wheat. Data are based on USDA crop estimates of September 29, 2000.*

Harvest Data

Soft Red Winter	Mennel Data		Composite Average		East Coast Virginia and North Carolina		Gulf Ports Arkansas, Illinois, Indiana, Missouri and Ohio*	
	2000	1999	2000	1999	2000	1999	2000	1999
Wheat Grade Data:								
Test Weight (lb/bu)	57.9	58.8	58.0	58.1	58.9	59.4	57.9	58.5
(kg/hl)	76.3	77.4	76.4	76.5	77.5	78.2	76.2	77.0
Damaged Kernels (%)			1.4	0.7	0.7	1.0	1.5	0.5
Foreign Material (%)			0.1	0.1	0.1	0.1	0.1	0.1
Shrunken & Broken (%)			0.5	0.5	0.7	0.7	0.5	0.5
Total Defects (%)			1.9	1.2	1.5	1.7	2.0	1.1
Grade			2 SRW	2 SRW	2 SRW	2 SRW	3 SRW	2 SRW
Wheat Non-Grade Data:								
Dockage (%)			0.5	0.6	0.5	1.0	0.5	0.6
Moisture (%)	13.0	12.7	13.2	13.1	12.9	13.0	13.2	13.2
Protein: 12% Moisture Basis (%)	10.2	10.0	10.2	10.1	10.8	10.7	10.1	9.9
0% Moisture Basis (%)	11.5	11.4	11.6	11.5	12.3	12.1	11.5	11.3
Ash: 14% Moisture Basis (%)			1.56	1.53	1.49	1.50	1.57	1.53
0% Moisture Basis (%)			1.81	1.78	1.73	1.75	1.82	1.77
1000 Kernel Weight (g)			31.2	31.6	31.4	31.2	31.2	31.3
Kernel Size (%) lg/md/sm			82/17/1		81/19/1		82/17/1	
Single Kernel: Hardness			17.0	24.2	18.4	33.8	16.8	24.5
Weight (mg)			31.5	33.1	31.2	32.9	31.4	32.8
Diameter (mm)			2.3	2.3	2.2	2.3	2.3	2.3
Sedimentation (cc)			13.8	12.0	18.3	17.0	12.9	10.5
Falling Number (sec)	296	321	317	328	331	316	315	343
Flour Data:								
Extraction Rate (%)			69.8	70.4	69.3	70.3	70.0	70.3
Color: L*			93.5	93.7	94.0	93.6	93.5	93.8
a*			-3.3	-3.7	-3.4	-3.7	-3.3	-3.8
b*			8.2	8.6	8.2	8.9	8.2	8.7
Protein: 14% Moisture Basis (%)	8.7	8.6	8.5	8.3	9.1	8.9	8.5	8.2
0% Moisture Basis (%)	10.1	10.0	9.9	9.7	10.5	10.4	9.8	9.5
Flour Ash: 14% Moisture Basis (%)	0.47	0.46	0.43	0.45	0.39	0.46	0.43	0.40
0% Moisture Basis (%)	0.54	0.54	0.50	0.53	0.45	0.53	0.50	0.50
Wet Gluten (%)			23.0	20.7	24.4	24.1	22.6	20.7
Falling Number (sec)			294	325	324	295	291	338
Amylograph Viscosity 65 g (BU)	465	475	377	596	458	560	363	672
MacMichael Viscosity		43	63	49	90	64	59	47
Starch Damage (%)			4.0		3.8		4.0	
Dough Properties:								
Farinograph:								
Peak Time (min)			1.7	1.5	1.8	1.9	1.7	1.4
Stability (min)			3.3	3.2	4.0	3.6	3.3	3.1
Absorption (%)			52.1	53.2	53.7	54.4	51.8	53.1
Alveograph: P (mm)			30	36	39	37	28	36
L (mm)			128	97	124	108	128	94
W (erg/gm)			91	83	137	104	84	83
Baking Evaluation:								
Crumb Grain			6	6	6	6	6	6
Crumb Texture			6	6	6	7	6	6
Loaf Volume (cc)			768	760	754	785	770	765
Cookie Spread Ratio	8.7	6.8	8.5	8.9	8.1	9.1	8.6	9.0
% of Area Sampled:			100	100	13	14	87	47

* 1999 Gulf Ports data do not include Missouri and Ohio

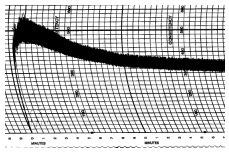
Export Cargo Data

Soft Red Winter	2000	1999
Wheat Grade Data:		
Test Weight (lb/bu)	58.9	59.3
(kg/hl)	77.5	78.0
Damaged Kernels (%)	1.6	1.8
Foreign Material (%)	0.1	0.2
Shrunken & Broken (%)	0.7	0.9
Total Defects (%)	2.5	2.9
Grade	2SRW	2SRW
Wheat Non-Grade Data:		
Dockage (%)	0.7	0.7
Moisture (%)	12.6	12.5
Protein: 12% Moisture Basis (%)	10.4	10.1
0% Moisture Basis (%)	11.8	11.5
Ash: 14% Moisture Basis (%)	1.62	1.59
0% Moisture Basis (%)	1.89	1.84
1000 Kernel Weight (g)	29.6	28.8
Kernel Size (%) lg/md/sm	80/19/1	79/20/1
Single Kernel: Hardness	*	21.5
Weight (mg)	*	32.3
Diameter (mm)	*	2.3
Sedimentation (cc)	13.0	12.0
Falling Number (sec)	317	370
Flour Data:		
Extraction Rate (%)	71.1	70.4
Color: L*	93.8	93.5
a*	-2.5	-3.2
b*	8.2	8.6
Protein: 14% Moisture Basis (%)	8.8	8.5
0% Moisture Basis (%)	10.2	9.9
Flour Ash: 14% Moisture Basis (%)	0.45	0.43
0% Moisture Basis (%)	0.52	0.50
Wet Gluten (%)	22.6	22.3
Falling Number (sec)	326	378
Amylograph Viscosity 65 g (BU)	369	657
MacMichael Viscosity	65	62
Starch Damage (%)		
Dough Properties:		
Farinograph:		
Peak Time (min)	1.8	1.7
Stability (min)	3.9	4.4
Absorption (%)	51.8	52.5
Alveograph: P (mm)	37	42
L (mm)	122	89
W (erg/gm)	115	115
Baking Evaluation:		
Crumb Grain	6	6
Crumb Texture	7	6
Loaf Volume (cc)	737	741
Cookie Spread Ratio	7.9	7.9
Sample Count:	35	134

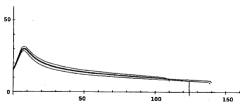
* Data not yet available.

2000 Farinogram and Alveogram

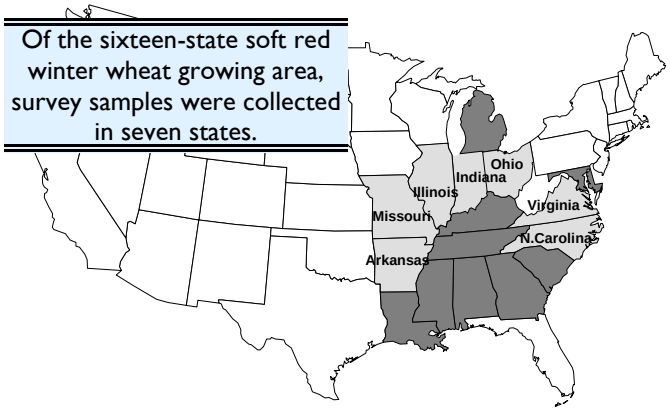
Farinogram:



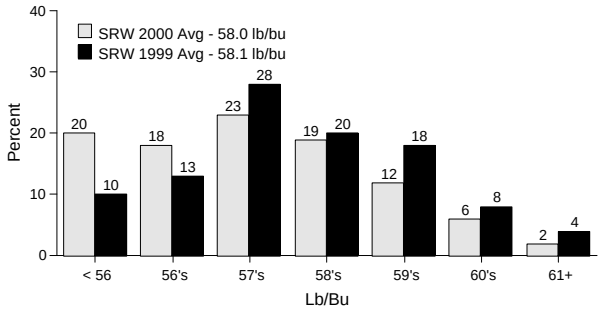
Alveogram:



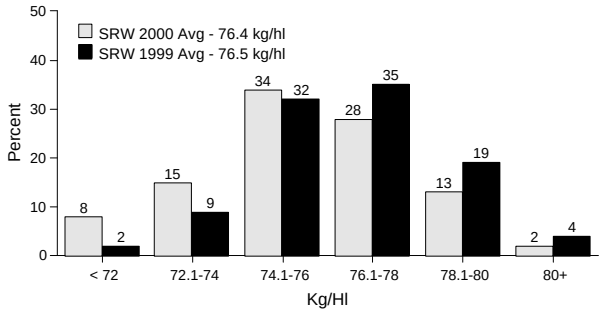
Of the sixteen-state soft red winter wheat growing area, survey samples were collected in seven states.



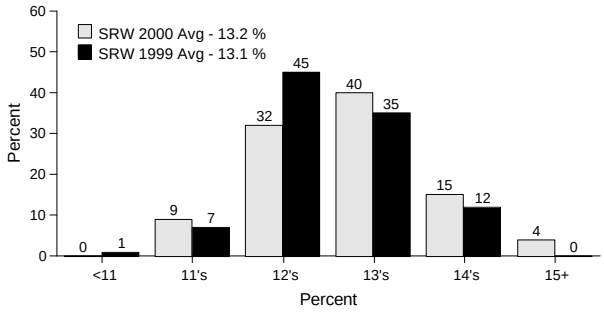
Test Weight



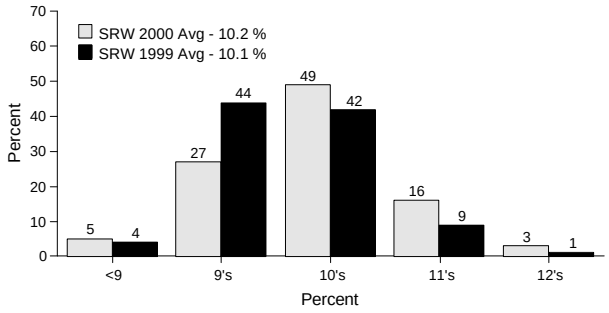
Hectoliter Weight



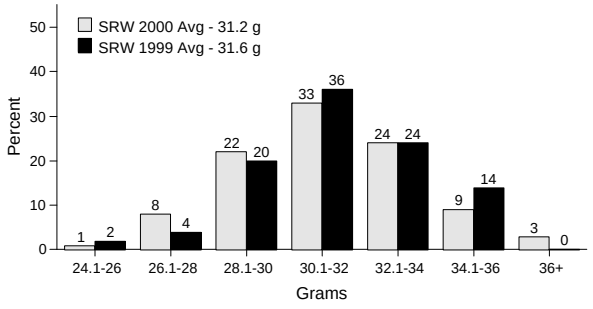
Wheat Moisture



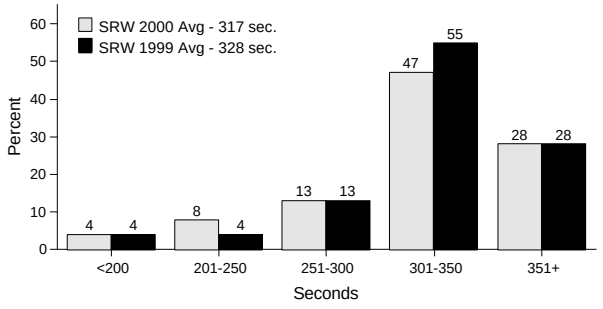
Protein (12% mb)



1000 Kernel Weight



Falling Number



(continued from p. 18)

Wheat buyers should always specify important quality requirements such as protein, moisture content, and falling number. There were pockets of sprout damage throughout the SRW area, and a specification for falling number is highly recommended this year. SRW wheat with high protein content was produced in the southern portion of the growing region. If wheat is moving off the Great Lakes, a vomitoxin specification is in order.

Export Cargo Survey

The export cargo data show the results of analysis of 169 individual sublot samples for marketing years 2000 and 1999 from Gulf of Mexico and East Coast ports. Samples were randomly selected from official Federal Grain Inspection Service samples. Grade data are the actual official grades on the individual sublots. Milling and baking analyses were conducted by CII Laboratory Services.

Durum Wheat

Northern Great Plains

The Northern Great Plains produced approximately 85% of the total estimated U.S. durum production of 3.14 million metric tons. Production was up by 16% for the U.S. and 19% for the region compared to the 1999 harvest. The southwestern states of California and Arizona accounted for approximately 15% of the total 2000 durum production. North Dakota is the primary durum producing state with 73% of the total U.S. production.

Weather and Harvest: The 2000 durum wheat production season in the Northern Plains was characterized by a dry planting season, variable growing conditions, and a wet harvest period. Planting of the 2000 durum crop had an average start date of April 17. Planting progressed normally and was completed the first week of June. The durum crop progress continued about one week ahead of last year and the five-year average. Periods of rain and humid conditions in mid-June to mid-July resulted in areas of leaf disease, root rot, head blight, and insect (orange blossom wheat midge) pressure. Hot conditions in late July and early August pushed crop development and brought lower crop condition ratings. Harvest of the durum crop started in early August about equal to last year and five-year average. Widespread rains slowed harvest in late August and early September. During this time, sprouting occurred in some regions. Harvest was completed by early October, two weeks ahead of last year and equal to the five-year average.

Quality: An analysis of samples collected from five durum producing districts in North Dakota and one district in Montana indicates the regional average grade for the 2000 crop is No. 3 Hard Amber Durum (HAD). However, with increased production this year, supplies of higher quality durum are actually larger than in 1999. Based on grade distributions among the samples, 43% or 1.1 million metric tons of the crop should grade No. 2 HAD or better, up from 39 percent and 0.88 million metric tons last year.

Despite a diverse grade profile, the crop's pasta processing characteristics are still quite good. The varietal composition of the crop and exceptional protein content at an average 14.3% are contributing to greater gluten strength, reduced cooking loss and increased pasta firmness. The average mixograph classification is 6, compared to the five-year average score of 5. Pasta color at an 8.9 rating is similar to average and considered good. With lighter test weights and reduced vitreous kernel content, this year's average semolina extraction (using a Buhler laboratory mill) of 62.6% is not as high as in 1999, but similar to average. Ash content is up slightly over last year.

Quality varies greatly within the region. Disease and insect pressure combined with sprout put average damage at 4.7%. The average regional falling number is 216 seconds, although 67% of the crop still has a falling number greater than 250 seconds. Buyers should use contract specifications to get the quality of durum they need.

This report was extracted from "Quality of the Regional 2000 Durum Wheat Crop Report" prepared by the Department of Cereal Science, North Dakota State University, funded by the North Dakota Wheat Commission, Montana Wheat and Barley Committee, and U.S. Wheat Associates.

Pacific Southwest

Desert Durum® wheat is usually delivered "Identity Preserved" to U.S. domestic and export markets. The identity preservation system allows buyers to purchase varieties with intrinsic quality parameters specific to their needs. Annual production requirements can be contracted ahead to experienced growers using certified seed and then stored for season-long shipment at the buyers' schedule.

The milling, semolina and pasta analyses used to produce these data were conducted at the California Wheat Commission wheat quality laboratory. The laboratory staff work closely with breeding companies and buyers to provide an accurate assessment of current crop quality and breeding material.

The data presented in this crop quality report are from samples that were traceable to known quantities of grain of each variety. Sampling techniques have been approved by an agricultural statistician, and at least 80% of the crop was sampled. Once again, on average the crop has low moisture (6.7%), high test weights (81.1 kg/hl), large kernels (49.3g 1000-kernel weight) and very consistant kernel size distribution (89/8/2).

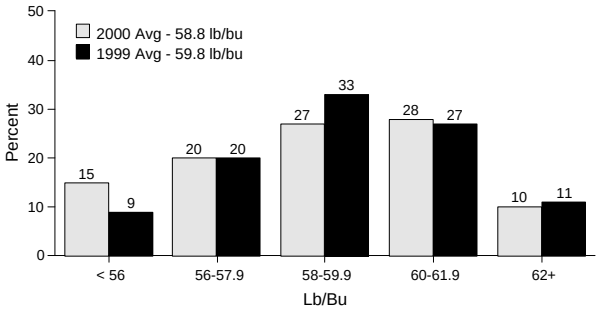
Export Cargo Survey

The durum export cargo survey shows the results of analysis of 41 individual sublot samples for crop year 1999 (collected from October 1998 through August 1999) and 61 samples for 1998. The samples were randomly selected from official Federal Grain Inspection Service samples. Grade data are the actual official grades on the individual sublots. Processing analysis was conducted by North Dakota State University.

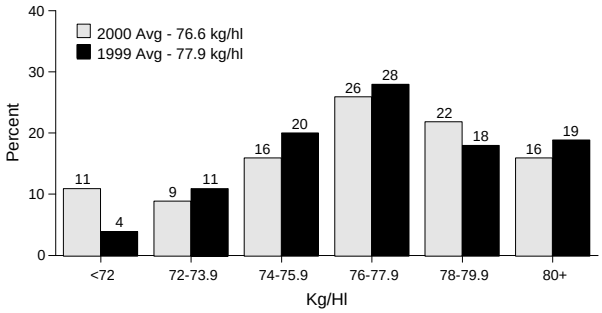
Harvest and Export Data

Durum	Harvest Data					Export Cargo Data			
	Great Plains		5-Year	Pacific Southwest		Great Plains		Pacific Southwest	
	2000	1999	Avg.	2000	1999	1999	1998	1999	1998
Wheat Grade Data:									
Test Weight (lb/bu)	58.8	59.8	59.8	62.3	62.9	60.3	60.4	62.7	62.9
(kg/hl)	76.6	77.9	77.9	81.1	81.9	78.6	78.6	81.6	81.9
Damaged Kernels (%)	4.7	1.7	1.6	0.6	0.2	3.0	1.9	1.2	1.1
Foreign Material (%)	0.3	0.1	0.1	0.2	0.2	0.3	0.4	0.2	0.2
Shrunken and Broken (%)	1.8	1.8	2.0	0.6	0.6	1.8	2.1	0.5	0.5
Total Defects (%)	6.8	3.6	3.7	1.4	0.9	5.1	4.3	1.9	1.8
Contrasting Classes (%)	0.6	0.4	0.3	0.0	0.0	0.8	1.1	0.0	0.0
Vitreous Kernels (%)	75	83	84	96	95	78	81	96	93
Grade	3 HAD	2 HAD	2 HAD	1 HAD	1 HAD	3 HAD	2 HAD	1 HAD	1 HAD
Wheat Non-Grade Data:									
Dockage (%)	1.5	1.9	2.4	0.5	0.5	0.7	0.7	0.5	0.5
Moisture (%)	11.5	12.4	11.9	6.7	7.4	12.0	11.5	7.8	8.3
Protein: 12% Moisture Basis (%)	14.3	13.8	13.8	13.5	13.6	12.7	13.7	13.2	13.1
0% Moisture Basis (%)	16.2	15.6	15.7	15.3	15.5	14.4	15.6	15.0	14.9
Ash: 14% Moisture Basis (%)	1.71	1.58	1.67	1.81	1.69	1.64	1.67	1.65	1.60
0% Moisture Basis (%)	2.00	1.84	1.95	2.10	1.96	1.91	1.95	1.92	1.86
1000 Kernel Weight (g)	33.6	39.3	36.5	49.3	50.9	36.7	36.8	52.2	53.4
Kernel Size (%) lg/md/sm	55/38/7	64/31/6	52/42/6	89/8/2	92/8/0	61/34/6	51/41/8	91/8/1	91/7/2
Single Kernel: Hardness	84.2	88.2							
Weight (mg)	35.8	38.6							
Diameter (mm)	2.5	2.6							
Falling Number (sec)	216	250	336	699	1156	273	412	930	736
Sedimentation (cc)	44	46	37						
Semolina Data:									
Total Extraction (%)	68.7	72.7	71.1	73.9	76.0	66.8	68.7	69.9	70.9
Semolina Extraction (%)	62.6	65.4	62.5	61.3	64.0	60.3	61.9	63.8	63.8
Ash: 14% Moisture Basis (%)	0.71	0.67	0.67	0.82	0.76	0.62	0.65	0.65	0.63
0% Moisture Basis (%)	0.83	0.78	0.78	0.95	0.88	0.72	0.76	0.76	0.74
Specks (no/10 sq in)	20	24	29	30	27	10	12	12	13
Protein: 14% Moisture Basis (%)	13.3	12.8	12.9	12.3	12.4	11.5	12.6	11.7	11.8
0% Moisture Basis (%)	15.5	14.9	15.0	14.3	14.4	13.4	14.6	13.6	13.7
Wet Gluten (%)	37.1	38.0	39.4	34.9	33.6				
Mixograph Classification	6.0	6.0	5.0			5.1	5.3	7.5	6.8
Alveograph: W (erg/gm)	81	94		210	183				
P (mm)	32	38							
L (mm)	119	117							
Color: L*	84.4	84.7		55.3		85.1	84.9	84.7	85.0
a*	-2.7	-2.9				-2.8	-2.7	-2.6	-2.6
b*	27.2	27.6		26.7		26.4	27.4	26.4	25.7
Spaghetti Procesing Data:									
Color Score	8.9	9.0	9.3	9.0	9.1	9.4	9.4	9.5	9.4
Cooked Weight (gm)	31.1	31.7	31.3	29.5	29.7	31.8	31.8	32.0	32.1
Cooking Loss (%)	5.9	6.3	5.8	7.2	7.2	5.7	5.6	5.9	6.0
Cooked Firmness (g cm)	6.6	5.9	6.1	8.4	7.2	5.7	5.8	5.6	5.4
Sample Count:						25	35	16	26

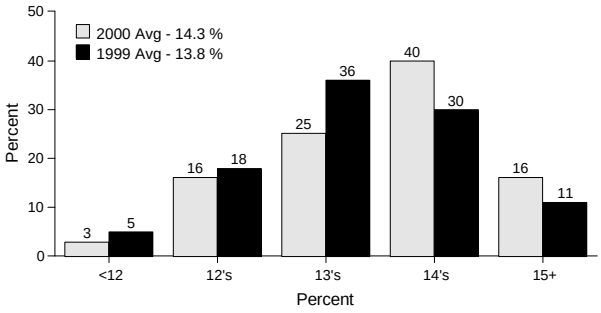
Test Weight



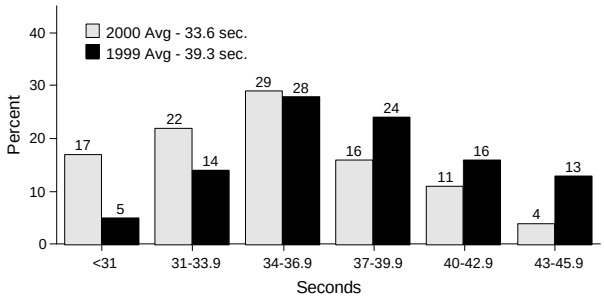
Hectoliter Weight



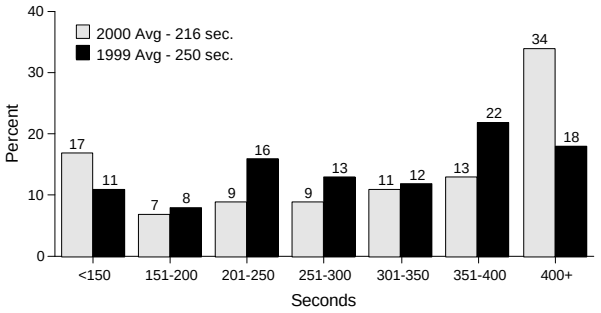
Protein (12% mb)



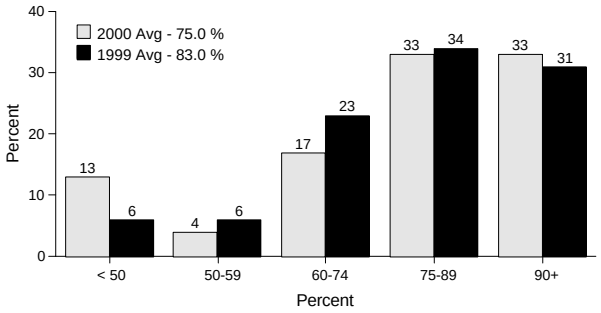
1000 Kernel Weight



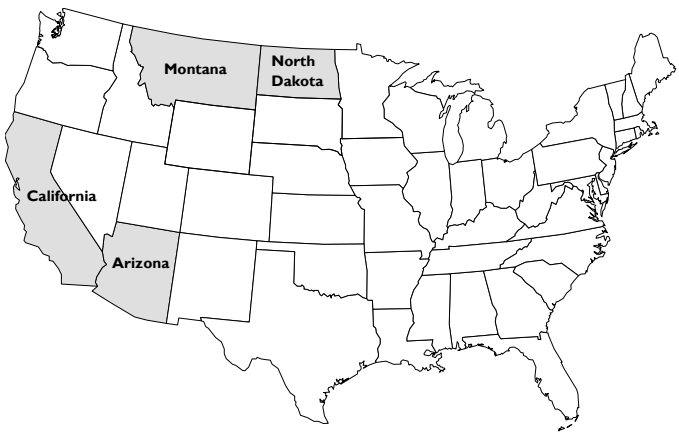
Falling Number



Vitreous Kernels



Note: Charts include Great Plains durum only.



Durum survey results are from four states.

Durum Production by Crop Year

for the major producing states
(million metric tons)

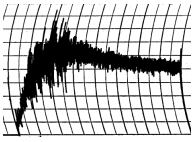
	2000	1999	1998	1997	1996
Arizona	0.22	0.20	0.41	0.22	0.40
California	0.26	0.24	0.43	0.37	0.38
Montana	0.36	0.26	0.33	0.21	0.19
North Dakota	2.29	1.96	2.57	1.57	2.16
Total U.S.	**3.14**	**2.70**	**3.76**	**2.39**	**3.16**

Based on USDA crop estimates of September 29, 2000.

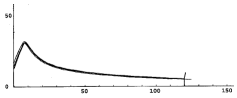
2000 Great Plains Durum Mixogram and Alveogram

Regional Average Mixogram:

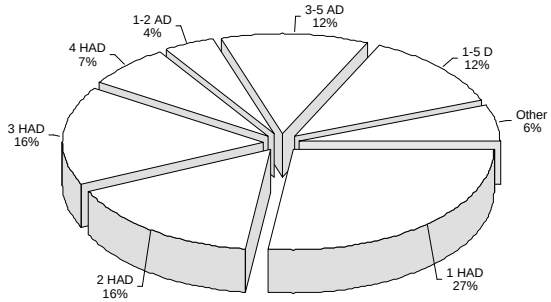
(score = 5)



Alveogram:



Great Plains Durum Grade Distribution



Hard White Wheat

Hard White Harvest Survey

Samples of specific varieties were collected from four states: ID 377S and Golden Spike from Idaho; Betty, Heyne, Lakin and Trego from Kansas; Nuplains from Nebraska; and Winsome from Oregon. Each variety was composited into three protein levels if available: low protein (less than 11.5%), medium protein (between 11.5 and 12.5%), and high protein (greater than 12.5%).

The hard white wheat production for the 2000 crop is estimated at 333,000 MT. This is an increase of about 22% over the approximately 260,000 MT produced last year. Two major varieties are ID 377S and Platte.

Survey Methods: All tests were conducted by the Wheat Marketing Center, Portland, Oregon. Wheat and flour tests were done according to the American Association of Cereal Chemists Methods (2000). Noodle testing and Chinese northern-type steamed bread evaluation were conducted according to the protocols established by Chinese noodle makers and flour millers at the Wheat Marketing Center.

Wheat and Grade Data: All wheats were graded No. 1 except for Golden Spike, Heyne and medium protein Nuplains, which were graded No. 2. Golden Spike had a test weight of 58.7 lb/bu and Heyne and medium protein Nuplains had wheat of contrasting classes of 1.8% and 1.5%, respectively.

Flour, Dough, and Baking Data: Straight grade flour extraction ranged from 70.4 to 73.1% and flour ash varied from 0.35 to 0.47% (14% mb). All but Winsome had amylograph peak viscosities higher than 700 Bu. Starch damage was in the range of 3.1 to 6.8%. Farinograph water absorption ranged from 54.5 to 59.8%, peak times varied from 5.3 to 17.4 minutes, and stability times were 10 minutes or longer for all samples except for ID 377S and Winsome, which had 6.0 and 7.0 minutes, respectively. Alveograph and extensigraph data were in the typical ranges of hard wheat. Bread baking quality was good overall. The loaf volumes were larger than the commercial control flour (744 cc) for all samples except for the low protein Nuplains.

Noodle Evaluation: Initial noodle sheet whiteness (L* value at 0 hr) was higher than the control noodle sheet (L*0 = 82.2). The initial b* values (yellowness) were smaller than the control (19.2) except for Golden Spike, Trego and Heyne. Trego showed the largest darkening from 0 to 24 hrs, with L* values decreasing by 10.2 units. The control noodle sheet had L*24 = 73.2, a*24 = 0.5, and b*24 = 26.0. Visual evaluation indicated that ID 377S, Golden Spike, Heyne, Lakin, and low protein Nuplains had acceptable noodle color scores.

Instrumental textural parameters of the cooked control noodles were: firmness, 1282 g; springiness, 96.6%; cohesiveness, 0.64; and chewiness, 798 g. Measurement of the test noodles showed that Betty, Nuplains (low, medium and high proteins) had firmness close to or larger than the control noodle. ID 377S and Heyne were soft in bite. Compared to the 1999 crop, varieties Betty, Nuplains and Trego showed consistent noodle hardness at similar protein levels.

Chinese Northern-Type Steamed Bread: Each hard white wheat flour was blended with a composite 2000 crop soft white wheat flour at a 60:40 ratio to produce steamed bread because hard white alone was too strong for steamed bread making. Steamed bread quality was evaluated against a Chinese commercial steamed bread flour. All but one sample (ID 377S) had smaller specific volumes than the control flour (2.61 ml/g). ID 377S, Golden Spike and Winsome had total scores close to the control flour (70). Others performed poorly in steamed bread production at the current blending ratios. The potential of hard white wheat in northern-type steamed bread making can be optimized by varying the blending ratios of hard white and soft white wheat flours.

Summary: The 2000 crop hard white wheats surveyed had breadmaking performance similar to or better than the control flour. Noodle color and color stability were acceptable for varieties ID 377S, Golden Spike, Heyne, Lakin, and low protein Nuplains. Betty and Nuplains (low, medium and high proteins) had firmness close to or greater than the control noodle. For the Chinese northern-type steamed bread making, ID 377S, Golden Spike and Winsome showed overall quality close to the control flour.

Harvest Data

Hard White	Idaho		Kansas				Nebraska			Oregon
	ID377s	Golden Spike	Betty	Trego	Heyne	Lakin	NuPlains			Winsome
	High	High	High	High	High	Med	Low	Med	High	High
Wheat Grade Data:										
Test Weight (lb/bu)	62.2	58.7	60.9	60.3	62.0	61.7	63.5	62.8	63.1	63.9
(kg/hl)	81.7	77.2	80.1	79.3	81.5	81.1	83.5	82.6	82.9	83.9
Heat Damage (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Damaged Kernels Total (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Foreign Material (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shrunken & Broken (%)	1.5	1.3	0.4	0.4	0.1	0.3	0.0	0.0	0.3	0.2
Total Defects (%)	1.5	1.3	0.4	0.4	0.1	0.3	0.0	0.0	0.3	0.2
Grade	1HDWH	2HDWH	1HDWH	1HDWH	2HDWH	1HDWH	1HDWH	2HDWH	1HDWH	1HDWH
Wheat Non-Grade Data:										
Dockage (%)	0.9	0.5	0.5	0.5	0.1	0.1	0.0	0.0	0.1	0.0
Moisture (%)	9.4	9.3	11.3	11.0	10.6	11.1	11.7	12.1	11.2	9.0
Protein: 12% Moisture Basis (%)	12.6	13.9	13.3	14.0	13.3	12.1	10.8	12.4	13.1	12.9
0% Moisture Basis (%)	14.3	15.8	15.1	15.9	15.2	13.7	12.2	14.1	14.9	14.7
Ash: 14% Moisture Basis (%)	1.60	1.41	1.48	1.47	1.37	1.43	1.54	1.50	1.44	1.51
0% Moisture basis (%)	1.86	1.64	1.72	1.71	1.60	1.66	1.80	1.75	1.68	1.76
1000 Kernel Weight (g)	37.4	28.7	25.8	29.6	28.6	31.5	27.4	28.1	31.2	34.1
Single Kernel: Hardness	75.1	76.2	94.7	85.1	70.0	85.2	84.9	79.6	76.9	87.6
Weight (mg)	37.4	28.7	25.8	29.6	28.6	31.5	27.4	28.1	31.2	34.1
Diameter (mm)	2.7	2.2	2.1	2.2	2.2	2.4	2.2	2.3	2.4	2.5
Sedimentation (cc)	14.2	42.3	21.9	27.4	39.1	28.8	12.7	18.1	26.9	19.7
Falling Number (sec)	414	466	416	433	398	401	473	453	488	311
Flour Data:										
Extraction Rate (%)	70.4	71.6	73.1	71.9	71.4	73.0	71.1	72.2	73.1	72.5
Color: L*	91.2	91.2	91.1	91.3	92.2	91.9	91.8	91.5	91.0	91.1
a*	-2.3	-2.9	-2.1	-2.4	-2.7	-2.5	-2.4	-2.3	-2.4	-1.7
b*	8.2	10.9	8.6	8.9	8.7	8.5	8.0	7.9	8.3	6.9
Protein: 14% Moisture Basis (%)	11.2	12.6	12.2	12.4	12.0	10.5	9.3	10.9	11.6	11.6
0% Moisture Basis (%)	13.0	14.6	14.2	14.4	13.9	12.3	10.8	12.6	13.4	13.4
Ash: 14% Moisture Basis (%)	0.47	0.42	0.44	0.41	0.35	0.41	0.46	0.43	0.42	0.41
0% Moisture Basis (%)	0.55	0.49	0.52	0.48	0.41	0.48	0.53	0.50	0.48	0.48
Wet Gluten - 14% Mt Basis (%)	32.6	33.1	31.8	35.7	32.9	29.6	24.3	29.5	31.8	34.2
Falling Number (sec)	437	518	420	437	361	390	511	454	498	395
Amylograph Viscosity 65 g (BU)	930	840	810	1095	850	730	778	750	730	590
Starch Damage (%)	6.6	4.0	4.9	4.5	3.1	5.4	4.9	4.5	5.1	6.8
Dough Properties:										
Farinograph:										
Peak Time (min)	5.3	17.4	8.9	5.5	8.3	7.4	6.8	5.7	5.8	5.3
Stability (min)	6.0	33.3	15.4	23.7	11.6	12.7	15.1	15.1	10.0	7.0
Absorption (%)	57.4	58.0	57.5	58.2	54.5	55.9	54.9	56.6	58.3	59.8
Alveograph: P (mm)	84	88	86	83	56	80	89	81	79	83
L (mm)	113	127	142	137	188	139	95	126	126	128
W (erg/gm)	270	410	430	313	335	325	270	325	275	335
Extensigraph: Resistance (cm)	7.2	13.4	10.3	8.3	10.4	8.1	9.8	8.7	7.2	7.3
(45 min) Extensibility (cm)	18.2	11.4	15.7	10.6	21.6	19.4	15.9	21.2	19.7	19.1
Area (sq cm)	93	106	120	61	152	103	110	131	99	95
Extensigraph: Resistance (cm)	8.3	13.9	12.0	10.0	12.1	10.0	11.3	9.3	8.3	8.1
(135 min) Extensibility (cm)	15.7	11.9	15.1	10.7	18.8	17.2	13.2	16.3	17.1	17.3
Area (sq cm)	86	112	122	73	103	122	102	121	96	97

* Low: Less than 11.5%; Med: 11.5 - 12.5%; High: Greater than 12.5%

Harvest Data

Hard White	Idaho		Kansas				Nebraska			Oregon
	ID377s	Golden Spike	Betty	Trego	Heyne	Lakin	NuPlains			Winsome
	High	High	High	High	High	Med	Low	Med	High	High
Baking Evaluation:										
Bake Absorption (%)	59.9	58.6	57.8	62.2	59.0	62.1	60.3	63.1	61.7	61.3
Crumb Grain and Texture	6.9	6.5	6.5	6.5	7.0	6.6	6.6	7.0	7.1	6.9
Loaf Volume (cc)	744	832	794	813	838	756	675	750	738	788
Noodle-Making Quality										
Color at 0 hour: L*	84.5	83.6	84.2	82.7	85.0	86.2	87.6	84.4	82.6	83.5
a*	-0.5	-0.9	0.1	-0.1	-0.8	-0.6	-0.7	-0.5	-0.5	0.6
b*	17.0	22.2	17.1	20.4	20.2	17.9	14.6	17.6	18.1	15.4
Color at 24 hours: L*	75.9	74.0	74.6	73.3	74.8	78.1	81.4	76.2	74.7	74.3
a*	0.3	0.0	1.1	0.6	-0.2	-0.1	-0.6	0.1	0.0	1.6
b*	24.6	32.6	24.7	26.9	30.4	26.7	20.8	23.9	23.8	21.6
Cooking Yield (%)	121	117	118	120	113	115	123	117	114	117
Sensory Score:										
Machining	7.4	7.0	7.0	7.0	6.5	7.5	7.8	7.4	7.4	7.0
Dough Sheet	8.0	7.0	6.5	6.5	6.5	8.0	8.5	8.0	7.5	7.0
Color Stability	7.7	7.5	6.2	6.7	7.3	8.2	8.3	6.8	6.8	6.3
Instrumental Texture										
Firmness (g)	1058	1245	1280	1160	1249	1263	1350	1334	1362	1249
Springiness (%)	95.7	96.4	96.7	96.2	95.4	96.3	96.7	96.3	96.4	96.2
Cohesiveness	0.66	0.66	0.65	0.66	0.63	0.64	0.63	0.65	0.60	0.63
Chewiness (g)	670	790	798	733	751	777	819	836	841	761
Chinese Northern-Type Steamed Bread Evaluation:										
Specific Volume (ml/g)	2.79	2.45	2.25	2.24	2.08	2.25	2.31	2.28	2.15	2.49
Total Score	66.5	66.0	62.4	62.8	64.7	62.8	63.4	62.4	61.8	67.7

U.S. Production by Class

Crop Year (Beginning June 1)
(million metric tons)

	2000	1999	1998	1997	1996
Hard Red Winter	22.96	28.60	32.10	29.89	20.72
Soft Red Winter	12.81	12.36	12.05	12.85	11.49
Hard Red Spring	13.84	12.19	13.24	13.37	17.17
Soft White	8.03	6.57	8.11	9.04	9.66
Hard White	0.33	0.26	n/a	n/a	n/a
Durum	3.14	2.70	3.76	2.39	3.16
Total	60.94	62.57	69.33	67.54	62.19

Estimates are based on USDA crop estimates of September 29, 2000. The soft white and hard white estimates are made by US Wheat Associates; hard white includes some production which USDA has included in red wheats.

U.S. Supply and Demand

Estimated for 2000/2001 (year beginning June 1)
(million metric tons)

	HRW	HRS	SRW	White	Durum	TOTAL
Supply:						
Beginning Stocks	12.5	5.9	3.6	2.5	1.4	25.9
Production	23.0	13.9	12.8	8.2	3.2	60.9
Total Supply	35.5	21.5	16.4	10.9	5.3	89.5
Demand:						
Domestic Use	13.7	8.1	7.4	2.9	2.6	34.7
Exports	12.4	6.8	5.4	4.8	1.2	30.6
Total Demand	26.1	14.9	12.9	7.6	3.8	65.3
Ending Stocks	9.4	6.6	3.6	3.2	1.5	24.2

Based on USDA Supply/Demand estimates of October 12, 2000.

Analysis Methods

With the exception of the Mennel soft red winter survey, both the harvest samples and cargo samples for each class were evaluated in the same methods as described below. All flour, semolina and end-use tests utilize flour or semolina produced as documented below under the methods labeled "Extraction." The Mennel data were volunteered by individual participating mills which may have used other methods.

Wheat and Grade Data

Grade: Official U.S. Standards for Grain.
Dockage: Official USDA procedure using the Carter Dockage Tester.
Moisture: HRS, Durum, SW, HW - Motomco Moisture Meter and AACC 44-15A. HRW, SRW - AACC 44-15A.
Test Weight: AACC 55-10; test weight is mathematically converted to hectoliter weight: for durum - kg/hl = lb/bu x 1.292 + 0.630, for other wheats - kg/hl = lb/bu x 1.292 + 1.419.
Protein: AACC 46-30 (Combustion Nitrogen Analysis technique).
Single Kernel Characterization: Perten method using Perten SKCS 4100.
Sedimentation: HRS, HRW(Plains), SRW, SW, HW - AACC 56-61A; Durum - AACC 56-70.
1000 Kernel Weight: HRS, Durum, HRW, SRW - based on a 10-gram sample of clean wheat counted by an electronic counter. SW, HW - Perten SKCS 4100.
Ash: HRS, SW & durum - AACC 08-01 expressed on a 14% moisture basis.
Falling Number: AACC 56-81B. An average value is a simple mean of sample results.
Vitreous Kernels: HRS & durum only - Percentage by weight of vitreous kernels hand-picked from a 50-gram sample of clean wheat.
Kernel Size Distribution: *Cereal Foods World* (*Cereal Science Today*) 5:(3), 71 (1960). Wheat is sifted with a RoTap sifter using a Tyler No. 7 screen (2.82 mm) and a Tyler No. 9 screen (2.00 mm). Kernels retained on the No. 7 screen are classified as "Large." Kernels passing through the No. 7 screen and retained on the No. 9 screen are "Medium." Kernels passing through the No. 9 screen are "Small."

Flour Data

Extraction: Samples were cleaned and tempered according to AACC Method 26-10A. All samples within each class other than California HRW were milled with identical mill settings on a Buhler laboratory mill as described in the following procedures: SRW and SW - AACC 26-31; HW - AACC 26-31A; HRW (Midwestern) and HRS - AACC 26-21A. California HRW was milled on a Brabender Quadrumat Senior mill using the Brabender procedure. All extraction rates were calculated against total products on an "as is" moisture basis.
Ash: AACC 08-01, reported on a 14% moisture basis.
Color: HRW and SRW - Minolta Method using Minolta Chroma Meter CR-110 (for HRW and SRW) or CR-310 (for HRS, SW, and HW) with Granular-Materials Attachment CR-A50. CIE 1976 L*a*b* color system: L* indicates white-black, a* - red-green, and b* - yellow-blue.
Protein: AACC 46-30 (Combustion Nitrogen Analysis technique).
Wet Gluten: HRS, SRW, HW, HRW(Plains), Durum - AACC 38-12; SW - AACC 38-12 (water reduced from 4.8 to 4.2ml); HRW(CA) - Glutomatic Method (ICC 137); Semolina - AACC 38-12.
Falling Number: AACC 56-81B. An average value is a simple mean of sample results.
MacMichael Test: AACC Method 56-79 without conversion to cps.
Farinograph: AACC 54-21 with 50-gram bowl. Absorption except HRW (CA) is reported on 14% moisture basis. HRW (CA) reports "as is" absorption. Classification (HRS only) incorporates peak time, mixing tolerance, and general curve characteristics to assign rating based on a scale of 1-8. Higher numbers indicate stronger protein flours.
Alveograph: Durum - AACC 54-30A modified. Other classes - AACC 54-30A.
Amylograph: HRS (100g) - AACC 22-10. HRS (65g), SRW, SW, HRW, HW - AACC 22-10 modified to use 65g flour (14% moisture basis) and 450ml distilled water with paddle (HRS) or pins (other classes).
Extensigraph: AACC 54-10, modified 45 min. and 135 min. stretch, HRS, HRW, HW.
Starch Damage: AACC Method 76-31.

Semolina Data (Durum only)

Extraction: Great Plains samples were milled using a modified Buhler laboratory mill with identical settings and equipped with Miag laboratory purifiers, as described by Vasiljevic and Banasik 1980: *Quality Testing Methods for Durum Wheat and its Products*, pp. 64-72, Dept. of Cereal Chemistry and Technology, NDSU, Fargo, ND. Roll gaps have been modified to (in mm): B1-0.762; B2-0.305; B3-0.254; R1-0.102; B4-0.076; B5-0.038. Extraction rates were calculated against total products on an "as is" moisture basis. Procedure is derived from AACC 26-41 based on research showing improved correlation between laboratory and commercially milled semolina quality. Pacific Southwest samples were milled on a Modified Chopin CD2 mill.
Ash: AACC 08-01 on 14.0% moisture basis.
Protein: AACC 46-30 (Combustion Nitrogen Analysis technique).
Wet Gluten: Glutomatic procedure.
Specks: Sample is pressed under 3x4 inch glass plate, and number of specks within one-inch square marked on plate are counted. Average of three determinations is expressed as specks per 10 square inches.
Mixogram: Ten grams of semolina are mixed in a 10-gram mixograph bowl with 5.8 ml of distilled water to give maximum dough consistency. An overall empirical classification incorporating peak height and general curve characteristics is assigned based on comparison with eight reference mixograms. The higher the number, the stronger the curve type.

Baking, Noodle, Steamed Bread and Spaghetti Data

HRW & SRW: AACC Method 10-10B producing two loaves per batch using wet compressed yeast and ascorbic acid. After mixing, dough is divided into two equal portions, fermented for 160 min., proofed and baked in "pup loaf" pans. Loaf volume is measured immediately after baking by rapeseed displacement. California HRW only - AACC Method 10-10B producing two loaves per batch using wet compressed yeast, malt flour, 45 ppm ascorbic acid, and 120 min. fermentation. Loaf volume measured immediately after baking. SRW cookie spread ratio - AACC Method 10-50D.
HRS: AACC Method 10-09, modified: fungal amylase (I5 SKB units/100 g flour) replacing malt dry powder; instant dry yeast (1%); 20 ppm ascorbic acid, where added oxidants are required; 2% added shortening. Doughs are mechanically punched, moulded, and baked in "Shogren-type" pans. Scoring based on a scale of 1-10. Higher numbers indicate preferred quality attributes.
SW: Cookie diameter - AACC Method 10-52. Sponge cake volume and score - Japanese standard method described by Nagao in Cereal Chemistry 53:977-988, 1976.
Durum: Pasta is made using the laboratory procedure described by Walsh, Ebeling, and Dick, *Cereal Foods World*: 16:(11) 385 (1971). Water (32.0% based on semolina weight) is added to semolina and mixed in a Hobart mixing bowl 3.5 min. Semolina-water mixture is extruded using a DeMaco laboratory pasta extruder. Spaghetti is dried using modified Buhler high-temperature drying cycle as described by Debbouz, Pitz, Moore, and D'Appolonia, *Cereal Chemistry*: 72 (1):128-131. Color scores are determined by the procedure described by Walsh, *Macaroni Journal* 52:(4) 20 (1970), using a Minolta Color Difference Meter (Model: CR 310). Higher values (scale 1-12) are preferred. Cooked weight, cooking loss and firmness are determined by AACC Method 16-50.
HW Baking: AACC Method 10-10B. 180 min fermentation time is used. Loaf volume is measured by rapeseed displacement immediately after baking.
HW Noodle: Each of the hard white wheat flours was made into Chinese raw noodles using the following formula: flour, 1000 g; salt, 12 g; and distilled water, 280 g. Noodle sheet color is measured by stacking three dough sheets and taking two readings from each side of two dough sheets (a total of eight readings) using a Minolta CR-310 Chroma Meter; the mean value is reported. Cooking Yield is % of weight gain after cooking for 5 min, rinsing in 27^0C water and draining. Each Sensory Score property is rated compared with a control sample (a score of 7) and is reported based on a scale of 1-10; higher scores indicate better quality. The Instrumental Texture is determined on five strands of cooked noodles (2.5 x 1.2 mm, W x T) using a TA.XT2 Texture Analyzer. *Firmness* indicates noodle bite; *springiness* indicates the degree of recovery after first bite; *cohesiveness* is a measure of the extent to which noodle structure is disrupted during first bite; and *chewiness* is a product of firmness, cohesiveness and springiness (firmness x cohesiveness x springiness) and thus, a single parameter that incorporates the three textural parameters. High values of these textural parameters are generally more desirable for Chinese-style noodles.
Chinese Steamed Bread: Two types of Chinese steamed breads were prepared: southern-type steamed bread from each of the soft white and club wheat flours and northern-type steamed bread from each of hard white wheat flours. Southern-type steamed bread was made using the following formula: flour, 400 g; sugar, 60 g; shortening, 16 g; baking powder, 4 g; yeast, 4 g; and water, 160-165 g. Northern-type steamed bread was made using the following formula: flour, 400 g, yeast, 4 g; and water, 180-208 g. Yeast was dissolved in water before use. Both steamed breads were prepared using straight dough methods (Wheat Marketing Center Protocol). The Total Score of steamed bread is the sum of Process Score (15% total score) and Product Score (85% total score). Process Score includes mixing, sheeting, rolling, cutting and fermentation scores. Product Score comprises volume, external characteristics, internal characteristics, eating quality and flavor. Each property was rated compared with a control sample. The control flour was scored 70.

Wheat Grades and Grade Requirements Table

Grading Factors	Grades U.S. Nos. 1	2	3	4	5
	Minimum limits:				
Test Weight (lbs/bu)					
Hard Red Spring or White Club	58.0	57.0	55.0	53.0	50.0
All other classes and subclasses	60.0	58.0	56.0	54.0	51.0
Test Weight (kg/hl)					
Hard Red Spring or White Club	76.4	75.1	72.5	69.9	66.0
Durum	78.2	75.6	73.0	70.4	66.5
All other classes and subclasses	78.9	76.4	73.8	71.2	67.3
	Maximum percent limits:				
Defects					
Damaged kernels:					
- Heat (part of total)	0.2	0.2	0.5	1.0	3.0
- Total	2.0	4.0	7.0	10.0	15.0
Foreign material	0.4	0.7	1.3	3.0	5.0
Shrunken and broken kernels	3.0	5.0	8.0	12.0	20.0
Total 1/	3.0	5.0	8.0	12.0	20.0
Wheat of Other Classes 2/					
Contrasting classes	1.0	2.0	3.0	10.0	10.0
Total 3/	3.0	5.0	10.0	10.0	10.0
Stones	0.1	0.1	0.1	0.1	0.1
	Maximum count limits:				
Other material					
Animal filth	1	1	1	1	1
Castor beans	1	1	1	1	1
Crotalaria seeds	2	2	2	2	2
Glass	0	0	0	0	0
Stones	3	3	3	3	3
Unknown foreign substance	3	3	3	3	3
Total 4/	4	4	4	4	4
Insect-damaged kernels in 100 grams	31	31	31	31	31

U.S. Sample grade:
Wheat that:
(a) Does not meet the requirements for U.S. Nos. 1, 2, 3, 4, 5; or
(b) Has a musty, sour or commercially objectionable foreign odor (except smut or garlic odor); or
(c) Is heating or of distinctly low quality.

1/ Includes damaged kernels(total), foreign material, and shrunken and broken kernels.
2/ Unclassed wheat of any grade may contain not more than 10.0% of wheat of other classes.
3/ Includes contrasting classes.
4/ Includes any combination of animal filth, castor beans, crotalaria seeds, glass, stones, or unknown foreign substance.

Conversion Factors

Wheat Equivalents:		**Metric Equivalents:**	
1 bushel =	60 pounds (27.2 kg)	1 pound =	0.4536 kg
36.74 bushels =	1 metric ton	1 metric ton (MT) =	2204.6 lbs
37.33 bushels =	1 long ton	1 short ton (2000 lbs) =	0.9072 MT, or 907.2 kg
33.33 bushels =	1 short ton	1 long ton (2240 lbs) =	1.0160 MT, or 1016.0 kg
3.67 bushels =	1 quintal	1 metric ton =	10 quintals
tons/ha =	0.06725 bu/acre	1 hectare =	2.47 acres
durum kg/hl =	lbs/bu x 1.292 + 0.630	1 acre =	0.40 hectare
other wheat kg/hl =	lbs/bu x 1.292 + 1.419	1 hundredweight =	100 pounds or 45.36 kg

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