


TABLE OF CONTENTS



Hard Red Winter	2
Pacific Northwest Soft White	8
Hard Red Spring	12
Soft Red Winter	18
Durum	21
Hard White	25
U.S. Production by Class	27
U.S. Supply and Demand	27
Analysis Methods	27
Grades and Grade Requirements Table	29

Hard Red Winter

Soft White

Hard Red Spring

Soft Red Winter

Durum

Hard White

Hard Red Winter Wheat

Midwestern Harvest Survey

Most of the U.S. hard red winter wheat (HRW) is grown in the seven great plains states of the U.S. (Colorado, Kansas, Montana, Nebraska, Oklahoma, South Dakota and Texas). Although weather over this vast region varies considerably during the year, adequate soil moisture for fall planting and mild fall weather gave wheat a good start prior to winter. Winter was considered mild with little extreme cold and adequate snow cover to protect wheat from winter kill. Spring weather favored plant growth with cool temperatures and adequate moisture in April and May. June rains slowed harvest in the southern great plains raising concern for pre-harvest sprouting. Ultimately, only a small percent of the crop sustained damage as hot weather predominated July and August. The result was another large harvest with processing quality comparable to 1998. Despite lower average protein content, flour performance remained acceptable.

Survey Methods: Information on the 1999 HRW crop is based on testing by CII Laboratory Services of Kansas City, Missouri. More than 550 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. After the the grade was established 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 for the hard red winter states surveyed based on the USDA "Small Grains Summary" of 30 September 1999. Testing conforms to approved methods of the American Association of Cereal Chemists shown in the Analysis Methods of this report.

These data are presented as composite (Overall) averages and the projected averages that can be expected at Pacific Northwest and Gulf of Mexico ports. The data were compiled and summarized by personnel of the International Grains Program (IGP) at Kansas State University, Manhattan, Kansas. Support for collection and summarization of data comes 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.

Milling and Flour Use Values: Commercial flour millers noted an easy transition into new crop wheat again this year. They report comparable milling yield in the 1999 crop with better protein recovery than in 1998. The baking industries in the U.S. are making the crop work through careful monitoring of processing parameters and formula

modification. Reports from U.S. commercial bakers are that even at lower protein content, factors such as baking absorption and mixing time are down only slightly, while mixing tolerance may be slightly better. Among private laboratories conducting HRW quality evaluations, there is general agreement of acceptable to good performance from the crop with indications that loaf volume and bread quality scores are slightly improved over 1998. This is likely due to increased planting of improved wheat varieties.

Summary: The 1999 HRW crop is regarded as being of good milling quality with acceptable to good end-product performance. Protein quality is considered equivalent to or slightly better than 1998. The size of this HRW crop suggests that buyers can find wheat of a desired protein content, but should recognize that higher protein wheats are in shorter supply this year. Buyers should always specify important quality requirements. A range of protein contents is available to supply bakers of both traditional and non-traditional products.

California Harvest Survey

The 1999 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.

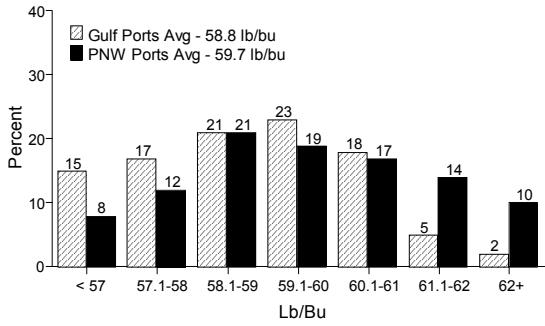
Over 70% of the 1999 California crop fell into medium protein (11.0%-12.4%) and high protein (12.5% and above) categories. The variety Express is the predominant medium protein wheat, averaging 12.2% protein. Express is characterized by high absorption (1999 average 69%) and mellow gluten quality. The varieties Brooks and Yecora Rojo account for the majority of the higher protein wheats. These varieties averaged 13.6% protein and tend to have strong gluten properties.

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 interests in purchasing California wheat in early spring months.

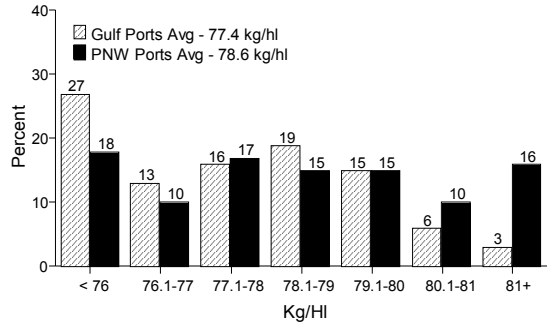
Export Cargo Survey

The export cargo data show the results of analysis of 498 individual subplot samples for marketing years 1999 and 1998. Of the 373 1998 samples, 289 are from Gulf ports and 84 from PNW ports. Of the 125 1999 (collected in July and August) samples, 109 were drawn at Gulf ports and 16 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.

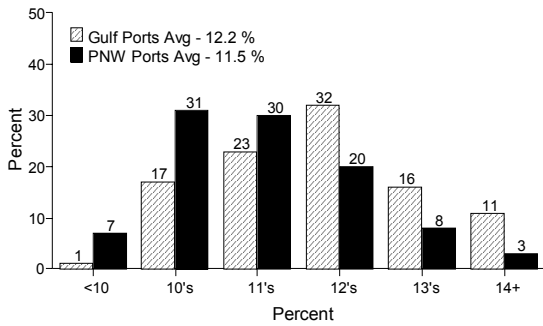
TEST WEIGHT



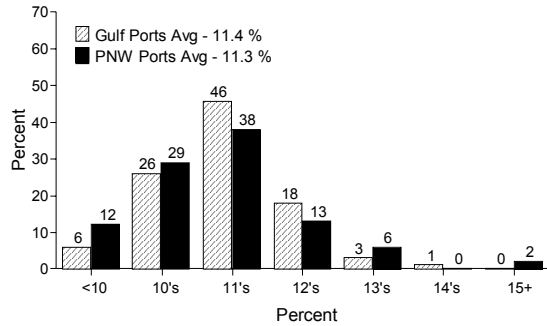
HECTOLITER WEIGHT



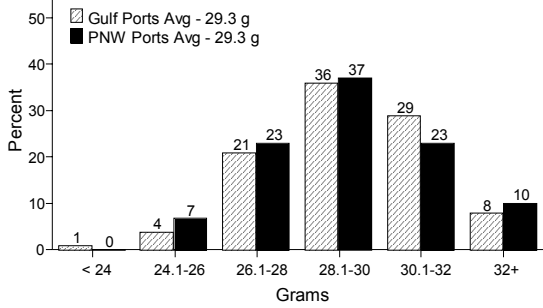
WHEAT MOISTURE



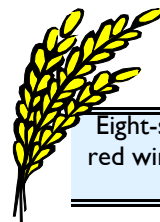
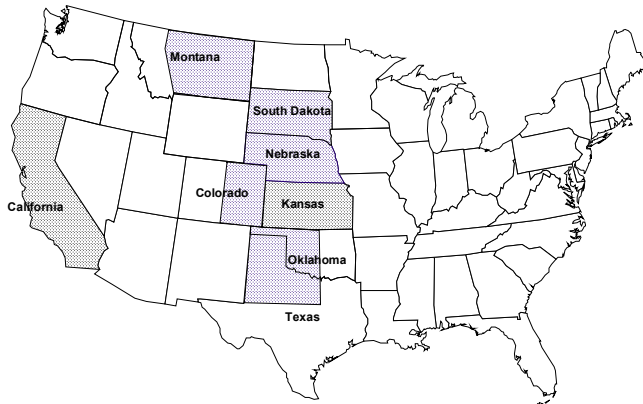
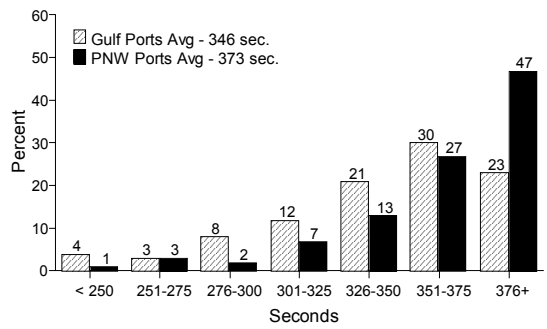
PROTEIN (12% MB)



1000 KERNEL WEIGHT



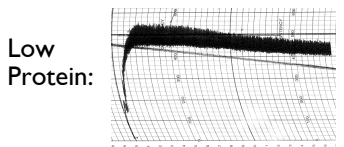
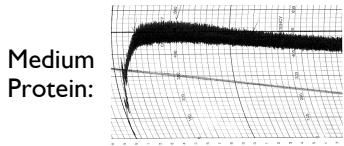
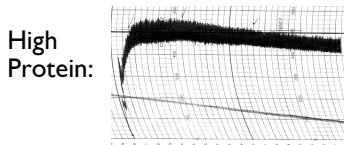
FALLING NUMBER



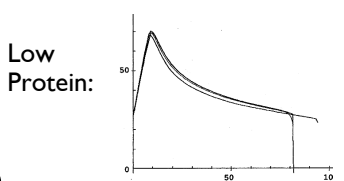
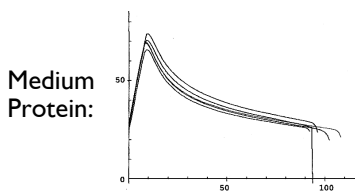
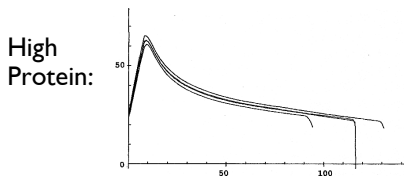
Eight-state area on which hard red winter wheat survey results are reported.

Composite Average Farinograms and Alveograms

Farinograms:



Alveograms:



Hard Red Winter

COMPOSITE AVERAGE

	COMPOSITE AVERAGE					
	1999 By Protein*				1998	5-Year
	Low	Med	High	Overall	Overall	Avg
Wheat Grade Data:						
Test Weight (lb/bu)	59.1	58.8	59.5	59.0	60.5	59.6
(kg/hl)	77.8	77.4	78.3	77.7	79.6	78.4
Damaged Kernels (%)	0.4	0.7	0.4	0.5	0.2	0.4
Foreign Material (%)	0.2	0.2	0.1	0.2	0.1	0.2
Shrunken & Broken (%)	1.1	1.0	0.9	1.1	1.3	1.5
Total Defects (%)	1.6	1.8	1.5	1.7	1.6	2.1
Grade	2 HRW	2 HRW	2 HRW	2 HRW	1 HRW	2 HRW
Wheat Non-Grade Data:						
Dockage (%)	0.5	0.6	0.7	0.6	0.6	0.8
Moisture (%)	12.0	12.2	11.9	12.1	11.4	11.8
Protein: 12% Moisture Basis (%)	10.7	11.9	13.1	11.4	11.7	12.1
0% Moisture Basis (%)	12.2	13.6	14.9	12.9	13.3	13.7
Ash: 14% Moisture Basis (%)	1.52	1.54	1.53	1.53	1.50	1.55
0% Moisture Basis (%)	1.76	1.79	1.78	1.77	1.74	1.79
1000 Kernel Weight (g)	29.6	28.9	29.1	29.3	29.7	29.3
Kernel Size (%) lg/md/sm						
Single Kernel: Hardness	64.3	65.8	66.3	65.0	74.3	
Weight (mg)	31.5	30.5	30.6	31.1	29.7	
Diameter (mm)	2.4	2.3	2.3	2.3	2.3	
Sedimentation (cc)	31.7	37.8	45.2	35.2	37.7	40.7
Falling Number (sec)	355	346	360	352	364	372
Flour Data:						
Extraction Rate (%)	72.4	72.7	72.0	72.5	71.9	71.0
Color: L*	92.9	92.7	91.3	92.7	92.9	
a*	-3.5	-3.5	-3.3	-3.4	-3.2	
b*	9.6	9.6	9.5	9.6	9.4	
Protein: 14% Moisture Basis (%)	9.8	10.4	11.5	10.2	10.3	10.8
0% Moisture Basis (%)	11.4	12.1	13.4	11.8	12.0	12.5
Ash: 14% Moisture Basis (%)	0.48	0.48	0.48	0.48	0.47	0.48
0% Moisture Basis (%)	0.56	0.56	0.56	0.56	0.55	0.56
Wet Gluten (%)	24.2	26.3	29.5	25.4	26.3	28.2
Falling Number (sec)	358	360	387	362	403	387
Amylograph Viscosity 65 g (BU)	573	571	567	572	672	672
Dough Properties:						
Farinograph:						
Peak Time (min)	4.8	5.3	5.9	5.1	5.7	5.6
Stability (min)	9.9	10.5	11.0	10.2	11.3	12.0
Absorption (%)	59.2	59.3	60.2	59.4	62.4	59.9
Alveograph: P (mm)						
L (mm)	84	80	79	82	101	85
W (erg/gm)	83	95	102	89	78	106
240	255	265	247	272	287	
Baking Evaluation:						
Crumb Grain	7	7	8	7	7	7
Crumb Texture	7	7	8	7	7	7
Loaf Volume (cc)	793	825	843	809	837	792
% of Area Production:	55	34	11	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				
1999 By Protein*				1998 Overall	1999 By Protein*				1998 Overall
Low	Med	High	Overall		Low	Med	High	Overall	
58.8	58.5	59.4	58.8	60.4	59.8	59.2	59.6	59.6	60.5
77.4	77.0	78.2	77.4	79.5	78.7	77.9	78.4	78.6	79.6
0.5	0.7	0.5	0.6	0.2	0.3	0.6	0.3	0.4	0.2
0.2	0.2	0.1	0.2	0.1	0.0	0.1	0.1	0.1	0.1
1.1	1.0	0.9	1.0	1.3	1.1	1.1	1.2	1.1	1.2
1.6	1.8	1.5	1.7	1.6	1.4	1.9	1.7	1.6	1.5
2 HRW	2 HRW	2 HRW	2 HRW	1HRW	2HRW	2 HRW	2 HRW	2 HRW	1HRW
0.5	0.5	0.7	0.5	0.6	0.6	0.7	0.6	0.6	0.7
12.3	12.2	12.1	12.2	11.4	11.4	11.8	11.4	11.5	11.4
10.8	11.9	13.0	11.4	11.6	10.6	11.9	13.4	11.3	11.9
12.2	13.5	14.8	12.9	13.2	12.1	13.6	15.3	12.9	13.6
1.51	1.54	1.53	1.52	1.49	1.52	1.54	1.52	1.53	1.53
1.76	1.79	1.78	1.77	1.73	1.77	1.79	1.77	1.78	1.78
29.6	28.8	29.3	29.3	29.4	29.5	29.2	28.5	29.3	30.8
64.4	65.8	67.0	65.2	74.9	64.0	64.7	64.5	64.2	71.9
31.7	30.4	30.5	31.1	29.4	30.7	30.5	30.9	30.7	30.7
2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
32.3	37.8	45.9	35.7	37.4	29.9	37.0	43.2	33.4	38.5
349	339	354	346	362	372	371	378	373	372
72.6	72.5	71.6	72.5	71.7	71.9	72.6	73.2	72.3	72.4
93.0	92.5	90.9	92.6	92.7	92.7	92.8	92.7	92.7	93.1
-3.4	-3.5	-3.4	-3.5	-3.2	-3.5	-3.3	-3.1	-3.4	-3.0
9.5	9.5	9.4	9.5	9.4	9.9	9.7	9.9	9.9	9.4
9.8	10.3	11.4	10.2	10.2	9.7	10.4	11.8	10.2	10.6
11.4	12.1	13.3	11.8	11.9	11.3	12.1	13.7	11.8	12.3
0.49	0.48	0.48	0.48	0.47	0.46	0.47	0.47	0.46	0.47
0.56	0.56	0.56	0.56	0.55	0.53	0.55	0.55	0.54	0.55
24.0	26.0	29.1	25.3	25.9	24.7	27.1	30.5	26.1	27.5
350	353	372	353	401	383	386	429	390	409
568	561	570	566	689	588	609	560	590	607
4.5	5.2	5.7	4.9	5.7	5.5	5.6	6.3	5.6	5.5
9.7	10.4	10.4	10.0	11.7	10.7	11.0	12.6	11.0	9.9
59.0	59.0	59.6	59.1	62.1	59.8	60.3	61.8	60.2	62.9
85	79	76	82	102	82	87	87	84	99
84	95	104	90	75	81	92	97	86	87
244	253	261	249	270	225	259	276	240	277
7	7	8	7	7	8	8	8	8	7
7	7	7	7	7	7	8	8	8	7
792	824	827	807	834	798	822	885	815	842
53	36	10	100	100	62	26	13	100	100

California and Export Data

Hard Red Winter	CALIFORNIA HARVEST DATA				EXPORT CARGO DATA			
	Medium Protein Average		High Protein Average		Gulf		PNW	
	1999	1998	1999	1998	1999	1998	1999	1998
Wheat Grade Data:								
Test Weight (lb/bu)	64.6	61.3	63.5	60.6	61.3	61.9	61.5	61.8
(kg/hl)	84.9	80.6	83.5	79.7	80.6	81.4	80.9	81.2
Damaged Kernels (%)	0.0	0.1	0.0	0.2	0.8	1.0	0.1	0.3
Foreign Material (%)	0.1	0.2	0.1	0.2	0.2	0.2	0.1	0.2
Shrunken & Broken (%)	0.4	0.6	0.6	0.7	1.4	1.8	1.8	1.7
Total Defects (%)	0.4	0.9	0.7	1.1	2.3	3.0	2.0	2.1
Grade	IHRW	IHRW	IHRW	IHRW	IHRW	IHRW	IHRW	IHRW
Wheat Non-Grade Data:								
Dockage (%)	0.5	0.8	0.9	1.0	0.5	0.6	0.5	0.4
Moisture (%)	8.5	10.1	8.4	9.5	12.0	11.1	10.7	10.7
Protein: 12% Moisture Basis (%)	11.8	11.8	13.6	13.5	11.4	11.6	12.0	11.9
0% Moisture Basis (%)	13.4	13.4	15.5	15.4	12.9	13.1	13.6	13.5
Ash: 14% Moisture Basis (%)	1.48	1.64	1.46	1.66	1.53	1.50	1.51	1.46
0% Moisture Basis (%)	1.72	1.91	1.70	1.93	1.78	1.75	1.76	1.70
1 000 Kernel Weight (g)	45.9	38.6	46.0	39.2	28.1	27.8	27.6	29.5
Kernel Size (%) lg/md/sm					65/34/1	59/39/2	61/38/1	66/33/1
Single Kernel: Hardness					*	71.6	*	71.0
Weight (mg)					*	30.6	*	32.4
Diameter (mm)					*	2.3	*	2.4
Sedimentation (cc)					29.0	28.2	33.9	33.8
Falling Number (sec)	390	362	398	370	385	447	398	393
Flour Data:								
Extraction Rate (%)	70.6	69.2	70.9	71.5	72.3	71.7	71.1	71.7
Color: L*					92.9	92.8	92.6	92.7
a*					-3.0	-2.9	-3.3	-2.9
b*					9.5	9.1	10.2	9.5
Protein: 14% Moisture Basis (%)	10.3	9.2	12.1	12.3	10.1	10.3	10.7	10.6
0% Moisture Basis (%)	12.0	10.7	14.1	14.3	11.7	12.0	12.5	12.4
Ash: 14% Moisture Basis (%)	0.44	0.50	0.40	0.43	0.48	0.48	0.47	0.47
0% Moisture Basis (%)	0.51	0.58	0.47	0.50	0.56	0.56	0.54	0.54
Wet Gluten (%)	27.2	27.0	31.5	32.9	25.8	26.3	28.0	28.7
Falling Number (sec)	390	362	398	370	429	483	450	451
Amylograph Viscosity 65 g (BU)					664	834	696	601
Dough Properties:								
Farinograph:								
Peak Time (min)	7.7	6.2	13.8	6.8	5.7	5.9	5.7	5.7
Stability (min)	16.1	13.7	21.1	13.0	11.8	12.2	11.1	10.4
Absorption (%)	63.8	63.6	64.7	65.5	59.2	60.3	61.2	62.8
Alveograph: P (mm)								
L (mm)					89	102	100	109
W (erg/gm)					91	79	91	80
Baking Evaluation:								
Crumb Grain					7.1	7.2	7.4	7.3
Crumb Texture					7.3	7.3	7.6	7.6
Loaf Volume (cc)	832	840	913	878	832	841	841	852
Number of Samples					109	289	16	84

* Data not yet available.

HARD RED WINTER PRODUCTION BY CROP YEAR

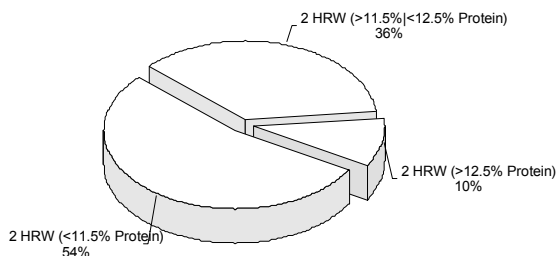
for the major HRW growing region
(million metric tons)

	1999	1998	1997	1996	1995
Kansas	11.77	13.47	13.65	6.95	7.78
Oklahoma	4.10	5.41	4.62	2.53	2.97
Texas	3.33	3.71	3.24	2.05	2.06
Colorado	2.81	2.71	2.35	1.92	2.79
Nebraska	2.35	2.25	1.91	2.00	2.34
Montana	1.00	1.33	1.50	1.72	1.49
South Dakota	1.61	1.66	0.94	1.51	1.53
California	0.79	0.62	0.76	1.03	0.71
Eight-State Total	27.76	31.17	28.96	19.71	21.68
Total HRW Production	28.71	32.10	29.89	20.72	22.45

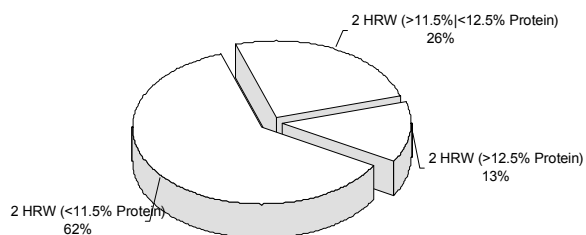
Based on USDA crop estimates of September 30, 1999.

Grade and Protein Distribution

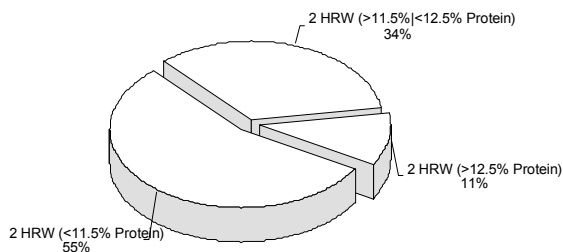
Gulf Exportable



PNW Exportable



Overall



Pacific Northwest Soft White Wheat

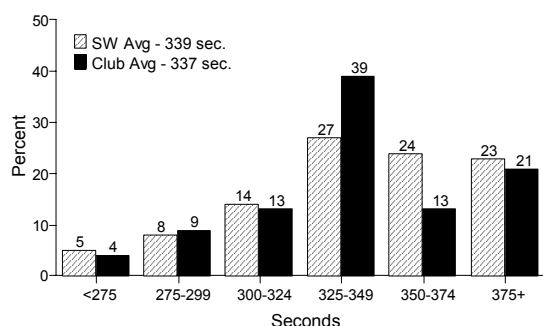
Weather and Harvest: Autumn and winter, 1998-99, were wetter than normal west of the Cascade Mountains, while drier conditions prevailed east of the Cascades. Summer and fall 1999 were predominantly dry. Weather during the grain filling period was near ideal with a limited number of very hot (38°C) days. Harvest conditions were very good, which helped create a mostly sound crop.

Wheat and Grade Data: 1999 crop test weights were slightly higher than last year and about equal to the five-year average. All final composite samples graded U.S. #1, and grading factors except shrunken and broken were near zero. The 1999 crop dockage was lower than last year and slightly lower than the five-year averages. Moisture was higher than

Appearance and crumb grain scores were similar to last year for club, but lower for soft white. Cookie baking quality showed smaller diameters this year for both soft white and white club, consistent with the higher protein content.

Summary: The 1999 soft white and white club crop appears to have good quality. The major change in the 1999 crop is the higher protein content (an increase of about 13% for soft white and about 20% for club). However, baking tests showed that baking quality was only slightly reduced (soft white cake volumes lost about 5% and cookie diameters about 2%). Although moisture content was higher and could potentially reduce millers' profitability, the higher flour yields may offset this limitation.

FALLING NUMBER

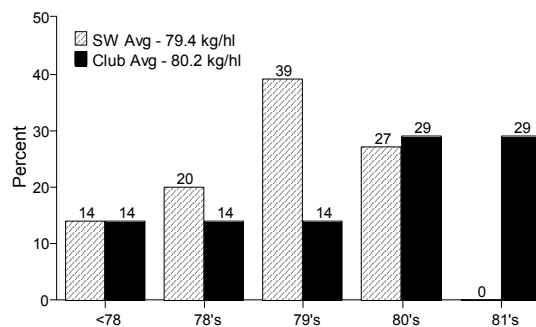


the abnormally low 1998 crop moisture. Club moisture was equal to and soft white only 0.3 percentage points higher than the five-year average. Protein content for soft white and club increased 1.2 and 1.7 percentage points, respectively, compared to last year and 0.6 and 0.7 points compared to the five-year average. Lower rainfall was the primary cause of the increase. The 1999 crop had higher sedimentation volumes compared to last year, indicating both higher protein content and gluten strength. Falling numbers were very similar to last year and indicated negligible sprout damage.

Flour, Dough and Bake Data: Flour extractions for the 1999 soft white and club crop rose 2.8 and 5.3 percentage points, respectively, compared to last year. The higher protein content may have helped the sieving characteristic on the Buhler mill. Flour wet gluten and protein were higher and reflect the higher wheat protein. Falling number and Amylograph viscosity both indicated negligible sprout damage. Farinograph data showed the 1999 crop to have similar mixing properties to last year and the five-year average. Alveograph data showed the 1999 crop had higher extensibility ("L") and overall strength ("W") than last year and the five-year average. Extensigraph data indicated that the 1999 crop had lower resistance to extension and greater extensibility than last year. Sponge cake volume was reduced in the 1999 soft white crop, but increased in club.

Wheat quality testing and data analysis was conducted by the Wheat Marketing Center, Portland, Oregon. Laboratory testing was conducted in accordance with approved methods of the American Association of Cereal Chemists (see Analysis Methods). Survey samples were collected from producers under the management of the National

HECTOLITER WEIGHT



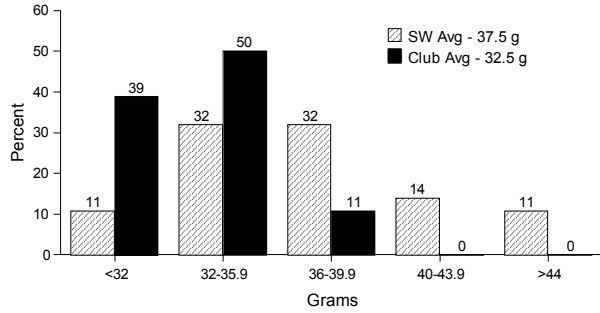
Agricultural Statistics Service, USDA and represent a statistical sampling of the crop.

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

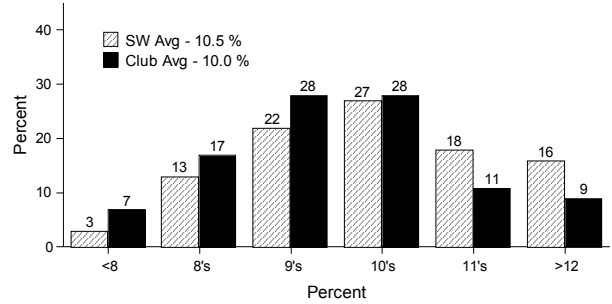
Export Cargo Survey

The Pacific Northwest white wheat export cargo data show the results of analysis of individual subplot samples including 120 drawn from the 1997 crop (October 1997-September 1998) and 90 from the 1998 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.

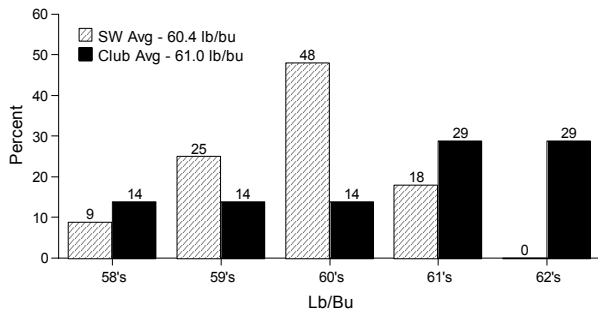
1000 KERNEL WEIGHT



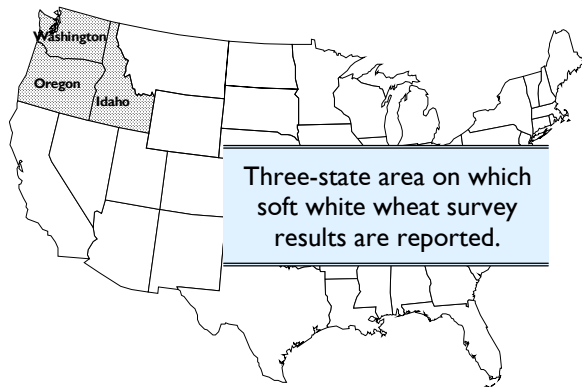
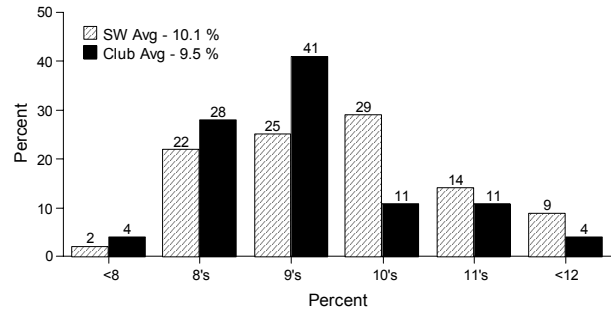
PROTEIN (12% MB)



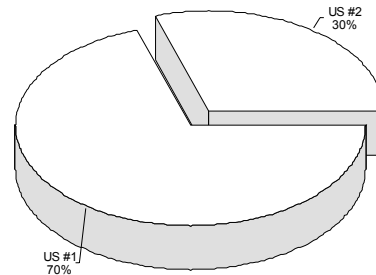
TEST WEIGHT



WHEAT MOISTURE



1999 SW Grade Distribution



PACIFIC NORTHWEST SOFT WHITE WHEAT PRODUCTION

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

	1999		1998		1997		1996		1995	
	SW	CLUB	SW	CLUB	SW	CLUB	SW	CLUB	SW	CLUB
Washington	2.78	0.19	3.60	0.33	3.72	0.32	4.36	0.47	3.78	0.44
Oregon	0.87	0.03	1.43	0.09	1.59	0.08	1.80	0.09	1.80	0.08
Idaho	1.86	0.02	2.01	0.02	2.47	0.02	2.69		2.63	
Three-state Total	5.51	0.24	7.04	0.44	7.78	0.42	8.85	0.56	8.21	0.52
Three-state Total Soft White Wheat	5.75		7.48		8.20		9.41		8.73	
Total Soft White Wheat Production	6.57		8.11		9.04		9.66		9.08	

Based on USDA crop estimates of September 30, 1999.

Pacific Northwest Harvest Data

Soft White

Soft White	1999					1998		5-Year Avg	
	Soft White By Protein*				Club Avg	SW	Club	SW	Club
	Low	Med	High	All					
Wheat Grade Data:									
Test Weight (lb/bu)	60.8	60.7	60.0	60.4	61.0	60.1	60.5	60.4	61.1
(kg/hl)	80.0	79.8	78.9	79.4	80.2	79.0	79.5	79.5	80.4
Heat Damage (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Damaged Kernels (%)	0.4	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0
Foreign Material (%)	0.0	0.1	0.0	0.0	0.1	0.1	0.2	0.1	0.2
Shrunken & Broken (%)	0.7	0.6	0.9	0.8	1.8	1.2	0.9	0.9	1.2
Total Defects (%)	1.1	0.7	0.9	0.9	1.9	1.3	1.1	1.0	1.3
Grade	ISWH	ISWH	ISWH	ISWH	IWHCB	ISWH	IWHCB	ISWH	IWHCB
Wheat Non-Grade Data:									
Dockage (%)	0.4	0.5	0.4	0.4	0.6	0.5	0.8	0.5	0.7
Moisture (%)	10.7	10.2	9.7	10.1	9.5	9.2	9.0	9.8	9.5
Protein: 12% Moisture Basis (%)	8.4	9.8	11.7	10.5	10.0	9.3	8.3	9.9	9.3
0% Moisture Basis (%)	9.7	11.1	13.2	11.9	11.4	10.6	9.4	11.2	10.5
Ash: 14% Moisture Basis (%)	1.37	1.31	1.38	1.35	1.25	1.44	1.38	1.43	1.31
0% Moisture Basis (%)	1.59	1.53	1.60	1.57	1.45	1.68	1.60	1.66	1.52
1000 Kernel Weight (g)	39.6	38.7	36.0	37.5	32.5	37.7	35.9	37.8	33.9
Kernel Size (%) lg/md/sm									
Single Kernel: Hardness	32.0	35.0	33.0	33.0	39.0	34.0	35.0		
Weight (mg)	39.6	38.7	36.0	37.5	32.5	37.7	35.9		
Diameter (mm)	2.6	2.6	2.5	2.5	2.3	2.6	2.5		
Sedimentation (cc)	12.3	16.4	24.1	19.5	13.4	10.7	9.6	15.1	12.7
Falling Number (sec)	325	336	346	339	337	340	335	334	339
Flour Data:									
Extraction Rate (%)	70.5	70.3	68.6	69.5	71.4	66.7	66.1	68.7	69.6
Color: L*	92.7	92.6	92.5	92.6	92.3	92.1	92.2		
a*	-2.8	-2.7	-2.6	-2.7	-2.4	-2.7	-2.5		
b*	7.7	7.8	7.4	7.6	7.0	7.7	6.9		
Protein: 14% Moisture Basis (%)	6.9	8.1	9.8	8.8	8.6	7.5	6.5	8.3	7.6
0% Moisture Basis (%)	8.1	9.4	11.4	10.2	10.0	8.7	7.6	9.6	8.9
Ash: 14% Moisture Basis (%)	0.38	0.38	0.40	0.39	0.40	0.37	0.38	0.39	0.40
0% Moisture Basis (%)	0.45	0.44	0.46	0.45	0.48	0.43	0.44	0.45	0.47
Wet Gluten 14% mb (%)	15.8	21.1	31.7	25.4	15.6	18.0	13.7	22.4	18.1
Falling Number (sec)	322	331	340	334	347	345	354		
Amylograph Viscosity 65 g (BU)	570	550	605	580	645	556	700	535	592
Dough Properties:									
Farinograph:									
Absorption (%)	48.9	50.4	49.8	49.9	49.5	49.3	48.3	50.7	49.6
Peak Time (min)	1.3	1.5	1.7	1.5	1.3	1.7	1.0	1.7	1.3
Stability (min)	1.9	2.3	3.2	2.6	1.4	3.2	1.3	3.4	2.1
Alveograph: P (mm)	43	43	39	41	32	39	31	40	31
L (mm)	68	106	154	123	80	87	55	98	72
W (erg/gm)	88	114	138	122	56	94	45	98	54
Extensigraph: Resistance (Eu)	258	220	220	226	85	300	103		
Extension (cm)	13.6	16.0	19.3	17.2	16.6	14.3	14.1		
Area (sq cm)	50.5	51.1	60.8	55.7	20.0	60.8	22.4		
Baking Evaluation:									
Sponge Cake: Volume (cc)	1113	1113	1063	1088	1150	1140	1125	1167	1192
Score	49	49	43	46	51	53	53	59	58
Cookie Diameter (cm)	8.6	8.4	8.3	8.4	8.5	8.6	8.7	8.6	8.8
% of Area Production:	16	35	49	100	100				

* Low: Less than 9.0; Med: 9.0 - 10.5%; High: greater than 10.5%

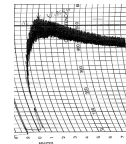
Export Cargo Data

Soft White	1998	1997
Wheat Grade Data:		
Test Weight (lb/bu)	61.2	61.5
(kg/hl)	80.5	80.9
Heat Damage (%)	0.1	0.0
Damaged Kernels (%)	0.2	0.2
Foreign Material (%)	0.2	0.1
Shrunken & Broken (%)	1.0	0.8
Total Defects (%)	1.3	1.1
Grade	ISWH	ISWH
Wheat Non-Grade Data:		
Dockage (%)	0.5	0.4
Moisture (%)	8.8	9.8
Protein: 12% Moisture Basis (%)	9.4	9.4
0% Moisture Basis (%)	10.7	10.7
Ash: 14% Moisture Basis (%)	1.37	1.40
0% Moisture Basis (%)	1.59	1.63
1000 Kernel Weight (g)	38.0	38.7
Kernel Size (%) lg/md/sm	85/14/1	88/11/1
Single Kernel: Hardness	32.6	31.3
Weight (mg)	39.6	40.2
Diameter (mm)	2.6	2.6
Sedimentation (cc)	13.2	13.1
Falling Number (sec)	375	343
Flour Data:		
Extraction Rate (%)	68.9	66.6
Color: L*	92.6	92.7
a*	-2.6	-2.5
b*	7.3	7.0
Protein: 14% Moisture Basis (%)	7.8	7.7
0% Moisture Basis (%)	9.0	9.0
Ash: 14% Moisture Basis (%)	0.37	0.36
0% Moisture Basis (%)	0.43	0.42
Wet Gluten 14% mb (%)	20.3	19.8
Falling Number (sec)	380	309
Amylograph Viscosity 65 g (BU)	592	519
Dough Properties:		
Farinograph:		
Absorption (%)	49.8	50.2
Peak Time (min)	1.3	1.4
Stability (min)	2.5	2.5
Alveograph: P (mm)		
L (mm)	44	42
W (erg/gm)	82	80
Extensigraph: Resistance (Eu)		
Extension (cm)	99	92
Area (sq cm)		
Baking Evaluation:		
Sponge Cake: Volume (cc)	1149	1143
Score	49	51
Cookie Diameter (cm)	8.4	8.3
Sample Count:	90	120

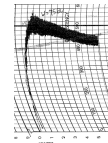
Composite Average Farinograms and Alveograms

Farinograms:

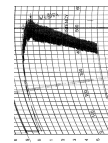
High Protein:



Medium Protein:



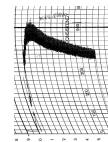
Low Protein:



Average Protein:

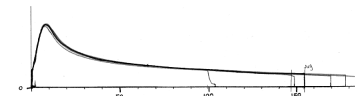


Club:

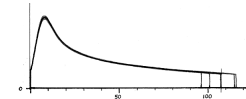


Alveograms:

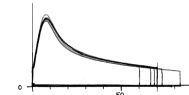
High Protein:



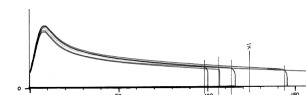
Medium Protein:



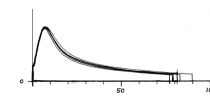
Low Protein:



Average Protein:



Club:



Hard Red Spring Wheat

Weather and Harvest: The 1999 hard red spring wheat production season was characterized by later than normal planting, variable growing season weather and a wet, prolonged harvest period. This combination of weather led to a lower production level than 1998 with more variance in quality. Disease pressures were significantly lower than previous years and protein levels are similar to last year and above long-term averages. However, the unusually wet harvest period did lead to weather damage in a portion of the crop across central and northern parts of the region.

The 1999 hard red spring wheat crop was planted in two distinct periods. The planting season advanced rapidly in April and early May with nearly sixty percent of the crop planted by May 16. This was equal to the five-year average for that date. However, planting the remainder of the crop was seriously delayed by heavy rains during mid-May. In particular, North Dakota plantings were only fifty percent complete on May 23 and did not reach full completion until mid-June, about two-weeks behind normal.

Despite a delayed start, early crop development was near ideal due to adequate soil moisture and average to below-average temperatures during the first part of the growing season. These conditions boosted overall crop potential, although a period of excessively warm temperatures stressed the crop across western locations in late July. The earliest portion of the crop avoided significant disease pressures, but some disease and insect pressures were noted on the middle to late portion of the crop.

Harvest of the 1999 hard red spring wheat crop began in early August and advanced to nearly thirty percent complete by August 15, near the five-year average pace. Toward the end of August harvest progress stalled, particularly across North Dakota, as frequent rain systems moved across the area. Regional harvest progress only advanced to seventy-five percent complete by September 15, well behind the 1998 pace of ninety-eight percent and the five-year average pace of ninety percent for that date. Harvest did not reach full completion until October 3.

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 1,094 HRS samples were collected from growers and grain elevators in Minnesota (145), Montana (247), North Dakota (497) and South Dakota (203). 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 analysis methods are described in the Analysis Methods section of this booklet.

Wheat and Grade Data: Test weights on average for the 1999 crop are lower than last year and the five-year average. The percentage of vitreous kernels is a little lower than last year with the average grade of 1NS for the region. The average amount of damaged kernels is less than last year and also less than the five-year average. There is considerably less fusarium head blight (scab) in this crop compared to the last four or five years. The lower falling number values for both export regions indicate some sprout damaged wheat in certain areas. Wheat protein on average is slightly lower than last year but slightly higher than the five-year average.

Flour and Baking Data: Flour extraction using the Buhler experimental mill is lower than last year and also lower than the five-year average. The wet gluten values for the 1999 crop are on average the same as last year. Dough properties on average as measured with the farinograph are somewhat weaker than last year. Farinogram absorption on the average for the 1999 crop is higher than last year and higher than the five-year average. Alveograph data indicate dough characteristics similar to last year and stronger than the five-year average. The baking data show that the average bake absorption is higher than last year and the longterm average. Average loaf volume for the region is higher than last year and the five-year average. However, crumb grain and texture is rated a little poorer than last years crop.

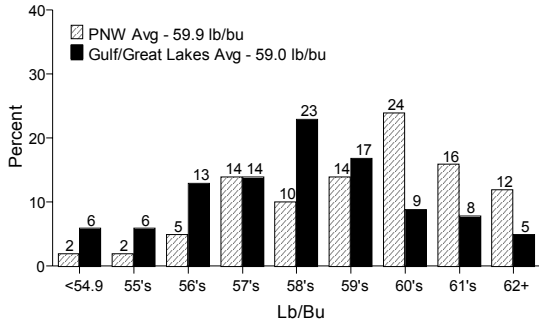
Summary: Compared to the five-year averages, the 1999 HRS crop has similar protein, lower test weight and a lower percentage of damaged kernels. There are isolated areas in the 1999 crop which have experienced sprouting resulting in lower average falling number values. Fusarium head blight was present to a minor extent and less than in the previous 4-5 years.

Average dough mixing properties of the 1999 crop as measured with the farinograph are comparable to the five-year average, although certain areas are considerably stronger in terms of mixing characteristics than other areas. Overall bread-baking performance including loaf volume is considered good. The 1999 HRS wheat crop is rated as having average to good quality but care must be exercised in wheat purchases due to the occurrence of sprouting in certain areas. Quality differences exist between the west and east export region.

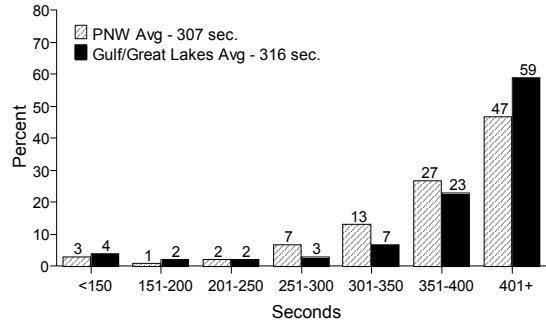
Export Cargo Survey

The export cargo survey shows the results of analysis of 166 individual subplot samples for crop year 1998 (collected from October through August) and 254 for crop year 1997. Of the 166 1998 samples, 89 were collected from PNW ports, 37 from the Lakes and 40 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.

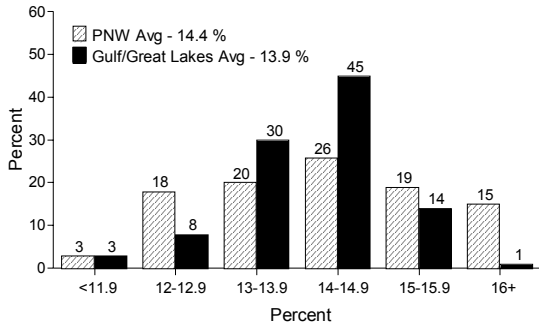
TEST WEIGHT



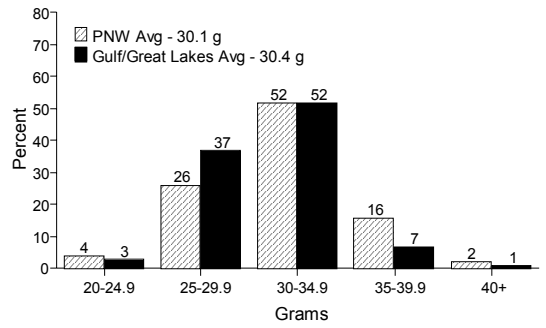
FALLING NUMBER



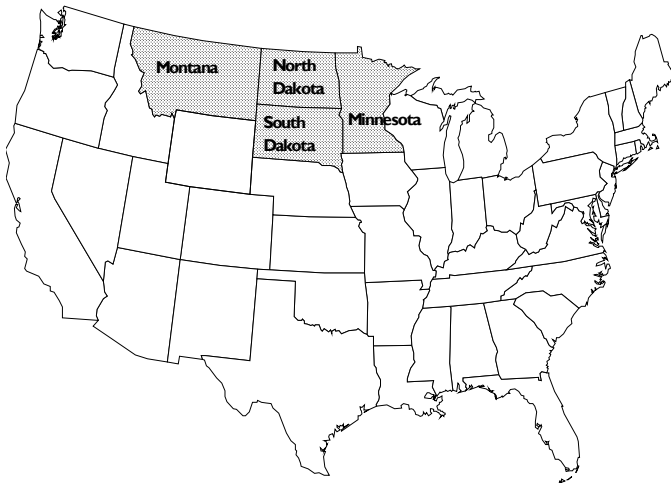
PROTEIN (12% MB)



1000 KERNEL WEIGHT



Hard Red Spring

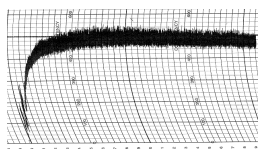


Four-state area on which hard red spring survey results are reported.

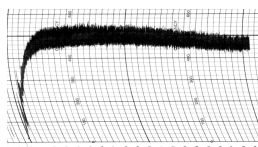
Composite Average Farinograms and Alveograms

Farinograms:

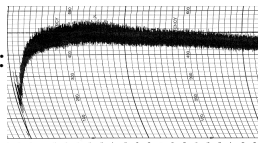
High Protein:



Medium Protein:

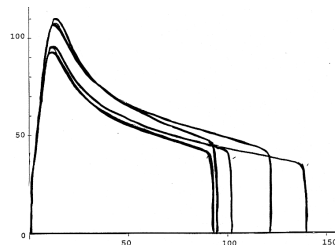


Low Protein:

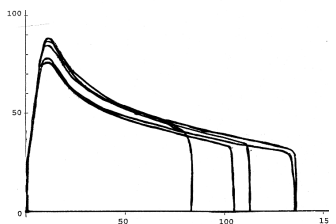


Alveograms:

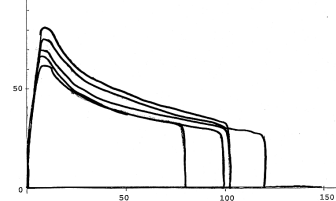
High Protein:



Medium Protein:



Low Protein:



Hard Red Spring

Hard Red Spring

COMPOSITE AVERAGE

	1999 By Protein*				1998	5-year
	Low	Med	High	Overall	Overall	Avg
Wheat Grade Data:						
Test Weight (lb/bu)	60.1	59.3	58.8	59.3	59.8	60.1
(kg/hl)	79.1	77.9	77.4	78.1	78.7	79.1
Damaged Kernels (%)	0.3	0.6	0.5	0.4	0.7	1.0
Foreign Material (%)	0.0	0.0	0.0	0.0	0.0	0.0
Shrunken & Broken (%)	1.3	1.4	1.4	1.4	2.0	1.6
Total Defects (%)	1.6	2.0	1.8	1.8	2.7	2.6
Vitreous Kernels (%)	57	59	66	61	71	79
Grade	INS	INS	INS	INS	INS	IDNS
Wheat Non-Grade Data:						
Dockage (%)	1.5	1.5	1.6	1.6	1.5	2.5
Moisture (%)	12.5	12.6	12.1	12.4	11.4	12.2
Protein: 12% Moisture Basis (%)	12.5	14.0	15.4	14.1	14.3	14.0
0% Moisture Basis (%)	14.2	15.9	17.6	16.0	16.3	15.9
Ash: 14% Moisture Basis (%)	1.60	1.67	1.76	1.68	1.69	1.65
0% Moisture Basis (%)	1.86	1.95	2.04	1.96	1.96	1.92
1000 Kernel Weight (g)	31.3	30.7	29.2	30.3	30.2	31.5
Kernel Size (%) lg/md/sm	60/34/6	60/34/6	53/40/7	58/36/6	57/37/6	
Single Kernel: Hardness	81.9	82.0	82.0	82.0	79.2	
Weight (mg)	31.9	31.6	30.4	31.2	31.9	
Diameter (mm)	2.5	2.4	2.4	2.4	2.4	
Sedimentation (cc)	40.1	50.3	58.4	50.5	49.0	
Falling Number (sec)	344	318	285	313	395	382
Flour Data:						
Extraction Rate (%)	69.6	68.3	68.3	68.6	70.0	69.1
Color: L*	90.5	90.3	89.9	90.2	90.4	
a*	-1.6	-1.5	-1.4	-1.5	-1.4	
b*	9.7	9.6	9.5	9.6	9.0	
Protein: 14% Moisture Basis (%)	11.5	12.7	14.1	12.9	13.1	12.9
0% Moisture Basis (%)	13.4	14.8	16.4	15.0	15.3	15.0
Ash: 14% Moisture Basis (%)	0.46	0.47	0.47	0.46	0.44	0.44
0% Moisture Basis (%)	0.53	0.54	0.54	0.54	0.51	0.51
Wet Gluten (%)	30.0	34.4	38.5	34.7	34.6	35.3
Falling Number (sec)	385	332	328	345	423	394
Amylograph Viscosity:						
65 g FL (BU)	539	354	354	404	617	546
100 g FL (BU)	1956	1329	1313	1493	3133	2780
Dough Properties:						
Farinograph:						
Peak Time (min)	6.9	8.8	10.0	8.7	15.4	10.2
Stability (min)	13.4	15.2	17.7	15.6	23.0	16.6
Absorption (%)	63.1	64.3	65.8	64.5	63.4	63.3
Classification	5.4	5.9	6.9	6.1	6.7	6.0
Alveograph:						
P (mm)	105	98	100	100	90	88
L (mm)	85	108	112	103	105	107
W (erg/gm)	340	379	405	378	362	321
Extensigraph:						
Resistance	7.9	7.8	8.4	8.0	7.2	
Extension	22.0	23.9	23.8	23.3	21.6	
Area	120	133	151	136	116	
Baking Evaluation:						
Absorption (%)	61.6	62.8	64.3	63.0	61.9	61.8
Crumb Grain and Texture	8.0	8.2	7.9	8.1	8.6	8.1
Loaf Volume (cc)	948	1039	1097	1035	1008	984
% Area Production:	27	37	36	100	100	

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

Data

PNW AVERAGE					GULF/GREAT LAKES AVERAGE				
1999 By Protein*				1998	1999 By Protein*				1998
Low	Med	High	Overall		Low	Med	High	Overall	
61.0	59.6	59.2	59.9	59.6	59.5	59.0	58.5	59.0	59.9
80.2	78.4	77.9	78.7	78.4	78.3	77.6	77.0	77.6	78.8
0.0	0.5	0.0	0.1	0.3	0.5	0.6	0.8	0.6	1.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.4	1.6	1.5	1.5	2.3	1.2	1.3	1.3	1.3	1.8
1.4	2.1	1.5	1.6	2.6	1.7	1.9	2.1	1.9	2.8
68	73	84	76	76	49	49	52	50	68
INS	INS	IDNS	IDNS	IDNS	INS	INS	INS	INS	INS
1.3	1.5	1.4	1.4	1.6	1.7	1.5	1.8	1.6	1.4
12.0	12.2	11.5	11.8	10.4	12.8	12.9	12.6	12.8	12.1
12.4	14.2	15.9	14.4	14.5	12.6	13.8	15.1	13.9	14.2
14.1	16.1	18.1	16.3	16.5	14.3	15.7	17.2	15.8	16.1
1.55	1.63	1.74	1.65	1.63	1.63	1.70	1.77	1.71	1.74
1.80	1.90	2.02	1.92	1.89	1.90	1.98	2.06	1.99	2.02
30.4	31.0	29.4	30.1	29.4	31.9	30.5	29.0	30.4	30.7
58/35/7	59/35/6	51/42/7	57/36/7	51/42/7	62/32/6	62/33/5	56/37/7	60/34/6	63/33/4
85.1	83.0	82.6	83.5	79.1	79.4	81.3	81.5	80.9	79.6
33.8	32.3	30.4	31.9	2.4	30.5	31.0	30.4	30.7	32.4
2.6	2.4	2.4	2.5	30.8	2.4	2.4	2.4	2.4	2.5
43.0	56.0	67.0	56.7	52.0	38.0	46.0	52.0	46.0	47.0
338	317	279	307	404	348	318	290	316	390
69.0	68.7	68.0	68.5	69.8	70.0	68.0	68.5	68.6	70.2
90.7	90.5	90.5	90.6	90.5	90.4	90.2	89.5	90.0	90.2
-1.5	-1.4	-1.3	-1.4	-1.4	-1.7	-1.6	-1.5	-1.6	-1.4
9.2	9.0	8.9	9.0	8.7	10.2	10.0	9.9	10.0	9.3
11.6	13.0	14.7	13.3	13.3	11.4	12.5	13.7	12.6	13.0
13.5	15.1	17.1	15.5	15.5	13.3	14.5	15.9	14.7	15.1
0.46	0.46	0.45	0.46	0.43	0.46	0.47	0.48	0.47	0.45
0.53	0.53	0.52	0.53	0.50	0.53	0.55	0.56	0.55	0.52
30.1	34.5	39.6	35.3	34.0	29.9	34.4	37.7	34.4	35.1
388	325	306	336	431	383	337	345	350	420
550	400	325	414	626	530	320	375	385	614
2110	1540	1330	1626	3282	1840	1170	1300	1364	3044
8.0	10.5	12.0	10.4	25.6	6.0	7.5	8.5	7.5	7.7
16.0	17.5	24.5	20.0	32.5	11.5	13.5	12.5	12.7	16.2
64.2	65.6	66.5	65.6	64.6	62.3	63.4	65.2	63.7	62.7
6.0	7.0	8.0	7.1	8.0	5.0	5.0	6.0	5.3	5.8
119	110	111	113	104	94	89	91	91	79
84	110	111	102	104	86	107	112	104	107
365	431	456	421	431	322	339	366	343	317
8.8	8.5	8.5	8.6	8.3	7.2	7.2	8.4	7.6	6.4
20.8	23.7	23.6	22.8	22.3	22.9	24.0	23.9	23.7	21.2
121	139	157	141	134	120	128	147	132	103
62.7	64.1	65.0	64.1	63.1	60.8	61.9	63.7	62.2	61.2
8.0	8.5	8.5	8.3	8.6	8.0	8.0	7.5	7.8	8.7
945	1025	1125	1043	1010	950	1050	1075	1035	1009
31	26	43	100	100	23	46	31	100	100

Hard Red Spring

Export Cargo Data

Hard Red Spring

Hard Red Spring	PNW Average		Great Lakes Average		Gulf Average	
	1998	1997	1998	1997	1998	1997
Wheat Grade Data:						
Test Weight (lb/bu)	60.7	61.1	60.6	59.8	60.2	59.8
(kg/hl)	79.9	80.4	79.7	78.7	79.2	78.6
Damaged Kernels (%)	0.2	0.5	1.2	1.9	1.8	2.4
Foreign Material (%)	0.2	0.2	0.1	0.2	0.2	0.2
Shrunk & Broken (%)	2.2	1.7	1.8	1.7	1.8	1.8
Total Defects (%)	2.6	2.3	3.1	3.7	3.9	4.4
Vitreous Kernels (%)	81.4	77.6	59.6	51.7	57.1	53.3
Grade	1DNS	1DNS	2NS	2NS	2NS	2NS
Wheat Non-Grade Data:						
Dockage (%)	0.6	0.6	0.6	0.6	0.8	0.8
Moisture (%)	10.2	11.1	12.0	12.3	12.0	12.5
Protein: 12% Moisture Basis (%)	14.1	14.0	14.5	14.3	13.9	14.1
0% Moisture Basis (%)	16.1	15.9	16.4	16.2	15.8	16.0
Ash: 14% Moisture Basis (%)	1.6	1.6	1.7	1.7	1.7	1.7
0% Moisture Basis (%)	1.9	1.8	2.0	2.0	1.9	2.0
1000 Kernel Weight (g)	32.1	32.6	32.0	29.9	31.6	30.5
Kernel Size (%) lg/md/sm	57/36/7	63/32/5	61/33/6	55/39/6	58/35/7	56/38/6
Single Kernel: Hardness	78.8	78.7	79.2	78.2	76.8	77.4
Weight (mg)	32.0	32.3	31.8	30.0	31.6	30.0
Diameter (mm)	2.4	2.5	2.5	2.4	2.4	2.4
Sedimentation (cc)						
Falling Number (sec)	426	409	407	390	405	395
Flour Data:						
Extraction Rate (%)	68.7	69.8	70.2	70.2	69.7	70.1
Color: L*	90.7	90.4	90.2	89.9	90.4	90.1
a*	-1.3	-1.3	-1.3	-1.3	-1.3	-1.3
b*	8.5	8.4	9.1	9.0	9.0	9.0
Protein: 14% Moisture Basis (%)	13.0	12.9	13.2	13.1	12.7	12.9
0% Moisture Basis (%)	15.1	15.0	15.4	15.2	14.8	15.0
Ash: 14% Moisture Basis (%)	0.45	0.44	0.49	0.47	0.48	0.48
0% Moisture Basis (%)	0.52	0.51	0.57	0.54	0.56	0.55
Wet Gluten (%)	34.2	34.8	36.7	35.4	34.2	34.8
Falling Number (sec)	476	457	443	437	444	438
Amylograph Viscosity:						
65 g FL (BU)	583	535	510	482	463	452
100 g FL (BU)						
Dough Properties:						
Farinograph:						
Peak Time (min)	19.6	12.7	7.7	7.6	8.2	7.7
Stability (min)	26.3	22.1	13.9	13.0	13.9	13.2
Absorption (%)	64.7	64.8	63.4	62.3	62.6	62.5
Classification	7.6	7.0	5.6	5.5	5.5	5.3
Alveograph: P (mm)						
	109	100	82	75	84	78
L (mm)	89	104	97	116	94	116
W (erg/gm)	360	377	275	293	273	299
Extensigraph: Resistance						
Extension						
Area						
Baking Evaluation:						
Absorption (%)	63.3	63.3	61.9	60.8	61.1	61.0
Crumb Grain and Texture	8.2	8.1	8.2	8.1	8.1	8.1
Loaf Volume (cc)	1012	986	1015	996	998	983
Sample Count:	89	143	37	42	40	69

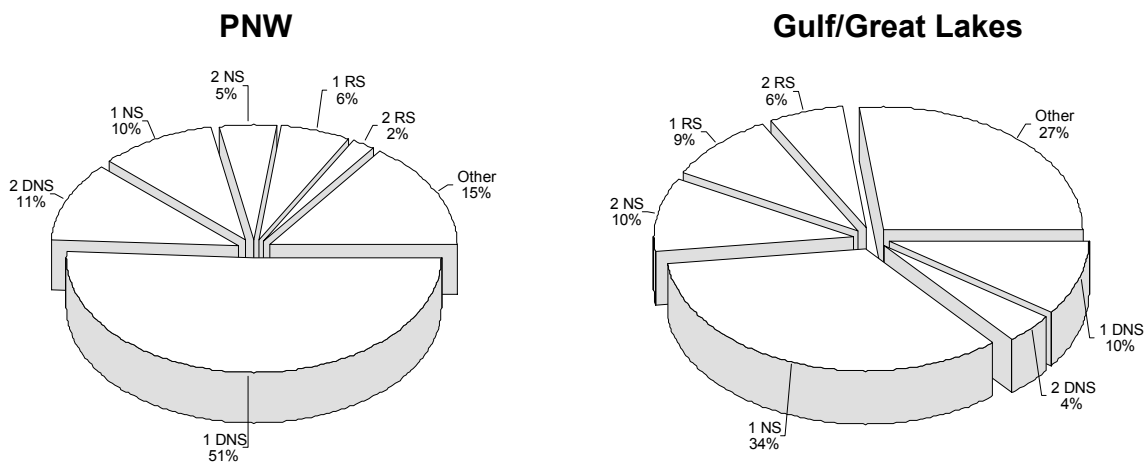
HARD RED SPRING PRODUCTION BY CROP YEAR

for the major producing states
(million metric tons)

	1999	1998	1997	1996	1995
Minnesota	2.29	2.14	2.05	2.86	1.92
Montana	2.94	2.94	3.24	2.90	3.62
North Dakota	4.57	5.75	5.72	8.53	6.03
South Dakota	1.63	1.61	1.71	2.27	0.91
Four-State Total	11.43	12.44	12.71	16.56	12.48
Total HRS Production	12.36	13.24	13.37	17.17	12.93

Based on USDA crop estimates of September 30, 1999.

Grade Distribution



Soft Red Winter Wheat

Quality of the 1999 crop is considered better than the crop of 1998 due to lower average protein and moisture content. Mostly favorable weather throughout the SRW growing region produced a crop with only small areas reporting disease damage and isolated instances pre-harvest sprouting.

SRW Survey: The 1999 SRW survey is based on 360 samples collected from seven key production states: Arkansas, Illinois, Indiana, North Carolina, Virginia, Missouri and Ohio. Samples are collected in each state at two different times reflecting early and late harvest conditions. Sample collection and analysis is performed by CII Laboratory Services.

Data from the samples are reported as Composite Averages in the following table and are further separated into production areas labeled “East Coast” and “Gulf Ports”. These two production areas do not include regions where the production is unlikely to be exported. The composite

averages do include all production areas sampled. All data is weighted by production based on the USDA “Small Grains Summary” of 30 September 1999 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 1999 SRW crop is characterized as slightly drier, with a lower average protein content and very slightly lower average test weight than the 1998 crop. Grade factors show the crop to be well within the limits for the grade U.S. No. 2 SRW. Millers reported a transition period into new crop which is typical of good crop years with acceptable protein recovery. Bakers indicate they are pleased with the performance of the 1999 SRW crop and that there are no production issues related to using new crop wheat in cakes, biscuits and pretzels. Buyers should always specify important quality requirements.

WINTER WHEAT PRODUCTION

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

	1999	1998	1997	1996	1995
Alabama	0.12	0.10	0.10	0.10	0.08
Arkansas	1.40	1.25	1.07	1.82	1.28
Georgia	0.26	0.28	0.42	0.46	0.31
Illinois	1.65	1.57	1.81	1.14	1.85
Indiana	0.92	0.97	0.99	0.74	1.08
Kentucky	0.67	0.67	0.62	0.76	0.66
Louisiana	0.13	0.11	0.12	0.15	0.08
Maryland	0.33	0.29	0.39	0.32	0.39
Michigan	1.13	0.84	0.88	0.65	1.01
Mississippi	0.22	0.18	0.20	0.31	0.17
Missouri	1.20	1.56	1.59	1.33	1.31
North Carolina	0.77	0.76	0.93	0.71	0.77
Ohio	1.96	2.02	1.87	1.41	2.01
South Carolina	0.26	0.21	0.41	0.33	0.24
Tennessee	0.46	0.41	0.44	0.48	0.43
Virginia	0.37	0.30	0.47	0.40	0.48
16-State Total	11.85	11.53	12.31	11.11	12.15
Total SRW Production*	12.30	12.05	12.85	11.49	12.40

* 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 30, 1999.

Harvest Data

Soft Red Winter	Mennel Data		Composite Average		East Coast Virginia and North Carolina		Gulf Ports Arkansas, Illinois and Indiana	
	1999	1998	1999	1998	1999	1998	1999	1998
	Wheat Grade Data:							
Test Weight (lb/bu)	58.8	58.1	58.1	58.3	59.4	57.8	58.5	58.0
(kg/hl)	77.4	76.5	76.5	76.7	78.2	76.1	77.0	76.4
Damaged Kernels (%)			0.7	1.4	1.0	1.7	0.5	1.8
Foreign Material (%)			0.1	0.1	0.1	0.1	0.1	0.1
Shrunken & Broken (%)			0.5	0.6	0.7	0.8	0.5	0.6
Total Defects (%)			1.2	2.1	1.7	2.6	1.1	2.5
Grade			2 SRW	2SRW	2 SRW	3 SRW	2 SRW	2 SRW
Wheat Non-Grade Data:								
Dockage (%)			0.6	0.5	1.0	0.7	0.6	0.6
Moisture (%)	12.7	12.9	13.1	13.4	13.0	13.8	13.2	13.0
Protein: 12% Moisture Basis (%)	10.0	9.8	10.1	10.3	10.7	10.4	9.9	10.5
0% Moisture Basis (%)	11.4	11.2	11.5	11.7	12.1	11.9	11.3	11.9
Ash: 14% Moisture Basis (%)			1.53	1.60	1.50	1.62	1.53	1.60
0% Moisture Basis (%)			1.78	1.86	1.75	1.88	1.77	1.86
1000 Kernel Weight (g)			31.6	30.9	31.2	30.2	31.3	30.4
Kernel Size (%) lg/md/sm								
Single Kernel: Hardness			24.2	25.4	33.8	24.5	24.5	22.8
Weight (mg)			33.1	30.9	32.9	29.6	32.8	30.9
Diameter (mm)			2.3	2.3	2.3	2.1	2.3	2.3
Sedimentation (cc)			12.0	13.4	17.0	15.4	10.5	13.3
Falling Number (sec)	321	300	328	341	316	362	343	334
Flour Data:								
Extraction Rate (%)			70.4	70.8	70.3	69.2	70.3	70.8
Color: L*			93.7	93.9	93.6	94.0	93.8	93.8
a*			-3.7	-3.1	-3.7	-3.6	-3.8	-3.1
b*			8.6	8.6	8.9	9.0	8.7	8.5
Protein: 14% Moisture Basis (%)	8.6	8.6	8.3	8.5	8.9	8.7	8.2	8.7
0% Moisture Basis (%)	10.0	10.0	9.7	9.9	10.4	10.2	9.5	10.2
Flour Ash: 14% Moisture Basis (%)	0.46	0.47	0.45	0.46	0.46	0.48	0.45	0.46
0% Moisture Basis (%)	0.54	0.54	0.53	0.53	0.53	0.56	0.52	0.53
Amylograph Viscosity 65 g (BU)	475	471	596	484	560	650	672	538
MacMichael Viscosity	43	51	49	56	64	69	47	56
Wet Gluten (%)			20.7	21.4	24.1	23.5	20.7	21.6
Falling Number (sec)			325	332	295	357	338	337
Dough Properties:								
Farinograph:								
Peak Time (min)			1.5	1.5	1.9	1.6	1.4	1.5
Stability (min)			3.2	3.5	3.6	3.5	3.1	3.5
Absorption (%)			53.2	53.6	54.4	54.2	53.1	53.2
Alveograph: P (mm)			36	35	37	38	36	33
L (mm)			97	102	108	114	94	104
W (erg/gm)			83	91	104	110	83	86
Baking Evaluation:								
Crumb Grain			6	6	6	6	6	6
Crumb Texture			6	6	7	6	6	6
Loaf Volume (cc)			760	744	785	744	765	730
Cookie Spread Ratio	6.8	8.4	8.9	7.9	9.1	8.0	9.0	8.6
% of Area Sampled:			100	100	14	13	47	45

* East and Gulf Ports data do not include Missouri and Ohio

Soft Red Winter

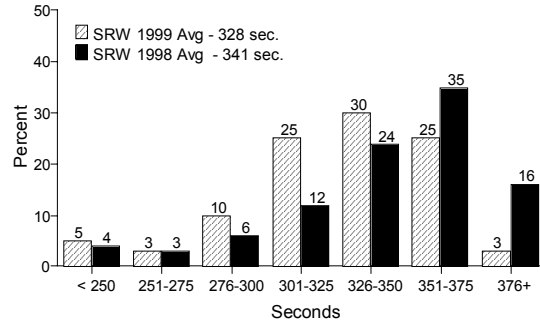
Export Cargo Data



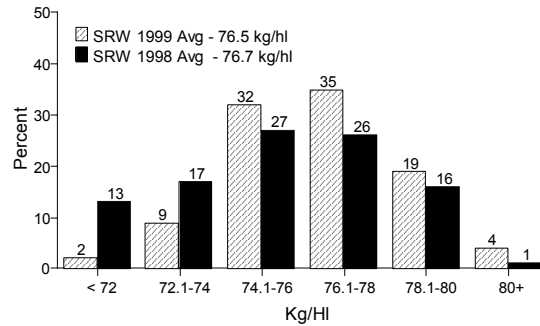
Soft Red Winter		1999	1998
Wheat Grade Data:			
Test Weight (lb/bu)		59.2	59.0
(kg/hl)		77.9	77.7
Damaged Kernels (%)		1.5	1.8
Foreign Material (%)		0.2	0.2
Shrunken & Broken (%)		0.9	0.9
Total Defects (%)		2.5	2.9
Grade		2SRW	2SRW
Wheat Non-Grade Data:			
Dockage (%)		0.7	0.7
Moisture (%)		12.7	12.5
Protein: 12% Moisture Basis (%)		10.1	10.3
0% Moisture Basis (%)		11.4	11.7
Ash: 14% Moisture Basis (%)		1.56	1.60
0% Moisture Basis (%)		1.82	1.86
1000 Kernel Weight (g)		29.4	29.2
Kernel Size (%) lg/md/sm		79/20/1	77/22/1
Single Kernel: Hardness		*	19.4
Weight (mg)		*	31.9
Diameter (mm)		*	2.3
Sedimentation (cc)		10.9	11.8
Falling Number (sec)		373	364
Flour Data:			
Extraction Rate (%)		70.2	70.5
Color: L*		94.0	93.6
a*		-3.0	-3.1
b*		8.7	8.5
Protein: 14% Moisture Basis (%)		8.3	8.6
0% Moisture Basis (%)		9.7	10.0
Flour Ash: 14% Moisture Basis (%)		0.44	0.45
0% Moisture Basis (%)		0.51	0.53
Amylograph Viscosity 65 g (BU)		648	670
MacMichael Viscosity		55	55
Wet Gluten (%)		22.1	21.4
Falling Number (sec)		367	375
Dough Properties:			
Farinograph:			
Peak Time (min)		1.5	1.5
Stability (min)		4.6	4.4
Absorption (%)		53	52
Alveograph: P (mm)		41	39
L (mm)		86	95
W (erg/gm)		112	111
Baking Evaluation:			
Crumb Grain		6	6
Crumb Texture		6	7
Loaf Volume (cc)		751	752
Cookie Spread Ratio		8.1	8.6
Sample Count:		44	133

* Data not yet available.

FALLING NUMBER



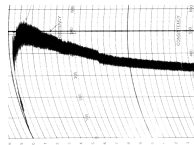
HECTOLITER WEIGHT



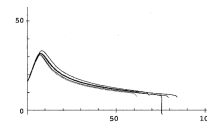
Soft Red Winter

1999 Farinogram and Alveogram

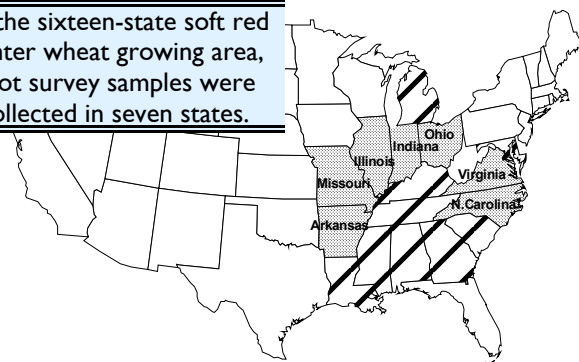
Farinogram:



Alveogram:



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



Durum Wheat

Northern Great Plains

Most of the United States durum wheat crop is grown in the Northern Great Plains. This region produced approximately 85% of the total estimated U.S. durum production of 2.99 million metric tons. Production was down by more than 20% for the U.S. and 13% for the region compared to the 1998 harvest. The Southwestern states of California and Arizona accounted for approximately 15% of the total 1999 durum production. North Dakota is the primary durum producing state with 74% of the total United States production.

Weather and Harvest: The 1999 durum wheat production season in the Northern Plains was characterized by a delayed planting season, variable growing conditions, and a wet, prolonged harvest period. Planting of the 1999 durum crop had an average start date of April 22. Planting progressed at a normal pace until mid-May with 13% planted. A two-week period of rainfall prevented planting and created two different planting periods. Planting was not completed until mid-June.

The durum crop progress continued behind normal because of the delayed planting. Periods of rain in early to mid-July created areas of leaf disease and insect (orange blossom wheat midge) pressure. Hot and humid conditions in late July pushed crop development and brought lower crop condition ratings. However, crop development still lagged behind last year and the five-year average.

Harvest of the early seeded durum started in early August until widespread rains halted harvest with 2% complete. This widespread rain created problems for the early-planted durum while helping the late-planted crop. Periods of rain continued until mid-September with 45% harvested, well behind last year at 97% and the five-year average of 85%. During this time sprouting did occur in some regions. Harvest was not complete until mid-October with 92% complete, behind last year and the five-year average.

Quality: The 1999 crop quality data was generated from 375 samples collected from five durum-producing districts in North Dakota and one district in Montana. The 1999 durum wheat crop quality is down from last year, but is equal to or better than the five-year average. Test weight was down from 60.3 to 59.8 lb/bu and damage increased from 0.8% to 1.7%. Approximately 38% of the samples were graded # 2 or higher hard amber durum (HAD) and 21% graded # 3 HAD. The regional grade average for the 1999 crop was 2 HAD, same as last year. Protein content was down slightly from last year at 13.8% (12% moisture basis). There was evidence of sprout damage with an average falling number value of 250 seconds. The 1000 kernel

weight improved to 39.3 gm from 37.6 gm last year and 36.7 gm the five-year average.

Semolina extraction (65.4%), obtained using a Buhler laboratory mill increased by 3.2 percentage points compared to the yield reported for the 1998 crop (62.2%). The regional average obtained for ash increased slightly from 0.62% (14% moisture basis) in 1998 to 0.67% in 1999. Gluten strength, as estimated by the mixograph classification scored 6, up from a 5 last year and the five-year average. Pasta color was down from 9.8 in 1998 to 9.0 in 1999, but still considered good. Cooking loss increased from 5.3 in 1998 to 6.3 in 1999, while the cooked firmness remained the same.

This report was extracted from "Quality of the Regional 1999 Durum Wheat Crop Report" prepared by the Department of Cereal Science, North Dakota State University and funded by the North Dakota Wheat Commission, Montana Wheat and Barley Committee, and U.S. Wheat Associates.

Pacific Southwest

Desert durum is planted, harvested and delivered to the domestic and export customer on an identity-preserved basis. The information presented in this report is a weighted average of the data collected on all commercially available varieties. Samples were collected at the point of inspection between the farm and the elevator.

Desert durum is produced in the desert valleys and lowlands of Arizona and California. These are regions of extreme temperatures (May-June temperatures average 32c) and low rainfall. Desert durum is planted December through February and harvested in May and June. In 1999, once again, consistent growing conditions allowed for high test weights (81.9 kg/hl), large kernel size (50.9 gm, 1000-kernel weight), and low moisture (7.4%). All 1999 export cargoes graded US #1.

Kronos, WB 881 and Kofa are examples of varieties that have excellent color, gluten strength and extraction rates. Strong breeding programs in the Desert Southwest continue to release high quality varieties that must meet the color, gluten strength and extraction rates necessary to compete with the established varieties produced in the desert.

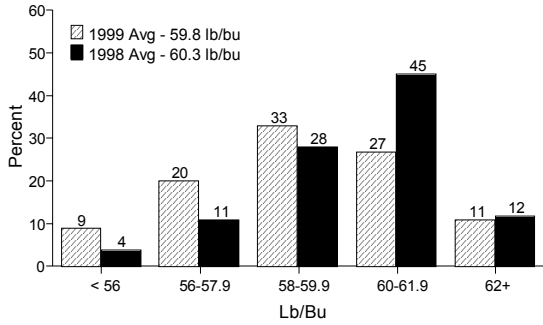
Export Cargo Survey

The durum export cargo survey shows the results of analysis of 50 individual subplot samples for crop year 1998 (collected from October 1997 through August 1998) and 58 samples for 1997. 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.

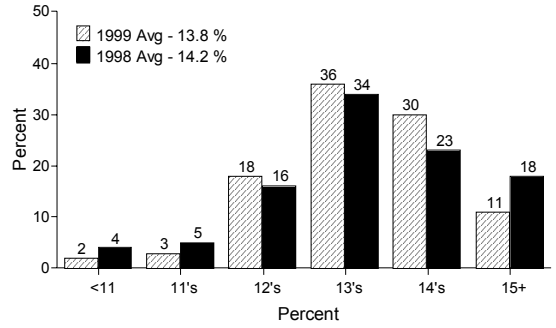
Harvest and Export Data

Durum	HARVEST DATA					EXPORT CARGO DATA			
	Great Plains		5-YEAR	Pacific Southwest		Great Plains		Pacific Southwest	
	1999	1998	Avg.	1999	1998	1998	1997	1998	1997
Wheat Grade Data:									
Test Weight (lb/bu)	59.8	60.3	60.0	62.9	62.7	60.2	59.8	62.9	62.0
(kg/hl)	77.9	78.5	78.2	81.9	81.6	78.4	77.9	81.9	80.8
Damaged Kernels (%)	1.7	0.8	1.5	0.2	0.1	2.0	2.4	1.1	0.5
Foreign Material (%)	0.1	0.1	0.2	0.2	0.1	0.4	0.4	0.2	0.2
Shrunken and Broken (%)	1.8	2.3	2.1	0.6	0.6	2.2	2.3	0.5	1.0
Total Defects (%)	3.6	3.2	3.8	0.9	0.8	4.6	5.1	1.8	1.6
Contrasting Classes (%)	0.4	0.2	0.3	0.0	0.0	1.1	1.0	0.0	0.1
Vitreous Kernels (%)	83	77	84	95	96	81	79	93	91
Grade	2HAD	2HAD	2HAD	1HAD	1HAD	2HAD	3HAD	1HAD	1HAD
Wheat Non-Grade Data:									
Dockage (%)	1.9	2.2	2.4	0.5	0.7	0.7	0.8	0.5	0.8
Moisture (%)	12.4	11.2	11.9	7.4	7.9	11.6	12.1	8.3	8.0
Protein: 12% Moisture Basis (%)	13.8	14.2	13.6	13.6	13.4	13.8	13.9	13.1	12.8
0% Moisture Basis (%)	15.6	16.2	15.5	15.5	15.2	15.7	15.7	14.9	14.6
Ash: 14% Moisture Basis (%)	1.58	1.68	1.68	1.69	1.76	1.67	1.70	1.60	1.65
0% Moisture Basis (%)	1.84	1.95	1.95	1.96	2.05	1.94	1.98	1.86	1.92
1000 Kernel Weight (g)	39.3	37.6	36.7	50.9	54.1	36.7	35.4	53.4	48.4
Kernel Size (%) lg/md/sm	64/31/6	51/42/7	47/46/6	92/8/0	94/6/0	49/42/9	51/42/7	91/7/2	87/11/2
Single Kernel: Hardness	88.2	90.2							
Weight (mg)	38.6	38.9							
Diameter (mm)	2.6	2.6							
Falling Number (sec)	250	369	355	1156	630	402	374	736	523
Sedimentation (cc)	46	31	34						
Semolina Data:									
Total Extraction (%)	72.7	69.6	70.6	76.0	74.0	68.3	68.5	70.9	71.1
Semolina Extraction (%)	65.4	62.2	61.8	64.0	62.5	61.6	59.9	63.8	61.7
Ash: 14% Moisture Basis (%)	0.67	0.62	0.67	0.76	0.75	0.65	0.65	0.63	0.69
0% Moisture Basis (%)	0.78	0.72	0.78	0.88	0.87	0.76	0.75	0.74	0.81
Specks (no/10 sq in)	24	17	32	27	60	11	22	13	30
Protein: 14% Moisture Basis (%)	12.8	13.1	12.7	12.4	12.3	12.7	12.8	11.8	11.5
0% Moisture Basis (%)	14.9	15.2	14.8	14.4	14.3	14.7	14.9	13.7	13.3
Wet Gluten (%)	38.0	39.2	39.1	33.6	33.1				
Mixograph Classification	6.0	5.0	5.0			5.3	5.5	6.8	6.3
Alveograph: W (erg/gm)	94	77		183	182				
P (mm)	38	29			83				
L (mm)	117	122			68				
Color: L*	84.7	85.3				84.9	84.9	85.0	85.0
a*	-2.9	-3.1				-2.7	-2.7	-2.6	-2.6
b*	27.6	27.5				27.3	27.1	25.7	25.3
Spaghetti Processing Data:									
Color Score	9.0	9.8	9.5	9.1	10.4	9.3	9.3	9.4	9.1
Cooked Weight (gm)	31.7	31.1	31.4	29.7	29.9	31.8	31.4	32.1	32.2
Cooking Loss (%)	6.3	5.3	5.7	7.2	7.3	5.5	5.6	6.0	6.4
Cooked Firmness (g cm)	5.9	6.0	6.0	7.2	7.3	5.8	6.0	5.4	5.1
Sample Count:						24	44	26	14

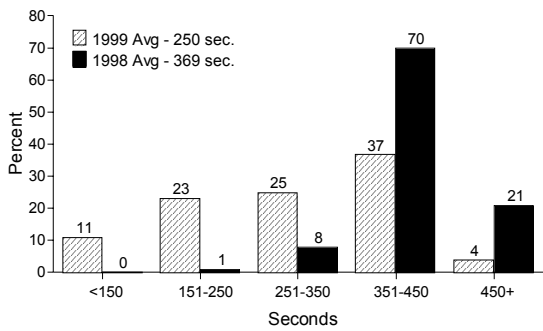
TEST WEIGHT



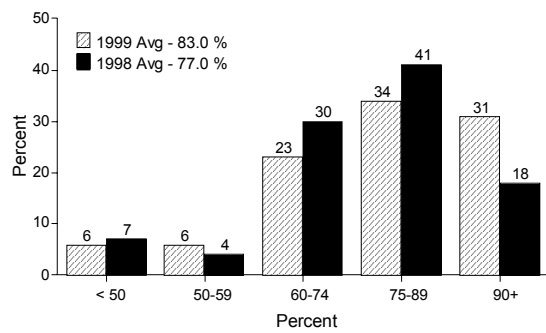
PROTEIN (12% MB)



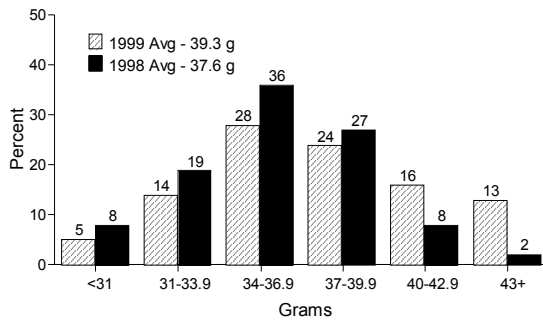
FALLING NUMBER



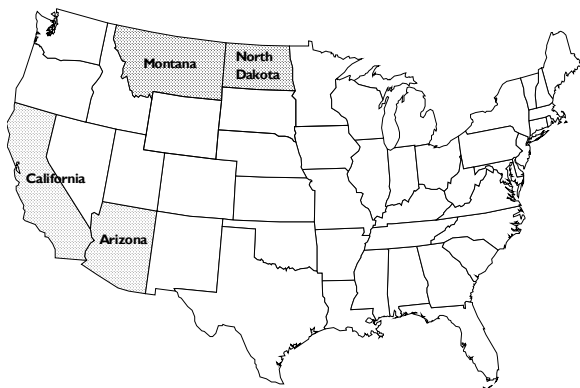
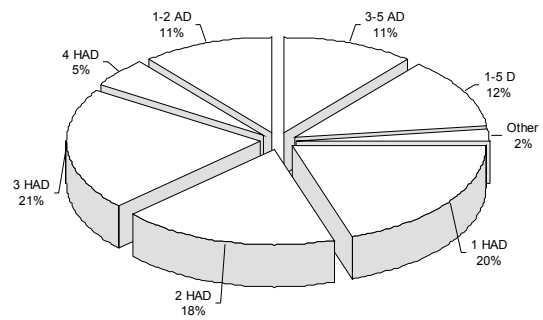
VITREOUS KERNELS



1000 KERNEL WEIGHT



Grade Distribution



Four-state area which was sampled for the durum wheat survey.

DURUM PRODUCTION BY CROP YEAR

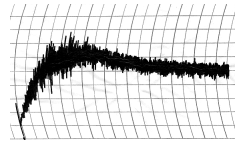
for the major producing states
(million metric tons)

	1999	1998	1997	1996	1995
Arizona	0.20	0.41	0.22	0.40	0.23
California	0.24	0.43	0.37	0.38	0.19
Minnesota	0.00	0.01	0.00	0.01	0.01
Montana	0.30	0.33	0.21	0.19	0.22
North Dakota	2.21	2.57	1.57	2.16	2.12
South Dakota	0.04	0.02	0.01	0.02	0.02
Total U.S.	2.99	3.76	2.39	3.16	2.78

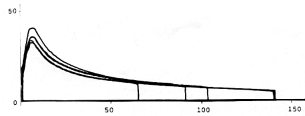
Based on USDA crop estimates of September 30, 1999.

1999 Durum Mixogram and Alveogram

Regional Average Mixogram:
(score = 5)



Alveogram:



Hard White Wheat

Hard White Harvest Survey

Samples of specific varieties were collected from seven states: Klasic from California; Platte from Colorado; ID 377S from Idaho and Montana; Betty, Heyne 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 estimated production of HW wheat varieties tested were: Klasic, 25,000 metric tons; Platte, 23,000 MT; ID 377S, 170,000 MT; Betty, 800 MT; and Heyne, 800 MT. Others were not commercially produced. The total production quantity this year increased by over 100% from last year.

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 (1995). Noodle testing was conducted according to the protocol established by Chinese noodle makers and flour millers at the Wheat Marketing Center.

Wheat and Grade Data: All samples were graded U.S. #1 except NuPlains, which graded U.S. #2 due to 3.1% total damaged kernels.

Flour, Dough, and Baking Data: Straight grade flour extraction ranged from 67.6 to 71.7%; and flour ash varied from 0.37 to 0.45% (14% mb). All but Winsome (medium

protein) had amylograph peak viscosities higher than 700 Bu. Farinograph water absorption ranged from 56.4 to 61.7%; peak times varied from 2.6 to 20.4 min; and stability times were more than 10 min for all except for NuPlains and Winsome, which had 5.6 and 7.7 min, respectively.

Alveograph and extensigraph data were in the typical ranges of bread wheat. Bread-baking quality was good overall. The loaf volume ranged from 846 to 1034 cc with higher flour protein, yielding larger volume.

Noodle Evaluation: Initial noodle sheet whiteness (L^* value at 0 hr) was close to or higher than the control noodle sheet ($L^* = 82.5$). The initial b^* values (yellowness) of Klasic, Platte (low protein), and Winsome were smaller than the control ($b^* = 17.6$). The b^* values of Platte (high protein), ID 377S (high protein), and Heyne were higher than the control. High protein ID 377S from Montana and NuPlains showed the largest darkening from 0 to 24 hrs, with L^* values decreasing by 11.5 and 11.3 units, respectively. The control noodle sheet had $L^*_{24} = 73.2$, $a^*_{24} = 0.7$, and $b^*_{24} = 23.4$. Visual evaluation indicated that all except NuPlains, Klasic, ID 377S (high protein from Montana) and Winsome (medium protein) had acceptable noodle color score.

Instrumental textural parameters of cooked control noodles were: firmness, 1222 g; springiness, 95.5%; and cohesiveness, 0.64. Measurement of test noodles showed that Platte (low- and high-protein), ID 377S (high proteins), Betty and NuPlains had firmness larger than the control noodle. Klasic, Winsome (low- and medium- protein) and ID 377S (medium protein) were soft in bite. (Continued on p. 26)

Harvest Data

Hard White	Calif	Colorado		Idaho		Kansas			Mont	Nebr	Oregon	
	Klasic	Platte		ID377s		Betty	Heyne	Trego	ID377s	NuPlains	Winsome	
	Low*	Low	High	Med	High	High	High	Med	High	High	Low	Med
Wheat Grade Data:												
Test Weight (lb/bu)	65.6	65.2	64.1	62.8	60.8	61.9	61.1	62.1	60.4	62.4	64.6	62.6
(kg/hl)	86.2	85.7	84.2	82.6	80.0	81.4	80.4	81.7	79.5	82.0	84.9	82.3
Heat Damage (%)	0.0	0.0	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	3.1	0.0	0.0
Foreign Material (%)	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Shrunken & Broken (%)	0.4	0.8	1.1	0.7	1.6	0.1	0.2	0.8	2.6	0.6	0.1	0.6
Total Defects (%)	0.4	0.8	1.1	0.7	1.7	0.1	0.2	0.8	2.7	3.7	0.1	0.6
Grade	1HW	1HW	1HW	1HW	1HW	1HW	1HW	1HW	1HW	2HW	1HW	1HW
Wheat Non-Grade Data:												
Dockage (%)	0.0	0.3	0.6	0.5	1.2	0.2	0.2	0.6	0.7	0.0	0.0	0.0
Moisture (%)	9.5	11.1	10.5	8.8	9.1	10.4	10.3	11.0	10.7	11.2	11.2	10.3
Protein: 12% Moisture Basis(%)	11.3	11.2	13.6	12.0	12.9	13.3	13.5	12.3	14.8	13.7	10.9	12.0
0% Moisture Basis(%)	12.8	12.7	15.4	13.6	14.6	15.1	15.4	14.0	16.8	15.5	12.4	13.6
Ash: 14% Moisture Basis (%)	1.38	1.47	1.45	1.48	1.48	1.48	1.38	1.29	1.45	1.54	1.16	1.52
0% Moisture basis (%)	1.60	1.71	1.68	1.72	1.73	1.72	1.61	1.50	1.68	1.80	1.35	1.77
1000 Kernel Weight (g)	50.5	30.9	27.4	34.5	31.8	28.5	30.7	29.2	30.1	33.3	37.9	31.8
Single Kernel: Hardness	68.9	84.5	84.7	83.5	78.4	73.3	65.0	84.0	75.4	72.6	93.0	89.3
Weight (mg)	50.5	30.9	27.4	34.5	31.8	28.5	30.7	29.2	30.1	33.3	37.9	31.8
Diameter (mm)	3.2	2.5	2.3	2.6	2.4	2.3	2.3	2.2	2.2	2.5	2.7	2.4
Sedimentation (cc)	16.6	11.3	33.6	13.0	22.5	20.1	38.7	30.3	42.0	22.0	33.0	13.4
Falling Number (sec)	397	430	518	402	423	526	457	419	325	479	335	364

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

Harvest Data

Hard White	Calif	Colorado		Idaho		Kansas			Mont	Nebr	Oregon	
	Klasic	Platte		ID377s		Betty	Heyne	Trego	ID377s	NuPlains	Winsome	
	Low*	Low	High	Med	High	High	High	Med	Low	High	Low	Med
Flour Data:												
Extraction Rate (%)	71.2	70.5	68.6	67.8	67.6	71.3	71.6	71.7	69.5	70.9	70.6	70.5
Color: L*	91.7	92.0	91.3	91.4	91.2	91.4	91.8	91.2	91.1	91.3	91.5	91.0
a*	-2.1	-2.4	-2.3	-2.5	-2.4	-2.2	-2.3	-2.4	-2.4	-2.2	-1.7	-1.9
b*	6.4	8.0	8.4	8.0	8.2	7.4	7.1	8.4	8.5	7.8	6.2	6.6
Protein: 14% Moisture Basis(%)	10.2	10.2	12.5	10.1	11.7	12.5	12.4	10.6	13.5	12.2	9.8	11.2
0% Moisture Basis(%)	11.9	11.8	14.6	11.8	13.6	14.5	14.5	12.3	15.7	14.2	11.3	13.0
Ash: 14% Moisture Basis(%)	0.39	0.43	0.43	0.39	0.39	0.38	0.37	0.37	0.39	0.40	0.37	0.45
0% Moisture Basis(%)	0.45	0.50	0.50	0.45	0.45	0.44	0.43	0.43	0.45	0.47	0.43	0.53
Wet Gluten - 14% Mt Basis (%)	23.6	27.3	32.8	26.9	31.6	33.1	34.1	28.1	36.7	33.9	24.7	31.1
Amylograph Viscosity 65 g (BU)	1120	785	830	1070	1230	995	920	1260	910	730	785	585
Falling Number (sec)	369	444	482	403	401	458	421	453	372	408	347	375
Dough Properties:												
Farinograph:												
Absorption (%)	59.2	58.5	58.2	56.4	56.8	59.6	58.1	57.9	56.7	58.7	61.7	61.6
Peak Time (min)	17.8	4.6	7.1	2.6	10.9	8.5	8.7	8.6	7.5	4.1	20.4	6.8
Stability (min)	32.6	10.5	47.5	42.4	40.2	32.1	22.7	36.9	35.4	5.6	30.3	7.7
Alveograph: P (mm)												
L (mm)	124	114	104	111	102	106	102	104	80	73	145	116
L (mm)	90	93	110	78	112	135	139	100	144	139	69	102
W (erg/gm)	404	343	408	304	389	470	463	329	384	260	375	378
Extensigraph: Peak Resistance												
Extensibility (cm)	530	388	493	480	540	550	538	505	485	238	525	358
Area (sq cm)	13.7	18.8	15.2	8.8	10.6	15.1	16.6	10.3	15.0	22.6	9.8	17.9
Noodle-Making Quality												
Color At 0 hour: L*	85.7	86.1	82.7	86.0	84.2	83.6	83.5	84.4	83.1	82.3	86.9	85.8
a*	-0.2	-0.4	-0.1	-0.8	-0.5	-0.1	-0.3	-0.6	0.0	-0.1	0.3	0.3
b*	14.6	15.1	19.5	17.4	19.1	17.5	18.7	18.0	19.8	17.6	11.6	12.9
Color at 24 hours: L*	75.5	78.6	72.5	77.9	75.7	74.5	73.3	74.9	71.6	71.0	79.3	76.5
a*	0.1	0.1	1.1	-0.3	0.3	0.7	0.3	-0.1	1.4	0.7	0.8	1.0
b*	20.8	22.9	27.7	25.7	27.2	24.4	25.5	25.9	27.2	24.2	17.7	20.1
Cooking Yield (%)	115	116	113	123	114	116	112	121	110	105	121	119
Sensory Score:												
Machining	7.3	7.6	6.4	7.1	7.0	7.0	6.8	7.3	6.5	7.2	6.8	7.1
Dough Sheet	7.0	7.0	6.5	7.0	7.0	6.5	6.5	7.0	6.5	7.0	6.5	6.5
Color Stability	6.8	7.5	7.3	8.5	8.0	7.5	7.5	7.7	6.8	6.2	7.3	6.8
Instrumental Texture												
Firmness (g)	996	1201	1395	1026	1170	1301	1177	1146	1245	1349	931	1019
Springiness (%)	95.8	95.1	94.5	95.2	94.2	95.7	94.0	95.0	93.4	96.4	94.0	94.5
Cohesiveness	0.64	0.64	0.63	0.65	0.63	0.64	0.63	0.65	0.62	0.66	0.66	0.65
Baking Evaluation:												
Bake Absorption (%)	61.4	60.6	58.9	59.7	59.6	60.9	58.7	59.4	59.2	59.5	63.6	63.3
Crumb Grain and Texture (1-10)	6.0	4.5	4.3	5.8	5.3	7.0	7.0	6.3	5.5	6.8	4.5	5.3
Loaf Volume (cc):	894	881	938	856	944	994	1016	931	1034	1019	846	953

(Continued from p. 25)

Summary: The 1999 crop HW wheats surveyed had fairly good breadmaking performance. Noodle color and color

stability were acceptable, except for NuPlains, Klasic and Winsome (medium protein) varieties. Most samples had acceptable noodle texture.

U.S. PRODUCTION BY CLASS

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

	1999	1998	1997	1996	1995
Hard Red Winter	28.71	32.10	29.89	20.72	22.45
Soft Red Winter	12.30	12.05	12.85	11.49	12.40
Hard Red Spring	12.36	13.24	13.37	17.17	12.93
Soft White	6.57	8.11	9.04	9.66	9.08
Hard White	0.15	0.08	n/a	n/a	n/a
Durum	2.99	3.76	2.39	3.16	2.78
Total	63.08	69.33	67.54	62.20	59.65

U.S. SUPPLY AND DEMAND

Estimated for 1999/2000 (year beginning June 1)
(million metric tons)

	HRW	HRS	SRW	Soft White	Durum	TOTAL
Supply:						
Beginning Stocks	11.8	6.3	3.7	2.4	1.5	25.7
Production	28.7	12.4	12.3	6.7	3.0	63.1
Total Supply	40.6	20.3	16.0	9.3	5.5	91.7
Demand:						
Domestic Use	14.2	7.7	7.3	2.6	2.4	34.2
Exports	14.3	6.9	3.8	4.5	1.1	30.6
Total Demand	28.4	14.6	11.1	7.1	3.5	64.8
Ending Stocks	12.2	5.6	4.9	2.2	2.0	26.9

Based on USDA Supply/Demand estimates of October 8, 1999.

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".

ANALYSIS METHODS

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. only.

Semolina Data (Durum only)

Extraction: 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.

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 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 (15 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, using 60% patent flour.

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 conventional drying conditions, 18-hour cycle of increasing followed by decreasing temperature (40° C to 25° C) and decreasing relative humidity (90% to 40%). 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, the firmness measurement modified by selecting two spaghetti strands in lieu of five, as specified in the method.

HW Baking: AACC Method 10-09, modified by using 2.0% shortening (flour basis), 40 ppm ascorbic acid, and 0% ammonium phosphate. Loaf volume measured by rapeseed displacement immediately after removal from oven.

HW Noodle: 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°C 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; and *cohesiveness* is a measure of the extent to which noodle structure is disrupted during first bite. High values are generally more desirable for Chinese-style noodles.

WHEAT GRADES AND GRADE REQUIREMENTS TABLE

Grading Factors	Grades U.S. Nos.				
	1	2	3	4	5
Minimum pound limits:					
Test Weight (lbs/bu)					
Hard Red Spring wheat or White Club wheat	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
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
<p>U.S. Sample grade: Wheat that:</p> <p>(a) Does not meet the requirements for U.S. Nos. 1, 2, 3, 4, 5; or</p> <p>(b) Has a musty, sour or commercially objectionable foreign odor (except smut or garlic odor); or</p> <p>(c) Is heating or of distinctly low quality.</p> <p>1/ Includes damaged kernels(total), foreign material, and shrunken and broken kernels.</p> <p>2/ Unclassed wheat of any grade may contain not more than 10.0% of wheat of other classes.</p> <p>3/ Includes contrasting classes.</p> <p>4/ Includes any combination of animal filth, castor beans, crotalaria seeds, glass, stones, or unknown foreign substance.</p>					

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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