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SUMMARY OF CLASSES

	Hard Red Winter		Hard Red Spring		Soft Red Winter		Soft White		Durum*	
	2002	5-Year Avg	2002	5-Year Avg	2002	5-Year Avg	2002	5-Year Avg	2002	5-Year Avg
Test Weight (lb/bu)	58.9	59.6	59.3	59.8	59.2	58.5	59.7	60.6	59.9	59.4
(kg/hl)	77.5	78.4	78.1	78.7	77.9	77.0	78.5	79.7	78.0	77.4
Grade	2 HRW	2 HRW	1 NS	1 NS	2 SRW	2 SRW	2 SW	1 SW	2 HAD	2 HAD
Dockage (%)	0.6	0.7	1.2	1.7	0.8	0.6	0.7	0.5	1.7	2.2
Wheat Moisture (%)	11.2	11.6	12.4	11.8	12.5	13.3	9.4	9.5	12.0	11.5
Wheat Protein (%)**	13.4	12.1	15.1	14.3	10.5	10.1	10.8	10.2	14.0	14.2
Wheat Ash (%)**	1.58	1.54	1.65	1.69	1.62	1.54	1.41	1.39	1.56	1.71
1000 Kernel Weight (g)	27.5	28.6	27.9	30.3	32.7	32.2	33.4	36.7	36.9	36.3
Wheat Falling Number (sec)	425	388	321	371	364	336	362	338	292	307
Flour/Semolina Extraction (%)	70.9	70.6	68.8	69.3	68.7	70.1	69.1	68.2	63.3	63.0
Flour/Semolina Ash (%)**	0.51	0.49	0.43	0.45	0.46	0.44	0.35	0.37	0.67	0.69
Wet Gluten (%)	32.4	27.9	36.3	35.2	23.1	22.1	23.4	22.3	36.5	38.5
Farinograph:										
Peak Time (min)	7.0	5.8	16.5	10.1	1.8	1.7	1.7	1.6	n/a	n/a
Stability (min)	11.2	11.0	28.9	17.6	3.2	3.5	2.7	2.8	n/a	n/a
Absorption (%)	62.0	60.0	64.4	63.9	52.3	53.0	49.8	50.1	n/a	n/a
Alveograph WV (10-4 joules)	345	283	380	365	90	92	124	109	78	n/a
Loaf Volume (cc)	900	844	1100	1035	751	739	n/a	n/a	n/a	n/a
Production (mmt)	16.6	26.1	9.9	13.0	9.0	12.0	6.4	7.7	2.2	2.9

* Great Plains durum only, extraction and ash values are for semolina.

** Protein - 12% moisture basis; ash - 14% moisture basis

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). For 2002, extremely dry conditions during the fall 2001 planting season delayed germination and slowed growth before winter. Much of the HRW growing region experienced continued drought conditions throughout the winter and spring growing seasons. Yields were reduced substantially in most areas. However, the protein content was much higher for the 2002 crop with improved overall performance when compared to previous years. Predominantly dry conditions during harvest produced a very sound crop.

Processing quality is better than last year by most measures. Test weight is slightly lower while protein content average is 1.0 percentage points greater than last year. Much higher farinograph absorption and larger bread loaf volume indicate protein quality is improved.

Survey Methods: Information on the 2002 HRW crop is based on testing by CII Laboratory Services of Kansas City, Missouri. Approximately 557 samples were collected in 22 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 September 30, 2002. These data are presented as composite (overall) averages and the projected averages than 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 to new crop wheat this year was not difficult after the wheat had gone through the traditional "sweat" period. They report similar milling yield, with good flour quality which meets their customers' requirements. Mill labs confirm the higher farinograph absorption and higher loaf volume. The baking industries in the U.S. indicate the crop has processing characteristics similar to 2001, although some bakeries may not see the absorption increase indicated by the farinograph. Bakeries with manual production practices, as opposed to high speed commercial production, may experience better absorption characteristics. Pan bread loaf volumes remain at levels acceptable to the baking companies.

Summary: The 2002 HRW crop has good milling quality and acceptable to good baking performance. Some millers are experiencing slightly decreased yields due to smaller kernels. Protein quality is better than in 2001, and the supply of high protein wheat is readily available.

A range of protein contents is available to supply bakers of both traditional and non-traditional products. Buyers should always specify important quality requirements.

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

California Harvest Survey

California's wheat growing regions are defined by climate, value of alternative crops, and the distinct differences in variety selection. This system has led to an implied "identity preserved" program in California. For example, many domestic buyers will specify Yecora Rojo, Express, Brooks or Bonus varieties.

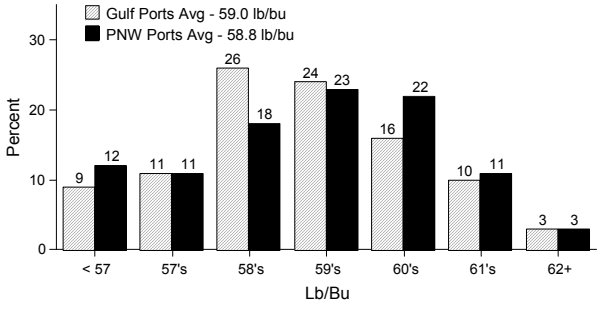
While California's climate is usually considered mild, this past season was highly unusual. Growers dealt with untimely rains, wind and frost. Buyers were more specific in their quality requirements than in years past. With very little on-farm storage in the state, lower quality wheat was diverted into feed channels rather than stored in commercial warehouses. Recent changes in the ownership and operation of Northern California grain export facilities has allowed for an increase in HRW exports from California. Both the Port of Sacramento and the Port of Stockton are operated or owned by California companies.

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

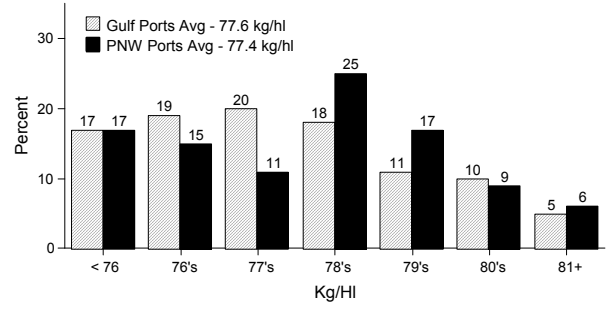
Export Cargo Survey

The export cargo data show the results of analysis of 493 individual subplot samples for marketing years 2002 and 2001. Of the 373 2001 samples, 307 are from Gulf ports and 66 from PNW ports. Of the 120 2002 samples (collected in July and August), 95 were drawn at Gulf ports and 25 at PNW ports. Samples were randomly selected from official Federal Grain Inspection Service samples. Grade data are the actual official grades on the individual subplots. Milling and baking analyses were conducted by CII Laboratory Services.

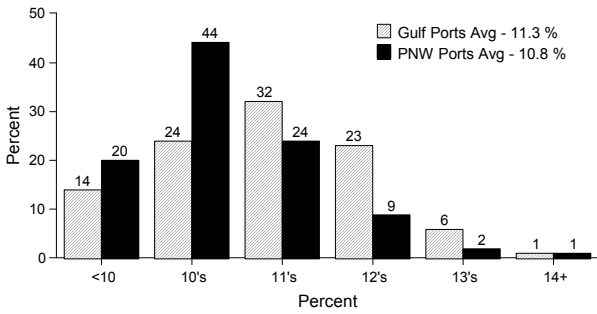
Test Weight



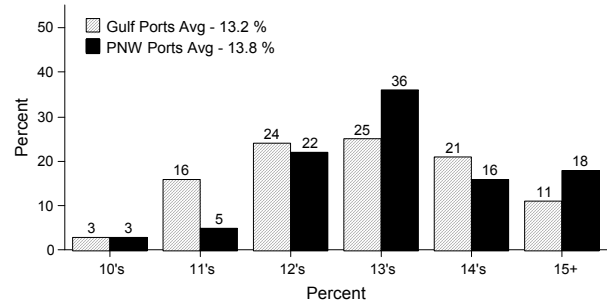
Hectoliter Weight



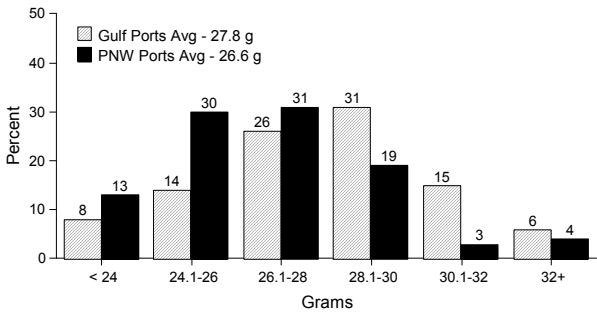
Wheat Moisture



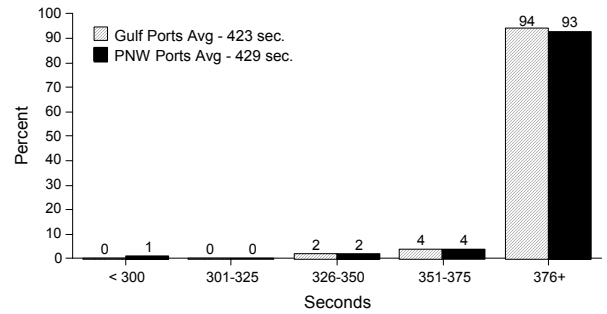
Protein (12% mb)



1000 Kernel Weight



Falling Number



Note: Charts include Great Plains HRW only.

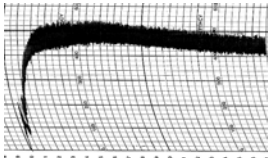


Hard red winter survey results are from eight states.

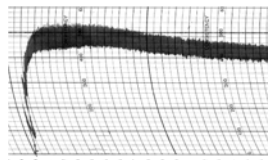
Composite Average Farinograms and Alveograms

Farinograms:

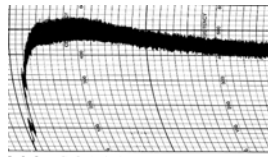
High Protein:



Medium Protein:

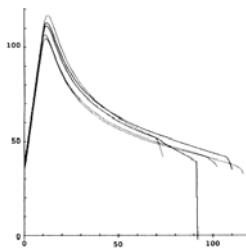


Low Protein:

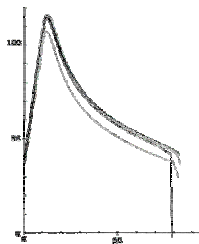


Alveograms:

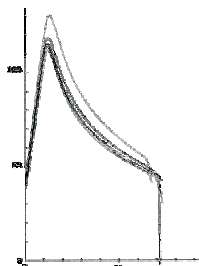
High Protein:



Medium Protein:



Low Protein:



Hard Red Winter

Composite Average

	2002 By Protein*				2001 Overall	5-Year Avg
	Low	Med	High	Overall		
Wheat Grade Data:						
Test Weight (lb/bu)	59.5	59.4	58.7	58.9	60.4	59.6
(kg/hl)	78.4	78.2	77.3	77.5	79.4	78.4
Damaged Kernels (%)	0.4	0.2	0.1	0.2	0.1	0.2
Foreign Material (%)	0.1	0.1	0.1	0.1	0.1	0.1
Shrunken & Broken (%)	1.2	1.3	1.3	1.3	1.3	1.3
Total Defects (%)	1.7	1.7	1.5	1.6	1.6	1.7
Grade	2 HRW	2 HRW	2 HRW	2 HRW	1 HRW	2 HRW
Wheat Non-Grade Data:						
Dockage (%)	0.7	0.7	0.5	0.6	0.7	0.7
Moisture (%)	11.8	11.5	11.1	11.2	11.7	11.6
Protein (%) 12%/0% moisture basis	11.0/12.5	12.0/13.7	13.9/15.8	13.4/15.2	12.1/13.7	12.1/13.7
Ash (%) 14%/0% moisture basis	1.61/1.87	1.61/1.87	1.57/1.83	1.58/1.84	1.51/1.75	1.54/1.80
1000 Kernel Weight (g)	29.6	28.5	27.1	27.5	29.6	28.6
Kernel Size (%) lg/md/sm	64/34/1	53/45/2	42/57/2	45/53/2	59/40/1	51/47/2
Single Kernel: Hardness	70.2	74.0	75.7	75.0	79.2	73.8
Weight (mg)	31.4	29.9	28.6	29.0	29.1	29.3
Diameter (mm)	2.38	2.30	2.24	2.26	2.20	2.20
Sedimentation (cc)	31.1	38.0	48.7	45.6	39.6	39.7
Falling Number (sec)	410	418	427	425	407	388
Flour Data:						
Extraction Rate (%)	71.5	71.4	70.7	70.9	69.2	70.6
Color: L*	92.3	92.4	92.3	92.3	92.4	92.4
a*	-3.3	-3.4	-3.4	-3.4	-3.3	-3.3
b*	8.8	8.8	8.9	8.9	10.1	9.6
Protein (%) 14%/0% moisture basis	10.0/11.6	10.9/12.7	12.6/14.6	12.1/14.1	10.7/12.4	10.7/12.5
Ash (%) 14%/0% moisture basis	0.51/0.59	0.51/0.59	0.51/0.59	0.51/0.59	0.47/0.55	0.49/0.57
Wet Gluten (%)	26.1	28.9	33.8	32.4	28.6	27.9
Falling Number (sec)	438	444	467	460	420	411
Amylograph Viscosity 65 g (BU)	667	649	653	653	670	644
Starch Damage (%)	9.4	9.4	8.9	9.0	8.9	
Dough Properties:						
Farinograph:						
Peak Time (min)	6.0	6.3	7.3	7.0	5.8	5.8
Stability (min)	9.3	9.9	11.7	11.2	11.1	11.0
Absorption (%)	60.0	60.0	62.7	62.0	59.2	60.0
Alveograph: P (mm)						
L (mm)	104	100	110	108	96	95
W (10-4 joules)	83	95	96	95	87	87.9
Extensigraph: Resistance (BU)						
(45/135 min) Extension (cm)	295	313	358	345	283	283
Area (sq cm)						
Baking Evaluation:						
Crumb Grain	7	7	7	7	7.2	6.9
Crumb Texture	6	7	8	8	7.3	7.1
Loaf Volume (cc)	785	859	921	900	857	844
% of Area Production:	6	20	74	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					
2002 By Protein*				2001	5-Year	2002 By Protein*				2001	5-Year
Low	Med	High	Overall	Overall	Avg	Low	Med	High	Overall	Overall	Avg
59.6	59.4	58.8	59.0	60.5	59.5	59.5	59.4	58.7	58.8	59.6	59.7
78.4	78.2	77.4	77.6	79.6	78.3	78.3	78.2	77.3	77.4	78.4	78.6
0.5	0.2	0.1	0.2	0.1	0.3	0.4	0.1	0.2	0.2	0.3	0.3
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
1.2	1.3	1.2	1.3	1.3	1.3	1.1	1.4	1.7	1.7	1.5	1.3
1.7	1.7	1.4	1.5	1.5	1.6	1.6	1.7	2.1	2.0	1.9	1.7
2 HRW	2 HRW	2 HRW	2 HRW	1 HRW	2 HRW	2 HRW	2 HRW	2 HRW	2 HRW	2 HRW	2 HRW
0.7	0.8	0.5	0.6	0.7	0.6	0.9	0.5	0.5	0.6	0.8	0.7
11.8	11.6	11.2	11.3	11.8	11.7	11.5	10.6	10.7	10.8	11.6	11.3
11.0/12.6	12.0/13.7	13.8/15.7	13.2/15.1	12.0/13.6	12.0/13.7	11.0/12.5	12.2/13.8	14.2/16.1	13.8/15.7	12.7/14.4	12.3/14.0
1.62/1.88	1.61/1.87	1.58/1.83	1.59/1.84	1.51/1.75	1.54/1.80	1.55/1.80	1.56/1.81	1.56/1.82	1.56/1.82	1.50/1.74	1.53/1.78
29.7	28.5	27.3	27.8	29.8	28.5	28.6	28.3	26.3	26.6	28.5	28.7
65/33/1	54/44/2	44/54/2	48/51/2	61/38/1	52/47/2	53/46/1	50/49/1	33/65/2	35/62/2	50/49/1	46/52/2
70.8	74.2	75.7	75.0	79.7	74.3	66.1	72.0	75.6	74.8	76.7	72.1
31.7	30.0	28.7	29.1	29.2	29.1	29.6	29.6	28.3	28.5	28.3	29.5
2.39	2.30	2.24	2.27	2.20	2.20	2.25	2.29	2.21	2.22	2.10	2.24
31.4	38.3	48.4	45.1	38.9	39.4	28.9	36.1	50.0	47.8	42.1	40.7
411	417	427	423	403	385	399	431	430	429	428	400
71.4	71.4	70.8	71.0	69.0	70.4	72.0	71.4	70.4	70.6	69.9	70.9
92.3	92.4	92.3	92.3	92.3	92.2	92.4	92.4	92.6	92.5	92.5	92.6
-3.3	-3.4	-3.4	-3.4	-3.3	-3.3	-3.4	-3.4	-3.4	-3.4	-3.3	-3.3
8.8	8.8	9.0	8.9	10.1	9.5	8.5	8.8	8.7	8.7	10.1	9.6
10.0/11.6	10.9/12.7	12.6/14.6	12.0/14.0	10.6/12.3	10.7/12.4	10.1/11.7	11.0/12.7	12.7/14.8	12.4/14.4	11.3/13.0	11.0/12.8
0.51/0.59	0.51/0.59	0.51/0.60	0.51/0.59	0.47/0.55	0.49/0.57	0.49/0.57	0.49/0.57	0.50/0.59	0.50/0.58	0.48/0.56	0.48/0.55
26.2	28.9	33.7	32.1	28.5	27.6	25.1	29.6	34.2	33.4	29.1	28.8
435	443	463	456	413	406	468	453	481	477	461	431
658	643	645	645	657	648	734	704	683	687	733	635
9.6	9.5	9.1	9.2	9.0		8.1	8.2	8.1	8.1	8.4	
6.1	6.3	7.3	7.0	5.7	5.7	5.4	6.2	7.1	6.9	6.2	6.0
9.3	9.8	11.6	11.1	10.9	11.0	8.9	10.5	12.1	11.8	12.3	11.2
60.3	60.1	62.9	62.1	59.1	59.8	58.0	59.3	62.0	61.6	59.5	60.4
106	101	111	108	95	95	84	94	106	104	102	95
82	95	97	95	88	88	90	95	95	95	83	88
301	314	361	347	280	283	249	305	347	339	294	284
475/545	540/565	530/525	526/532	580/640		560/775	565/630	520/510	523/528	540/610	
16.5/15.1	17.1/16.2	17.7/18.2	17.4/17.5	17.3/15.3		14.6/13.9	16.0/15.9	20.3/18.3	19.5/17.8	15.5/14.4	
98/104	116/112	120/123	117/118	129/136		102/137	113/125	135/144	131/141	110/114	
7	7	7	7	7.2	6.9	7	7	7	7	7.2	7.3
7	7	8	8	7.3	7.1	7	7	7	7	7.4	7.3
814	864	924	903	857	842	743	814	910	893	853	847
6	22	72	100	100	100	3	11	86	100	100	100

California and Export Data

Hard Red Winter	California Harvest Data				Export Cargo Data			
	Medium Protein Average		High Protein Average		Gulf		PNW	
	2002	2001	2002	2001	2002	2001	2002	2001
Wheat Grade Data:								
Test Weight (lb/bu)	63.3	62.9	62.9	62.5	60.4	61.1	60.8	61.2
(kg/hl)	83.2	82.7	82.7	82.2	79.5	80.4	80.0	80.5
Damaged Kernels (%)	0.0	0.0	0.0	0.0	1.5	1.3	0.1	0.2
Foreign Material (%)	0.1	0.1	0.0	0.1	0.3	0.3	0.1	0.2
Shrunken & Broken (%)	0.5	0.5	0.6	0.9	1.8	2.0	1.7	1.8
Total Defects (%)	0.6	0.6	0.6	1.0	3.5	3.6	2.0	2.2
Grade	I HRW	I HRW	I HRW	I HRW	2 HRW	2 HRW	I HRW	I HRW
Wheat Non-Grade Data:								
Dockage (%)	0.6	0.6	0.6	0.7	0.7	0.7	0.3	0.3
Moisture (%)	8.5	8.4	8.4	8.2	11.5	11.4	10.6	10.7
Protein (%) 12%/0% moisture basis	11.7/13.3	11.8/13.4	13.4/15.2	13.8/15.7	12.3/14.0	12.0/13.6	13.6/15.5	12.4/14.1
Ash (%) 14%/0% moisture basis	1.47/1.71	1.60/1.86	1.58/1.84	1.60/1.86	1.56/1.81	1.55/1.81	1.56/1.81	1.54/1.79
1 000 Kernel Weight (g)	41.5	40.5	42.0	41.0	27.0	27.5	26.6	28.2
Kernel Size (%) lg/md/sm					56/42/2	57/41/2	45/53/2	55/43/2
Single Kernel: Hardness					*	72.6	*	71.3
Weight (mg)					*	29.5	*	29.8
Diameter (mm)					*	2.27	*	2.26
Sedimentation (cc)					30.2	26.7	40.1	31.0
Falling Number (sec)					505	509	503	486
Flour Data:								
Extraction Rate (%)	70.4	69.4	71.8	69.7	70.6	72.7	70.4	72.6
Color: L*					92.4	92.3	92.6	92.2
a*					-3.3	-3.0	-3.2	-3.1
b*					8.4	8.7	8.5	9.1
Protein (%) 14%/0% moisture basis	10.4/12.1	10.5/12.2	12.1/14.1	12.2/14.2	11.0/12.8	10.7/12.5	12.3/14.2	11.2/13.0
Ash (%) 14%/0% moisture basis	0.49/0.57	1.00/1.16	0.50/0.58	0.80/0.93	0.49/0.57	0.52/0.61	0.48/0.56	0.52/0.60
Wet Gluten (%)	28.2	26.0	33.7	31.3	28.9	27.5	33.0	29.2
Falling Number (sec)	331	362	374	381	524	540	529	524
Amylograph Viscosity 65 g (BU)					612	693	608	569
Starch Damage (%)								
Dough Properties:								
Farinograph:								
Peak Time (min)	5.8	10.8	8.0	11.5	7.3	6.5	7.0	5.8
Stability (min)	16.1	17.7	17.2	13.9	14.5	12.0	13.6	9.4
Absorption (%)	63.0	62.0	64.2	63.6	60.1	59.7	61.7	61.2
Alveograph: P (mm)								
L (mm)					116	108	114	107
W (10-4 joules)					78	79	85	81
Extensigraph: Resistance (BU)								
(45/135 min) Extension (cm)								
Area (sq cm)								
Baking Evaluation:								
Crumb Grain					6.8	7.1	6.7	7.0
Crumb Texture					7.2	7.2	7.5	7.1
Loaf Volume (cc)	888	841	974	927	815	832	848	831
Number of Samples					95	307	25	66

* Data not yet available.

Hard Red Winter Production by Crop Year

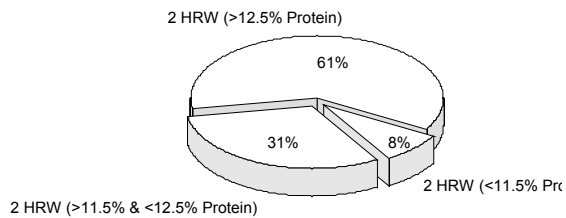
for the major HRW growing region
(million metric tons)

	2002	2001	2000	1999	1998
Kansas	7.20	8.84	9.37	11.65	13.33
Oklahoma	2.64	3.29	3.85	4.06	5.36
Texas	1.96	2.72	1.69	3.13	3.49
Colorado	0.99	1.80	1.85	2.81	2.71
Nebraska	1.32	1.61	1.62	2.22	2.25
Montana	0.55	0.51	1.20	0.99	1.31
South Dakota	0.49	0.32	1.46	1.61	1.66
California	0.58	0.69	0.71	0.75	0.59
Eight-State Total	15.74	19.77	21.75	27.22	30.71
Total HRW Production	16.58	20.87	23.03	28.60	32.10

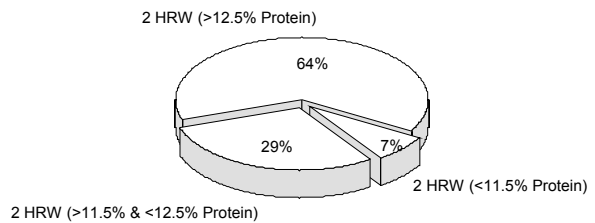
Based on USDA crop estimates of September 30, 2002.

Protein Distribution

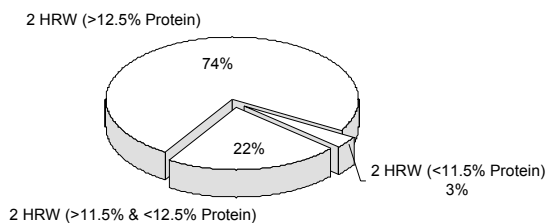
Gulf Exportable



Overall



PNW Exportable



Pacific Northwest Soft White Wheat

Harvest Survey

Weather and Harvest: Growing conditions were very dry during grain filling in spring and summer which resulted in increased protein content in most dryland farming areas of Oregon, Washington, and Idaho. However, much of the Idaho wheat was irrigated, so the drought did not have a major effect there. The drought resulted in thin kernels with low test weight, thousand kernel weight, and small kernel diameter. Mostly dry harvest conditions prevailed, and the soft white crop had very little, if any, sprout damage.

Wheat and Grade Data: The average test weight of 59.7 lb/bu (78.5 kg/hl) for the 2002 soft white (SW) crop was below last year and the five-year average. Club wheat (WC) test weight was 2.4 and 1.3 lb/bu lower than last year and

sound flour samples. Starch damage values were similar to last year. The farinograph showed weaker mixing properties and lower absorption compared with last year. Alveograph data indicated that maximum overpressure (“P”) was similar to last year and the five-year average, but extensibility (“L”) and overall strength (“W”) were moderately higher. Extensigraph data showed slightly higher resistance to extension. Extensibility for SW was shorter and area was smaller, and those of WC were similar to last year. Dough rheological testing indicated weak gluten properties. Sponge cake volume was larger than last year and the five-year average. Appearance and crumb grain scores for SW were the same as last year and the five-year average, while club scores were better than last year and the five-year average. Cookie spread for SW was larger than last year, and similar to the five-year average. Club cookie spread was the same as last year and five-year average.

Chinese Southern-Type Steamed Bread: Each flour was made into southern-type steamed bread and compared with a Chinese commercial southern-type steamed bread control flour. Specific volumes were lower than last year, but the total steamed bread scores were higher. Medium protein SW had a similar quality score to the control flour, high protein SW had a higher quality score than the control flour, and low protein SW and club composite had slightly lower scores than the control flour.

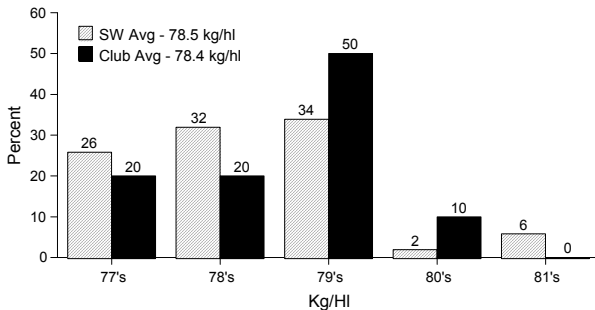
Summary: The 2002 SW and club crop showed lower test weight, thousand kernel weight and smaller kernel diameter than last year and the five-year average. Falling number values indicated a sound crop. Flour extractions were higher than last year and the five-year average with lower flour ash contents. Wheat and flour protein content was lower than last year, but higher than the five-year average, producing similar to better quality sponge cakes and cookies. Medium and high protein SW showed potential of making good quality Chinese southern-type steamed breads.

Wheat quality testing and data analyses were conducted by the Wheat Marketing Center, Portland, Oregon. Laboratory testing was conducted according to American Association of Cereal Chemists Approved Methods (10th Edition). Survey samples were collected from producers under the management of the National Agricultural Statistics Services, USDA, and represent a statistical sampling of the crop. Federal Grain Inspection Service graded the wheat samples. 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

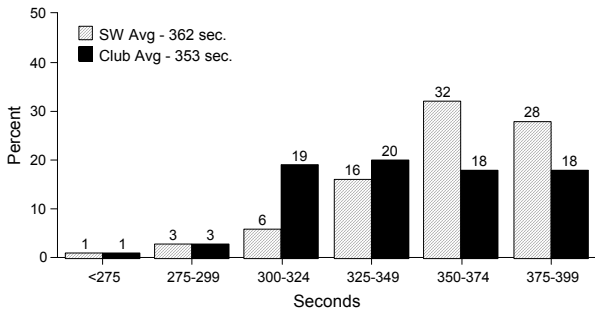
The Pacific Northwest white wheat export cargo data show the results of analyses of individual subplot samples including 90 drawn from the 2000 crop (October 2000-September 2001) and 60 from the 2001 crop. The samples were randomly selected from official Federal Grain Inspection Service samples. Grade data are the actual grades on the individual subplots. Milling and processing analyses were conducted by the Wheat Marketing Center, Portland.

Hectoliter Weight



the five-year average, respectively. Other grade data were similar to last year and the five-year average. SW high protein and overall final composites were graded No. 2 due to the low test weight. Moisture content of both SW and WC crop were lower than last year, but similar to the five-year average. Protein content was lower compared to last year, but moderately higher than the five-year average. Thousand kernel weight and kernel diameter were lower than last year and five-year average. Falling number values

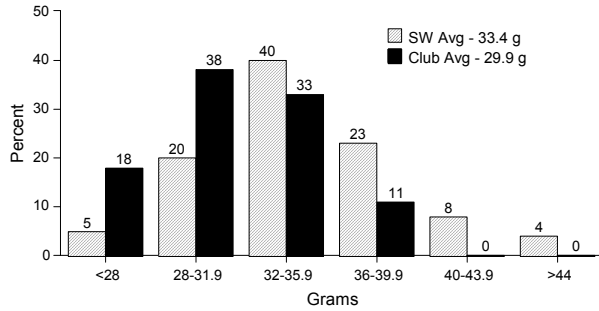
Falling Number



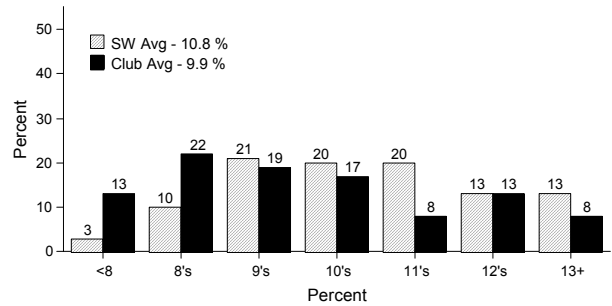
were similar to last year and higher than the five-year average, indicating very little sprout damage.

Flour, Dough and Bake Data: The 2002 Buhler flour extractions for both SW and WC were similar to last year and slightly higher than the five-year average in spite of having lower thousand kernel weights and smaller kernel diameters. Flour protein content was higher than five-year average, reflecting the higher wheat protein. High flour falling numbers and amylograph peak viscosities indicated

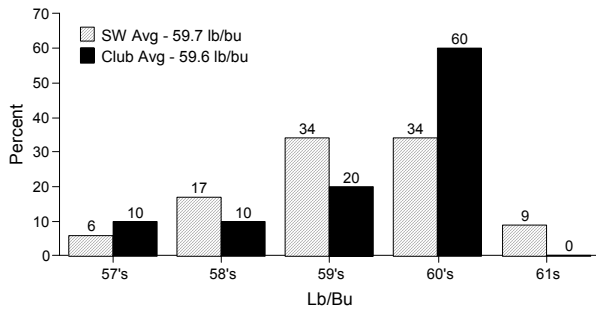
1000 Kernel Weight



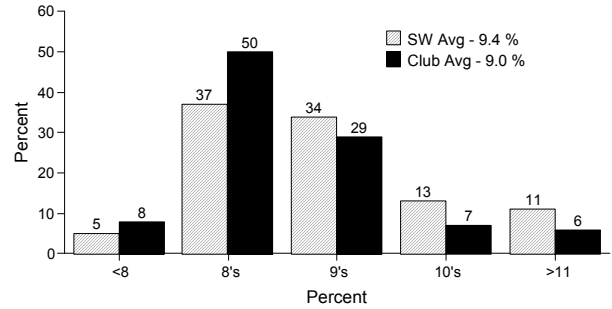
Protein (12% mb)



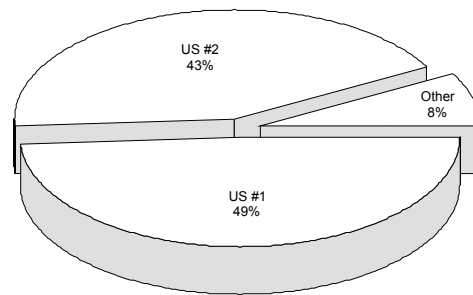
Test Weight



Wheat Moisture



2002 SW Grade Distribution



Pacific Northwest Soft White Wheat Production

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

	2002		2001		2000		1999		1998	
	SW	CLUB	SW	CLUB	SW	CLUB	SW	CLUB	SW	CLUB
Washington	2.86	0.28	2.91	0.30	3.52	0.41	2.78	0.19	3.60	0.33
Oregon	0.85	0.04	0.81	0.05	1.27	0.11	0.87	0.03	1.43	0.09
Idaho	1.57	0.04	1.49	0.05	2.03	0.08	1.86	0.02	2.01	0.02
Three-state Total	5.28	0.35	5.21	0.40	6.82	0.60	5.51	0.24	7.04	0.44
Three-state Total Soft White Wheat	5.62		5.61		7.42		5.75		7.48	
Total Soft White Wheat Production	6.42		6.31		8.25		6.72		8.11	

Based on USDA crop estimates of September 30, 2002.

Pacific Northwest Harvest Data

Soft White

Soft White	2002					2001		5-Year Avg	
	Soft White By Protein*				Club Avg	SW	Club	SW	Club
	Low	Med	High	All					
Wheat Grade Data:									
Test Weight (lb/bu)	61.0	60.7	59.5	59.7	59.6	61.4	62.0	60.6	60.9
(kg/hl)	80.2	79.8	78.3	78.5	78.4	80.7	81.5	79.7	80.0
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	0.0	0.0	0.0	0.0
Foreign Material (%)	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1
Shrunken & Broken (%)	0.8	0.4	1.3	0.9	1.9	0.8	1.4	0.9	1.4
Total Defects (%)	0.8	0.5	1.4	1.0	2.0	0.9	1.6	1.0	1.6
Grade	1 SW	1 SW	2 SW	2 SW	1 WC	1 SW	1 WC	1 SW	1 WC
Wheat Non-Grade Data:									
Dockage (%)	0.3	1.4	0.5	0.7	0.9	0.4	0.5	0.5	0.7
Moisture (%)	9.8	9.7	9.1	9.4	9.0	9.7	9.6	9.5	9.1
Protein (%) 12%/0% moisture basis	8.4/9.5	9.7/10.9	12.3/14.0	10.8/12.2	9.9/11.4	11.1/12.6	10.5/12.0	10.2/11.5	9.4/10.7
Ash (%) 14%/0% moisture basis	1.34/1.56	1.38/1.60	1.45/1.69	1.41/1.64	1.28/1.49	1.38/1.61	1.21/1.41	1.39/1.61	1.27/1.48
1000 Kernel Weight (g)	35.3	34.8	32.0	33.4	29.9	37.4	32.8	36.7	33.0
Kernel Size (%) lg/md/sm	81/18/1	77/22/1	66/33/1	72/27/1	56/42/2				
Single Kernel: Hardness	28.5	32.7	33.3	32.4	37.1	33.0	41.0	34.3	38.2
Weight (mg)	37.0	36.5	33.8	35.1	31.6	37.4	32.8	37.1	33.4
Diameter (mm)	2.49	2.48	2.35	2.41	2.22	2.51	2.28	2.54	2.35
Sedimentation (cc)	12.6	16.6	24.0	17.6	14.0	21.4	13.9	16.6	12.5
Falling Number (sec)	344	354	372	362	353	353	360	338	338
Flour Data:									
Extraction Rate (%)	70.9	70.3	67.7	69.1	70.6	68.8	70.8	68.2	69.5
Color: L*	92.6	92.7	92.4	92.6	92.5	92.6	92.3	92.4	92.4
a*	-2.7	-2.7	-2.5	-2.6	-2.5	-2.6	-2.5	-2.7	-2.5
b*	7.4	7.5	7.1	7.3	6.9	7.2	7.2	7.5	7.1
Protein (%) 14%/0% moisture basis	7.0/8.1	8.0/9.3	10.2/11.9	9.1/10.5	8.5/9.8	9.0/10.5	8.8/10.3	8.4/9.7	7.8/9.1
Ash (%) 14%/0% moisture basis	0.35/0.40	0.33/0.38	0.36/0.42	0.35/0.41	0.36/0.42	0.37/0.43	0.38/0.44	0.37/0.43	0.38/0.44
Wet Gluten (%)	16.6	20.0	27.2	23.4	17.2	25.5	18.4	22.3	15.3
Falling Number (sec)	361	371	376	373	363	352	368	348	354
Amylograph Viscosity 65 g (BU)	525	555	630	591	590	590	550	566	604
Starch Damage (%)	4.0	3.9	3.7	3.8	3.0	3.4	3.1		
Solvent Retention Capacity (%)									
Water/50% Sucrose	52.9/102.0	53.4/102.1	53.4/107.9	53.4/105.3	47.2/98.7				
5% Lactic Acid/5% Sodium Carbonate	104.4/78.2	110.0/78.7	119.4/78.0	114.3/78.3	88.1/68.9				
Dough Properties:									
Farinograph:									
Peak Time (min)	1.2	1.4	2.0	1.7	1.2	2.0	1.6	1.6	1.2
Stability (min)	1.9	2.1	3.2	2.7	1.2	3.3	1.4	2.8	1.2
Absorption (%)	47.5	49.4	50.6	49.8	48.6	51.8	50.9	50.1	49.0
Alveograph: P (mm)	43	40	39	40	28	39	26	39	28
L (mm)	75	113	158	132	74	111	55	111	64
W (10-4 joules)	90	105	145	124	46	116	40	109	43
Extensigraph: Resistance (BU)	246	230	218	226	90	202	73	233	91
(45 min) Extension (cm)	12.9	15.7	19.4	17.3	15.4	19.4	15.3	16.6	14.6
Area (sq cm)	49	54	60	56	21	59	18	57	20
Baking Evaluation:									
Sponge Cake: Volume (cc)	1175	1163	1125	1146	1175	1077	1075	1115	1139
Score	55	52	48	50	55	50	48	50	52
Cookie Diameter (cm)	8.6	8.3	8.3	8.4	8.6	8.2	8.6	8.5	8.6
Chinese Southern-Type Steamed Bread Evaluation:									
Specific Volume (ml/g)	2.49	2.46	2.75	2.62	2.57	2.96	3.43		
Total Score	68.1	70.0	73.2	71.5	65.8	68.9	63.1		
% of Area Production:	14	32	54	100	100	100	100	100	100

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

Export Cargo Data

Soft White		
	2001	2000
Wheat Grade Data:		
Test Weight (lb/bu)	61.9	61.8
(kg/hl)	81.4	81.2
Heat Damage (%)	0.0	0.0
Damaged Kernels (%)	0.1	0.1
Foreign Material (%)	0.1	0.2
Shrunken & Broken (%)	1.0	0.9
Total Defects (%)	1.3	1.3
Grade	1 SW	1 SW
Wheat Non-Grade Data:		
Dockage (%)	0.4	0.4
Moisture (%)	9.8	9.7
Protein (%) 12%/0% moisture basis	10.3/11.7	9.5/10.8
Ash (%) 14%/0% moisture basis	1.28/1.48	1.33/1.55
1000 Kernel Weight (g)	35.4	37.1
Kernel Size (%) lg/md/sm	78/21/1	84/15/1
Single Kernel: Hardness	36.6	36.7
Weight (mg)	36.0	37.6
Diameter (mm)	2.42	2.52
Sedimentation (cc)	18.8	15.9
Falling Number (sec)	393	351
Flour Data:		
Extraction Rate (%)	71.2	70.0
Color: L*	92.5	92.6
a*	-2.5	-2.6
b*	7.0	7.4
Protein (%) 14%/0% moisture basis	8.5/9.9	7.9/9.2
Ash (%) 14%/0% moisture basis	0.38/0.44	0.38/0.45
Wet Gluten (%)	22.3	20.5
Falling Number (sec)	428	368
Amylograph Viscosity 65 g (BU)	537	448
Starch Damage (%)		
Solvent Retention Capacity (%)		
Water/50% Sucrose		
5% Lactic Acid/5% Sodium Carbonate		
Dough Properties:		
Farinograph:		
Peak Time (min)	1.6	1.4
Stability (min)	2.4	2.4
Absorption (%)	51.1	50.8
Alveograph: P (mm)		
L (mm)	91	85
W (10-4 joules)	98	101
Extensigraph: Resistance (BU)		
(45 min) Extension (cm)		
Area (sq cm)		
Baking Evaluation:		
Sponge Cake: Volume (cc)	1063	1039
Score	43	48
Cookie Diameter (cm)	8.2	8.4
Chinese Southern-Type Steamed Bread Evaluation:		
Specific Volume (ml/g)		
Total Score		
Sample Count:	60	90

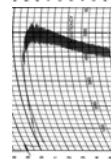
Composite Average Farinograms and Alveograms

Farinograms:

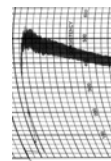
High Protein:



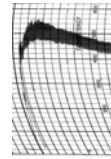
Medium Protein:



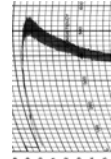
Low Protein:



Average Protein:

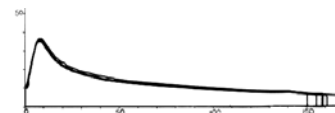


Club:

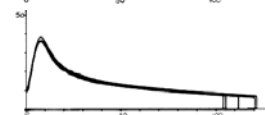


Alveograms:

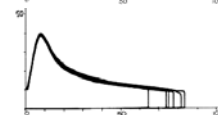
High Protein:



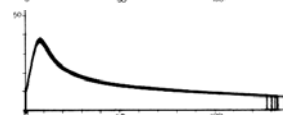
Medium Protein:



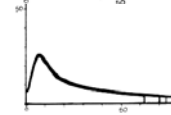
Low Protein:



Average Protein:



Club:



Soft White

Hard Red Spring Wheat

Harvest Survey

Weather and Harvest: The 2002 hard red spring (HRS) crop experienced drought and semi-drought conditions, which reduced production by 25% compared with 2001 but enhanced quality attributes with higher protein and stronger dough properties and bread baking performance. Despite higher planted area, harvested acres actually fell by 7% and yields were 20% lower. Production fell in all states, except Montana compared to 2001.

Planting started in April but progressed more slowly than normal because of dry soil conditions in the south and cold temperatures in the north. Improved conditions in late May allowed 90% of the crop to be planted by the end of the month. Early crop development was severely hampered by drought conditions across southern areas through much of June.

During the second half of the growing season, extended periods of hot temperatures and limited rainfall deepened the drought in the south and adversely affected crops in the north. These conditions minimized disease pressures but caused yield potential to diminish. In large areas of South Dakota and southern North Dakota, irreversible yield damage occurred, resulting in a high level of abandoned acres. Hot, dry weather continued into early August, accelerating crop maturity. The first 40% of the harvest was completed at a normal pace although a shift to cooler and wetter weather in mid- to late August slowed progress. Only 65% of the harvest was completed by the first week in September, compared to a normal level of 85%. Harvest progress continued slower than normal, and completion was delayed in parts of northern North Dakota and Montana until late September.

Samples and Methods: Sample collection and analysis were conducted by the Department of Cereal and Food Sciences, 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 714 HRS samples were collected from growers and grain elevators in Minnesota (110), Montana (176), North Dakota (380) and South Dakota (48). Samples were segregated by wheat protein content and were assigned to protein levels within each export region. Samples were then composited into three protein ranges for each export region as follows: 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 2002 crop are lower than last year and the five-year average. The average wheat protein content is higher than last year and is higher than it has been in the past several years. The percentage of vitreous kernels is slightly lower than last year

but slightly higher than the five-year average. The average grade for the 2002 crop is INS. The average amount of damaged wheat kernels is the same as last year. Thousand kernel weight is lower than last year and also lower than the five-year average. The regional average wheat falling number is lower than last year and the five-year average. These lower falling number values are located in areas across the northern part of the region with isolated areas scattered throughout the central part of the HRS growing area. There is very little fusarium head blight (scab) in this year's HRS crop.

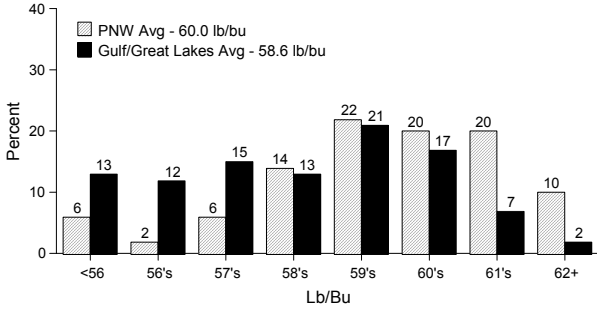
Flour and Baking Data: Flour extraction using the Buhler experimental flour mill is slightly lower than last year and the five-year average. The wet gluten average is somewhat higher than last year. Dough mixing properties as measured by the farinograph are stronger than last year. Farinograph absorption on average is somewhat higher than 2001 crop and also higher than the five-year average. The alveogram W value is also higher than last year and the five-year average. The baking data show that the average bake absorption and loaf volume is higher than last year. Crumb grain and texture is rated as slightly better than last year.

Summary: Compared to the five-year averages, the 2002 HRS wheat crop has higher wheat protein content, lower test weight, lower thousand kernel weight and lower falling number values. The average dough mixing stability of the 2002 crop as measured with the farinograph is stronger than the five-year average. Variability in dough mixing strength exists within each of the export regions. The overall bread-baking performance shows higher loaf volume and higher bake absorption with average to good crumb grain and texture. The 2002 HRS wheat crop is rated as having average to very good quality with particular emphasis on the higher wheat protein, higher absorption and very good dough mixing characteristics and baking performance. There is less fusarium head blight damage in this year's crop compared to last year. However, some precautions should be taken when purchasing HRS wheat due to the occurrence of low falling number (sprouting) and low test weight in some segments of the 2002 crop. Below average quality wheat does exist in some areas of the region. Quality differences also exist between the west and east export regions. Specifications to address the issue of falling number and test weight are encouraged.

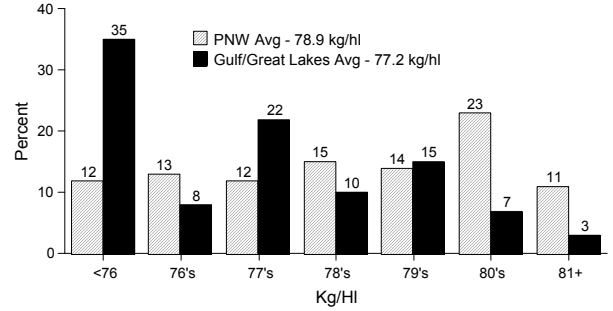
Export Cargo Survey

The export cargo survey shows the results of analysis of 170 individual subplot samples for crop year 2001 (collected from October through August) and 256 for crop year 2000. Of the 170 2001 samples, 85 were collected from PNW ports, 41 from the Lakes and 44 from Gulf ports. The samples were randomly selected from official Federal Grain Inspection Service samples. Grade data are the official

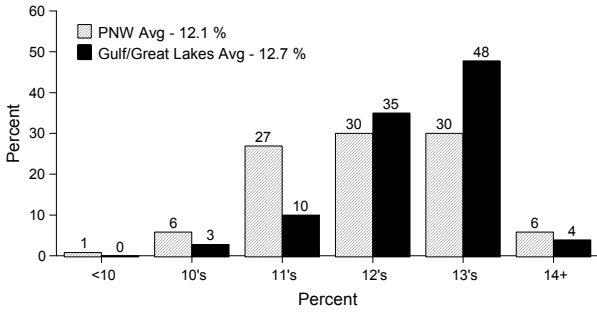
Test Weight



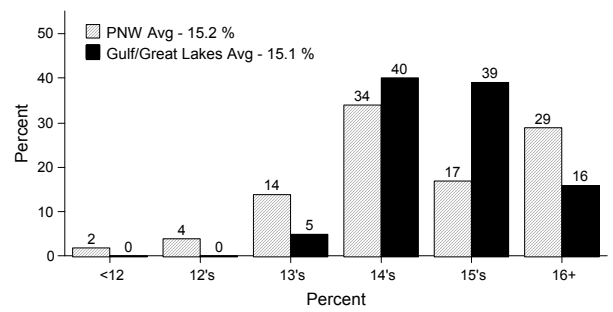
Hectoliter Weight



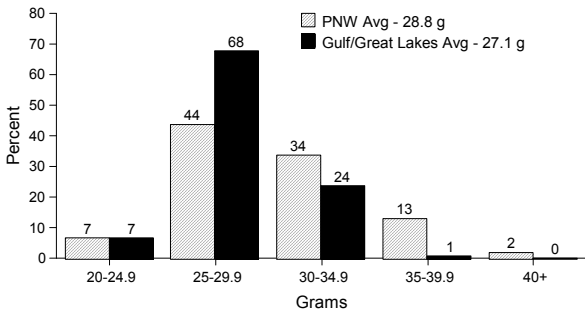
Wheat Moisture



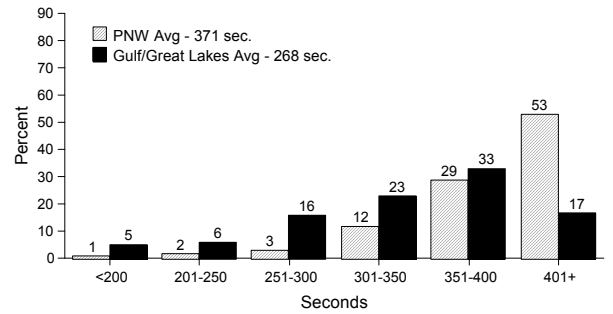
Protein (12% mb)



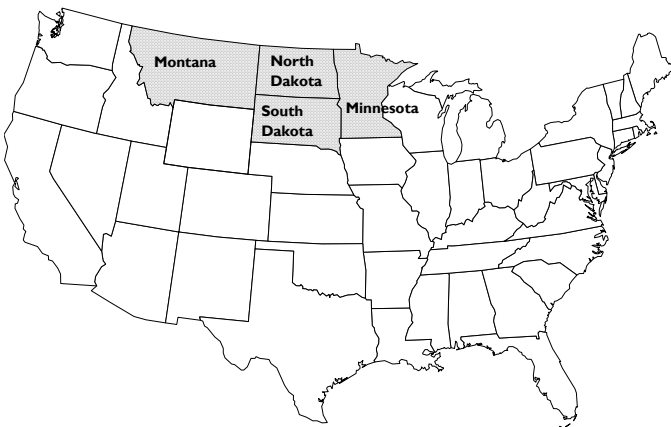
1000 Kernel Weight



Falling Number



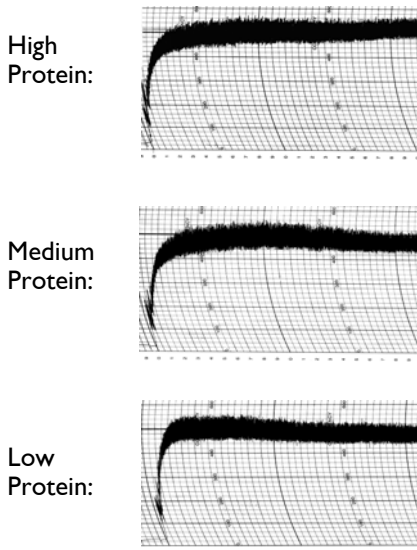
Hard Red Spring



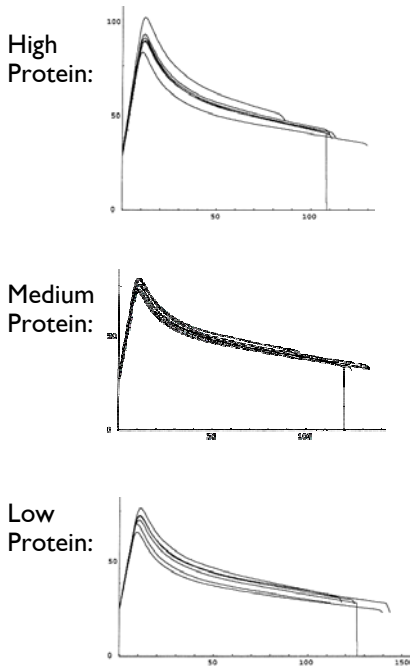
Hard red spring survey results are from four states.

Composite Average Farinograms and Alveograms

Farinograms:



Alveograms:



Hard Red Spring

Composite Average

	Composite Average					
	2002 By Protein*				2001	5-year
	Low	Med	High	Overall	Overall	Avg
Wheat Grade Data:						
Test Weight (lb/bu)	60.8	59.8	58.9	59.3	59.9	59.8
(kg/hl)	80.0	78.7	77.6	78.1	78.8	78.7
Damaged Kernels (%)	0.4	0.5	0.6	0.6	0.6	0.7
Foreign Material (%)	0.0	0.0	0.0	0.0	0.0	0.0
Shrunken & Broken (%)	1.2	1.2	1.5	1.4	1.7	1.6
Total Defects (%)	1.6	1.7	2.1	2.0	2.3	2.3
Vitreous Kernels (%)	63	64	77	72	75	69
Grade	1 NS	1 NS	1 DNS	1 NS	1 DNS	1 NS
Wheat Non-Grade Data:						
Dockage (%)	0.9	1.2	1.2	1.2	1.2	1.7
Moisture (%)	12.3	12.5	12.4	12.4	11.4	11.8
Protein (%) 12%/0% moisture basis	12.6/14.3	14.0/15.9	15.9/18.1	15.1/17.2	14.5/16.5	14.3/16.2
Ash (%) 14%/0% moisture basis	1.55/1.80	1.63/1.90	1.67/1.94	1.65/1.91	1.69/1.97	1.69/1.96
1000 Kernel Weight (g)	29.7	28.8	27.3	27.9	29.3	30.3
Kernel Size (%) lg/md/sm	54/38/7	53/38/9	42/47/11	46/44/10	49/42/9	
Single Kernel: Hardness	84.0	87.0	84.0	84.8	75.6	
Weight (mg)	31.5	30.7	29.3	29.9	29.8	
Diameter (mm)	2.37	2.35	2.25	2.29	2.30	
Sedimentation (cc)	52.3	56.7	65.5	62.0	50.2	
Falling Number (sec)	345	306	323	321	391	371
Flour Data:						
Extraction Rate (%)	67.7	69.5	68.8	68.8	69.0	69.3
Color: L*	90.5	90.0	89.9	90.0	90.1	
a*	-1.6	-1.5	-1.3	-1.4	-1.5	
b*	9.3	9.3	9.1	9.2	9.5	
Protein (%) 14%/0% moisture basis	11.3/13.1	12.9/15.0	14.7/17.1	13.9/16.2	13.3/15.5	13.1/15.2
Ash (%) 14%/0% moisture basis	0.40/0.47	0.44/0.51	0.42/0.49	0.43/0.50	0.43/0.50	0.45/0.53
Wet Gluten (%)	28.3	33.7	38.6	36.3	36.0	35.2
Falling Number (sec)	385	339	378	369	413	394
Amylograph Viscosity: 65g (BU)	628	302	548	495	670	556
100g (BU)	2378	1147	1910	1766	2581	2388
Starch Damage (%)	6.4	6.3	5.8	6.0	6.5	
Dough Properties:						
Farinograph:						
Peak Time (min)	6.6	8.9	20.9	16.5	10.2	10.1
Stability (min)	22.8	21.9	32.5	28.9	18.2	17.6
Absorption (%)	62.4	63.4	65.1	64.4	63.5	63.9
Classification	6.7	7.0	8.0	7.6	6.5	6.3
Alveograph: P (mm)						
	96	84	84	85	95	93
L (mm)						
	103	124	126	123	111	111
WV (10-4 joules)						
	351	354	395	380	370	365
Extensigraph: Resistance (BU)						
	513/590	497/526	531/567	521/559	610/700	
(45/135 min) Extension (cm)						
	21.9/20.5	24.0/25.1	25.8/26.9	24.9/25.8	22.7/22.5	
Area (sq cm)						
	136/160	145/166	170/192	160/182	167/194	
Baking Evaluation:						
Absorption (%)	60.9	61.9	63.6	62.9	62.0	62.4
Crumb Grain and Texture	8.0	8.5	8.2	8.3	8.2	8.2
Loaf Volume (cc)	946	1068	1137	1100	1066	1035
% Area Production:						
	10	25	65	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					
2002 By Protein*				2001	5-year Avg	2002 By Protein*				2001	5-year Avg
Low	Med	High	Overall			Low	Med	High	Overall		
61.1	60.5	59.5	60.0	60.7	60.3	59.0	59.1	58.4	58.6	59.2	59.5
80.4	79.6	78.3	78.9	79.9	79.3	77.6	77.8	76.9	77.2	77.9	78.3
0.2	0.3	0.4	0.3	0.8	0.4	1.5	0.6	0.8	0.8	0.5	0.9
0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.2	1.4	1.6	1.5	1.9	1.9	1.2	1.1	1.4	1.3	1.5	1.3
1.4	1.8	2.0	1.9	2.6	2.3	2.7	1.7	2.2	2.1	2.1	2.2
65	68	88	80	89	80	50	61	66	64	64	61
I NS	I NS	I DNS	I DNS	I DNS	I DNS	I NS	I NS	I NS	I NS	I NS	I NS
0.9	1.3	1.3	1.2	1.4	1.7	1.0	1.2	1.1	1.1	1.1	1.6
12.2	12.2	12.1	12.1	10.3	10.9	13.1	12.8	12.7	12.7	12.3	12.4
12.6/14.3	14.1/16.0	16.3/18.5	15.2/17.3	14.6/16.7	14.5/16.5	12.4/14.1	14.0/15.9	15.6/17.7	15.1/17.1	14.4/16.4	14.2/16.2
1.52/1.77	1.49/1.73	1.59/1.85	1.56/1.81	1.64/1.91	1.63/1.90	1.69/1.97	1.76/2.05	1.74/2.02	1.74/2.03	1.73/2.01	1.73/2.01
30.2	29.2	28.2	28.8	30.3	30.4	26.8	28.5	26.5	27.1	28.6	30.2
55/38/7	58/36/6	41/50/9	47/45/8	49/42/9		51/40/9	49/40/11	43/45/12	45/43/12	49/42/9	
85.0	87.0	84.0	84.8	76.9		79.0	87.0	84.0	84.7	74.5	
32.1	32.4	28.6	30.0	30.1		28.6	29.2	29.9	29.7	29.6	
2.40	2.40	2.20	2.28	2.32		2.20	2.30	2.30	2.30	2.28	
55.0	64.0	66.0	63.8	50.7	52.0	38.0	50.0	65.0	60.0	49.7	47.7
350	368	377	371	407	376	318	249	274	268	378	367
67.0	68.1	68.2	68.0	69.0	69.1	71.3	70.7	69.3	69.8	68.9	69.5
90.5	89.9	89.5	89.7	90.3		90.5	90.2	90.2	90.2	89.8	
-1.6	-1.4	-1.2	-1.3	-1.4		-1.9	-1.6	-1.5	-1.5	-1.5	
9.2	9.1	9.0	9.0	9.1		10.1	9.6	9.1	9.3	9.8	
11.3/13.1	13.0/15.1	15.1/17.6	14.0/16.3	13.5/15.7	13.3/15.5	11.1/12.9	12.8/14.9	14.3/16.6	13.8/16.0	13.1/15.2	12.9/15.1
0.40/0.47	0.42/0.49	0.43/0.50	0.42/0.49	0.41/0.47	0.44/0.51	0.42/0.49	0.46/0.53	0.42/0.49	0.43/0.50	0.45/0.53	0.47/0.54
28.4	34.3	39.7	36.7	37.1	35.8	28.0	33.1	37.5	36.0	35.0	35.0
390	379	413	402	432	401	358	303	346	334	399	387
665	440	725	650	753	593	435	175	385	328	604	519
2540	1740	2550	2362	2897	2647	1530	600	1320	1125	2334	2163
6.5	6.2	5.3	5.7	6.4		5.8	6.3	6.2	6.2	6.5	
6.5	10.5	30.0	21.8	13.2	13.5	7.0	7.5	12.5	10.9	7.9	7.5
25.0	31.0	39.0	34.9	24.0	23.9	11.0	13.5	26.5	22.4	13.7	13.4
62.8	64.3	65.8	65.0	65.4	65.2	60.2	62.5	64.4	63.7	62.0	63.1
7.0	8.0	8.0	7.8	7.2	7.3	5.0	6.0	8.0	7.3	6.0	5.6
102	88	83	87	113	105	66	80	85	83	81	85
99	120	130	123	85	104	122	127	123	124	131	117
367	364	399	386	368	402	270	344	391	374	372	339
525/620	510/490	505/515	509/526	590/660	490	450/430	485/560	555/615	532/594	620/730	430
21.5/20.2	25.7/25.4	27.7/27.0	26.2/25.5	23.9/23.7	23.0	23.9/21.8	22.4/24.8	24.0/26.9	23.5/26.2	21.8/21.5	22.2
136/167	163/157	175/175	166/170	172/189	143	135/120	129/175	165/208	154/196	163/198	122
61.3	62.8	64.3	63.5	63.9	63.7	58.7	61.0	62.9	62.2	60.5	61.6
8.0	8.5	8.5	8.4	8.1	8.3	8.0	8.5	8.0	8.1	8.2	8.2
940	1060	1160	1102	1074	1043	980	1075	1115	1100	1059	1035
16	23	61	100	100	100	3	28	69	100	100	100

Hard Red Spring

Export Cargo Data

Hard Red Spring

Hard Red Spring	PNW Average		Great Lakes Average		Gulf Average	
	2001	2000	2001	2000	2001	2000
Wheat Grade Data:						
Test Weight (lb/bu)	61.4	61.3	60.3	61.1	60.5	60.6
(kg/hl)	80.7	80.7	79.3	80.4	79.6	79.7
Damaged Kernels (%)	0.5	0.4	1.5	1.4	1.4	1.7
Foreign Material (%)	0.2	0.2	0.1	0.2	0.2	0.2
Shrunken & Broken (%)	1.8	1.7	1.6	1.4	1.6	1.4
Total Defects (%)	2.5	2.3	3.2	2.9	3.2	3.4
Vitreous Kernels (%)	81.9	82.9	50.8	49.1	60.7	56.4
Grade	1 DNS	1 DNS	2 NS	1 NS	2 NS	2 NS
Wheat Non-Grade Data:						
Dockage (%)	0.4	0.5	0.5	0.5	0.7	0.6
Moisture (%)	10.8	10.6	12.2	12.3	12.1	12.4
Protein (%) 12%/0% moisture basis	14.2/16.2	14.2/16.1	14.3/16.2	14.0/15.9	14.1/16.0	13.8/15.7
Ash (%) 14%/0% moisture basis	1.63/1.90	1.58/1.84	1.68/1.96	1.64/1.91	1.69/1.96	1.64/1.91
1000 Kernel Weight (g)	29.8	32.1	28.6	31.1	28.8	31.3
Kernel Size (%) lg/md/sm	53/39/8	56/36/8	52/40/8	59/33/7	51/40/9	60/32/8
Single Kernel: Hardness	77.5	77.3	75.5	76.3	75.2	76.2
Weight (mg)	30.7	32.5	29.4	30.8	29.7	31.0
Diameter (mm)	2.38	2.45	2.31	2.39	2.31	2.40
Sedimentation (cc)						
Falling Number (sec)	394	386	362	359	368	343
Flour Data:						
Extraction Rate (%)	70.1	69.8	70.5	70.9	70.6	70.9
Color: L*	90.5	90.4	90.2	90.2	90.4	90.3
a*	-1.4	-1.2	-1.4	-1.4	-1.4	-1.3
b*	8.8	8.7	9.2	9.3	9.0	9.3
Protein (%) 14%/0% moisture basis	13.1/15.3	13.1/15.2	13.0/15.2	12.7/14.8	12.9/15.0	12.6/14.7
Ash (%) 14%/0% moisture basis	0.49/0.57	0.47/0.55	0.50/0.58	0.47/0.55	0.49/0.57	0.49/0.56
Wet Gluten (%)	36.6	36.0	35.6	34.9	35.3	34.9
Falling Number (sec)	435	441	397	397	409	383
Amylograph Viscosity: 65g (BU)	579	570	511	460	543	429
100g (BU)						
Starch Damage (%)						
Dough Properties:						
Farinograph:						
Peak Time (min)	7.3	10.7	7.1	8.3	7.5	7.2
Stability (min)	16.6	21.1	12.5	12.7	13.8	11.7
Absorption (%)	64.7	65.2	63.0	63.6	62.9	63.6
Classification	6.3	6.7	5.5	5.5	5.8	5.3
Alveograph: P (mm)						
	101	110	88	92	91	93
L (mm)	106	102	111	112	111	106
W (10-4 joules)	371	400	338	355	347	335
Extensigraph: Resistance (BU)						
(45/135 min) Extension (cm)						
Area (sq cm)						
Baking Evaluation:						
Absorption (%)	63.2	63.8	61.5	62.1	61.4	62.1
Crumb Grain and Texture	8.2	8.2	8.1	8.2	8.2	8.3
Loaf Volume (cc)	1024	1026	1023	1027	1033	1014
Sample Count:	85	138	41	67	44	51

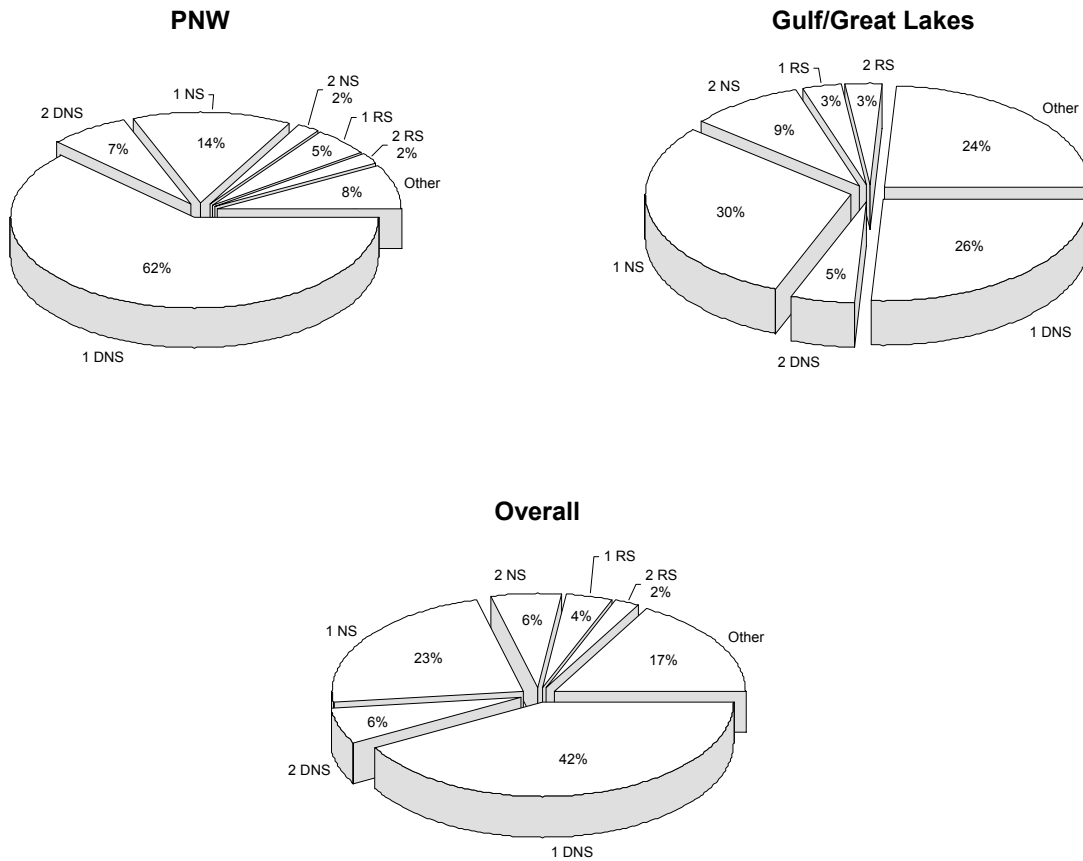
Hard Red Spring Production by Crop Year

for the major producing states
(million metric tons)

	2002	2001	2000	1999	1998
Minnesota	1.67	2.16	2.60	2.12	2.14
Montana	2.17	1.77	2.09	2.91	2.91
North Dakota	4.57	6.38	6.36	4.57	5.75
South Dakota	0.65	1.75	1.63	1.63	1.61
Four-State Total	9.06	12.06	12.68	11.23	12.41
Total HRS Production	9.91	12.94	13.67	12.19	13.24

Based on USDA crop estimates of September 30, 2002.

Grade Distribution



Soft Red Winter Wheat

Harvest Survey

Soft red winter wheat (SRW) is grown over a wide geographic region of the eastern United States which has diverse weather patterns and results in variations in SRW quality. During the 2001/02 growing season, weather patterns were mostly favorable for wheat growth. Conditions at harvest were primarily dry, except in the upper Midwest where there was some rain in June. A mostly sound crop was harvested and wheat diseases generally were not a problem. The quality of the 2002 crop is similar to the 2001 crop, as indicated by the test weight, falling number values and milling performance. Flour protein content is also similar to last year, which some processors may consider to be a disadvantage for certain types of soft wheat products.

SRW Survey: For the 2002 SRW survey, 372 samples were collected in eight key production states: Arkansas, Illinois, Indiana, Maryland, Missouri, Ohio, North Carolina and Virginia. 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 "projected" averages that might be expected at "East Coast" and "Gulf Ports". All data are weighted by production based on the USDA "Small Grains Summary" of September 30, 2002, 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. SRW samples this year were received from Ohio, Missouri, Illinois, Indiana, North Carolina, and Virginia.

Summary: The 2002 SRW crop has moisture, falling number, protein content, and average test weight similar to the 2001 crop. Grade factors show the crop to be well within the limits for U.S. No. 2 SRW. Millers report good flour yields and an easy transition period into the new crop. Baking performance is again equal to last year for samples tested. Overall, 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)

	2002	2001	2000	1999	1998
Alabama	0.07	0.09	0.13	0.12	0.10
Arkansas	1.05	1.37	1.62	1.40	1.25
Georgia	0.22	0.29	0.29	0.26	0.28
Illinois	0.85	1.17	1.40	1.62	1.54
Indiana	0.48	0.68	0.96	0.92	0.97
Kentucky	0.47	0.62	0.63	0.64	0.65
Louisiana	0.23	0.21	0.26	0.13	0.11
Maryland	0.32	0.30	0.34	0.33	0.29
Michigan	0.47	0.55	0.50	0.65	0.39
Mississippi	0.25	0.32	0.35	0.22	0.18
Missouri	0.90	1.08	1.30	1.17	1.52
North Carolina	0.55	0.50	0.75	0.77	0.76
Ohio	1.37	1.64	2.18	1.96	2.02
South Carolina	0.19	0.25	0.26	0.26	0.21
Tennessee	0.38	0.50	0.57	0.52	0.41
Virginia	0.29	0.28	0.35	0.37	0.30
16-State Total	8.09	9.85	11.89	11.34	10.98
Total SRW Production	9.04	10.88	12.83	12.36	12.05

Data are based on USDA crop estimates of September 30, 2002.

Harvest Data

Soft Red Winter	Mennel Data		Composite Average			East Coast*		Gulf Ports*	
	2002	2001	2002	2001	5-Year Avg	2002	2001	2002	2001
Wheat Grade Data:									
Test Weight (lb/bu)	60.0	59.8	59.2	59.1	58.5	59.5	59.6	59.3	59.1
(kg/hl)	79.0	78.7	77.9	77.8	77.0	78.3	78.4	78.1	77.7
Damaged Kernels (%)			0.9	0.6	1.0	0.6	0.7	1.0	0.6
Foreign Material (%)			0.1	0.1	0.1	0.0	0.1	0.1	0.1
Shrunken & Broken (%)			0.7	0.5	0.5	0.7	0.5	0.7	0.5
Total Defects (%)			1.7	1.2	1.5	1.3	1.2	1.8	1.2
Grade			2 SRW	2 SRW	2 SRW	2 SRW	2 SRW	2 SRW	2 SRW
Wheat Non-Grade Data:									
Dockage (%)			0.8	0.6	0.6	0.7	0.7	0.8	0.6
Moisture (%)	12.7	12.9	12.5	13.3	13.3	12.4	13.8	12.5	13.2
Protein (%) 12%/0% moisture basis	10.9/12.3	10.0/11.3	10.5/11.9	10.5/11.9	10.1/11.5	10.6/12.0	11.3/12.9	10.4/11.9	10.3/11.8
Ash (%) 14%/0% moisture basis			1.62/1.88	1.50/1.74	1.54/1.80	1.56/1.81	1.46/1.70	1.63/1.89	1.50/1.75
1000 Kernel Weight (g)			32.7	33.6	32.2	32.8	34.4	32.6	33.5
Kernel Size (%) lg/md/sm			81/18/1	83/17/1	n/a	79/20/1	82/17/1	82/18/1	83/17/1
Single Kernel: Hardness			27.6	24.9	22.9	27.0	25.3	27.8	24.9
Weight (mg)			33.5	32.5	32.0	33.2	33.4	33.6	32.3
Diameter (mm)			2.3	2.35	2.31	2.3	2.35	2.4	2.35
Sedimentation (cc)			16.1	16.1	13.3	17.2	19.9	15.8	15.4
Falling Number (sec)	342	338	364	356	336	364	354	364	357
Flour Data:									
Extraction Rate (%)			68.7	72.3	70.1	68.2	71.8	68.8	72.4
Color: L*			93.1	93.4	93.6	92.8	93.4	93.1	93.4
a*			-3.4	-3.3	-3.4	-3.4	-3.4	-3.4	-3.3
b*			7.9	8.2	8.4	7.6	8.4	8.0	8.2
Protein (%) 14%/0% moisture basis	9.6/11.1	8.7/10.1	8.8/10.3	9.0/10.4	8.4/9.8	9.1/10.6	9.8/11.4	8.8/10.2	8.8/10.3
Ash (%) 14%/0% moisture basis	0.50/0.58	0.45/0.52	0.46/0.54	0.45/0.52	0.44/0.52	0.48/0.56	0.46/0.53	0.46/0.53	0.45/0.52
Wet Gluten (%)			23.1	24.1	22.1	23.3	26.7	23.0	23.7
Falling Number (sec)			375	352	326	353	359	380	351
Amylograph Viscosity 65 g (BU)	512	444	538	517	512	459	530	558	514
MacMichael Viscosity			50	63	62	58	79	48	61
Starch Damage (%)			4.6	4.4	4.2	4.9	4.3	4.5	4.4
Solvent Retention Capacity (%)									
Water/50% Sucrose			57.4/114.6			58.2/118.3		56.6/112.9	
5% Lactic Acid/5% Sodium Carbonate			109.2/82.3			111.8/85.1		110.1/81.8	
Dough Properties:									
Farinograph:									
Peak Time (min)			1.8	2.1	1.7	2.4	2.6	1.7	2.0
Stability (min)			3.2	3.4	3.5	3.5	3.8	3.1	3.4
Absorption (%)			52.3	52.8	53.0	53.7	54.0	51.9	52.6
Alveograph: P (mm)									
			37	37	35	41	42	36	36
L (mm)									
			97	113	107	98	127	97	110
W (10-4 joules)									
			90	99	92	103	128	87	94
Baking Evaluation:									
Crumb Grain			5.7	5.7	5.9	6.1	6.0	5.6	5.7
Crumb Texture			5.9	5.9	6.0	6.0	6.6	5.8	5.8
Loaf Volume (cc)			751	750	739	768	770	747	747
Cookie Spread Ratio	9.0	8.3	8.6	8.1	8.4	8.0	8.0	8.8	8.1
% of Area Sampled:			100	100		20	15	80	85

* East Coast - Maryland, Virginia, North Carolina; Gulf Ports - Arkansas, Illinois, Indiana, Missouri and Ohio

Soft Red Winter

Export Cargo Data

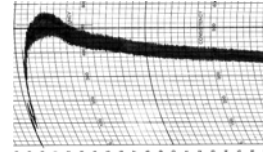
Soft Red Winter

	2002	2001
Wheat Grade Data:		
Test Weight (lb/bu)	59.5	59.7
(kg/hl)	78.3	78.6
Damaged Kernels (%)	1.7	2.0
Foreign Material (%)	0.2	0.1
Shrunken & Broken (%)	1.0	0.7
Total Defects (%)	2.8	2.9
Grade	2 SRW	2 SRW
Wheat Non-Grade Data:		
Dockage (%)	0.7	0.7
Moisture (%)	12.3	12.5
Protein (%) 12%/0% moisture basis	10.5/12.0	10.3/11.7
Ash (%) 14%/0% moisture basis	1.62/1.88	1.57/1.83
1000 Kernel Weight (g)	30.6	31.7
Kernel Size (%) lg/md/sm	79/20/1	81/18/1
Single Kernel: Hardness	*	22.0
Weight (mg)	*	33.1
Diameter (mm)	*	2.31
Sedimentation (cc)	15.1	13.4
Falling Number (sec)	372	357
Flour Data:		
Extraction Rate (%)	68.9	71.6
Color: L*	93.4	93.0
a*	-3.1	-3.0
b*	7.5	7.6
Protein (%) 14%/0% moisture basis	8.7/10.1	8.8/10.2
Ash (%) 14%/0% moisture basis	0.46/0.54	0.46/0.53
Wet Gluten (%)	22.7	22.2
Falling Number (sec)	371	366
Amylograph Viscosity 65 g (BU)	485	480
MacMichael Viscosity	56	64
Starch Damage (%)		
Solvent Retention Capacity (%)		
Water/50% Sucrose		
5% Lactic Acid/5% Sodium Carbonate		
Dough Properties:		
Farinograph:		
Peak Time (min)	1.5	1.5
Stability (min)	3.7	3.7
Absorption (%)	52.8	52.2
Alveograph: P (mm)		
L (mm)	49	45
W (10-4 joules)	87	100
Alveograph: W (10-4 joules)		
L (mm)	131	129
Baking Evaluation:		
Crumb Grain	5.9	6.1
Crumb Texture	6.4	6.2
Loaf Volume (cc)	731	737
Cookie Spread Ratio	8.0	7.7
Sample Count:	32	129

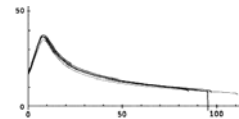
* Data not yet available.

2002 Farinogram and Alveogram

Farinogram:



Alveogram:

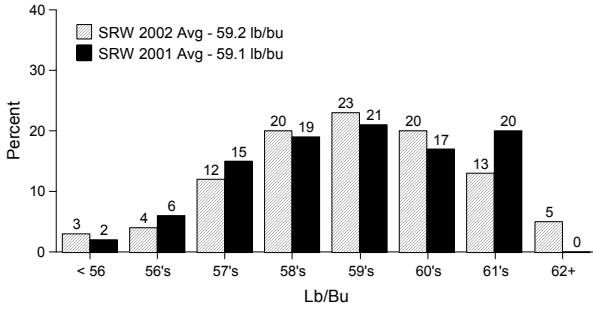


Soft Red Winter

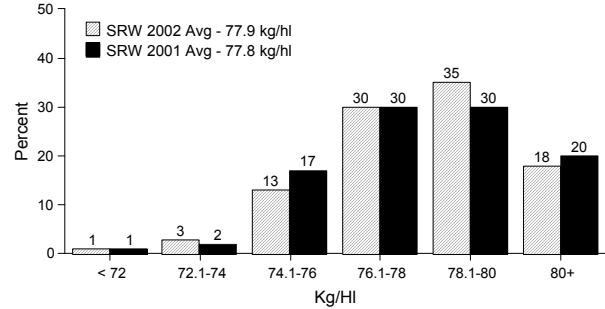
Of the sixteen-state soft red winter wheat growing area, survey samples were collected in eight states.



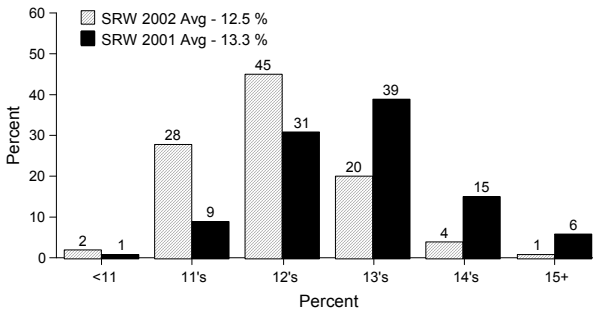
Test Weight



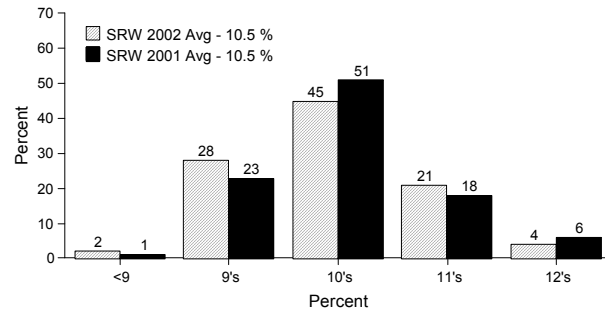
Hectoliter Weight



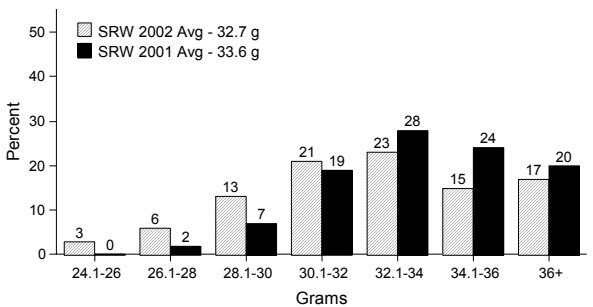
Wheat Moisture



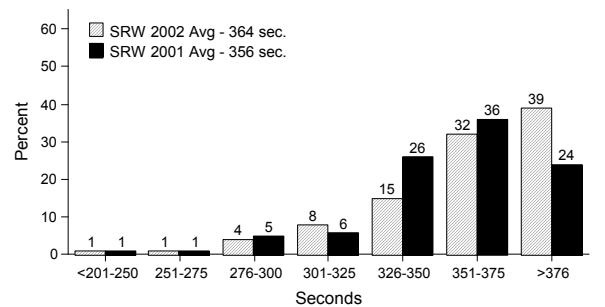
Protein (12% mb)



1000 Kernel Weight



Falling Number



Soft Red Winter

(continued from p. 18)

Wheat buyers should always specify important quality requirements such as protein, moisture content, and falling number. As there were areas of rain in the SRW production region, a specification for falling number is always recommended. Millers may wish to take advantage of the high protein content in SRW again this year for use in bread flours. Producers of cakes are pleased with baking performance. Bakers of cakes and biscuit products

(cookies) may find some amount of formulation adjustment necessary to account for the higher protein content.

Export Cargo Survey

The export cargo data show the results of analysis of 161 individual subplot samples for marketing years 2002 and 2001 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 2002 production season in the Northern Plains was characterized by a slow planting pace, good early season conditions, hot temperatures in the latter part of the season and a prolonged, wet harvest period. The crop, which is slightly smaller than a year ago, has an improved grade profile with higher test weights and lower levels of damage but has lower falling numbers.

Weather and Harvest: Planting began in late April, but progress was limited to less than 40% by May 20 because of cooler than normal temperatures. Progress accelerated in late May although completion was delayed until mid-June. Adequate moisture and favorable temperatures in June allowed the crop to emerge quickly, compensating for the delayed planting pace, and enhanced yield potentials. In July during the second half of the growing season, a drastic shift to very hot, dry conditions caused yield potential to diminish while limiting disease pressures.

Harvest began in early August across southern durum growing areas, near the normal pace, but progress was delayed in northern areas due to a shift to cooler, wetter conditions in late August and early September. By the first of September, only 25% of the crop was harvested compared to 60% in 2001. Harvest continued to be slow into September with completion in October, about two weeks behind normal.

Quality: The quality summary for the 2002 crop in the Northern Plains is based on 46 individual harvest samples collected in Montana and 174 in North Dakota. Collection began on August 8 and finished the last week of September.

The average grade on the 2002 durum crop in the Northern Plains is a 2 HAD, the same as last year and the five-year average. Test weights average 59.9 pounds per bushel (78.0 kg/hl), up from 58.8 (76.6 kg/hl) last year and 59.4 (77.4 kg/hl) for a five-year average. Damaged kernel levels are 2.1%, down from 2.7% last year and a five-year average of 2.4%. Protein levels are slightly lower, averaging 14.0% compared with 14.4% in 2001. Ash levels are significantly lower at 1.56% compared with 1.82% last year.

The delayed, wet harvest resulted in higher moisture content but virtually unchanged vitreous kernel counts, 85% compared to 88% last year. Average falling numbers are 292 seconds, slightly lower than the five-year average of 307 seconds and lower than the 355 seconds found under last years, rapid, dry harvest conditions. Despite the lower falling number average, nearly 70% of the 2002 crop is above 300 seconds.

Processing qualities of the crop include stronger mixograph properties, lower ash levels and lower speck counts, reflective of the lower disease and insect damage in the crop. Semolina extraction, pasta color and cooked firmness are slightly lower. Semolina extraction, obtained using a Buhler laboratory mill, is 63.3%, down from 64.3% last year but similar to the five-year average of 63.0%. Ash levels and speck counts are both lower than 2001. Average mixogram classification is a 6, on a scale of 1 to 8, which is higher than the score of 5 for the 2001 crop. The color score of the cooked pasta is an 8.7 on a scale of 1-12. Cooked weight and cooked firmness are down from last year, but cooking loss is also lower.

The 2002 durum crop can be characterized as average to good quality with noticeable improvements over the 2001 crop. As with most years, there can be significant differences between crop growing regions. Buyers are encouraged to use appropriate contract specifications for key quality factors to ensure they get the quality they need.

This report was extracted from "Quality of the Regional 2002 Durum Wheat Crop Report" which is 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®, a trademark of the Arizona Grain Research and Promotion Council and the California Wheat Commission, applies only to durum wheat produced in the states of Arizona and California.

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

During marketing year 2001/02 Desert Durum® was purchased for export to the Dominican Republic, Italy, Netherlands, Nigeria, Spain, Switzerland, and Venezuela. Desert Durum® varieties have consistent kernel size, low moisture (6%-8%moisture), strong gluten properties and very good color.

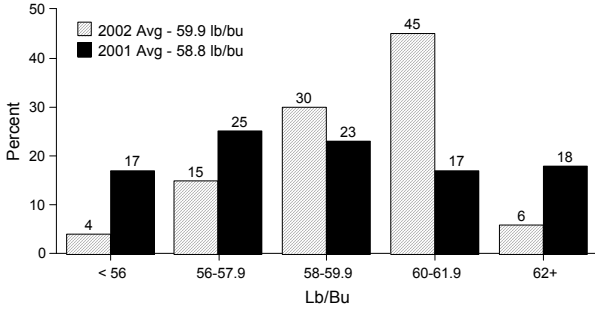
(continued on p. 25)

Harvest and Export Data

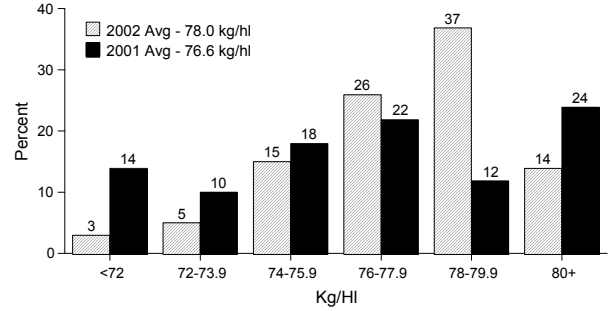
Durum	Harvest Data					Export Cargo Data			
	Great Plains		5-Year	Pacific Southwest		Great Plains		Pacific Southwest	
	2002	2001	Avg.	2002	2001	2001	2000	2001	2000
Wheat Grade Data:									
Test Weight (lb/bu)	59.9	58.8	59.4	62.4	63.8	59.9	59.7	62.6	62.2
(kg/hl)	78.0	76.6	77.4	81.3	83.1	78.1	77.7	81.6	81.0
Damaged Kernels (%)	2.1	2.7	2.4	0.1	0.1	6.3	8.1	0.8	1.1
Foreign Material (%)	0.0	0.1	0.1	0.1	0.2	0.3	0.3	0.2	0.2
Shrunken and Broken (%)	1.2	2.2	2.0	0.5	0.5	2.0	1.9	0.7	0.8
Total Defects (%)	3.3	5.0	4.6	0.7	0.8	8.6	10.3	1.7	2.1
Contrasting Classes (%)	0.2	0.1	0.3	0.0	0.0	1.1	1.1	0.2	0.0
Vitreous Kernels (%)	85	88	81	95	93	76	72	96	96
Grade	2 HAD	2 HAD	2 HAD	1 HAD	1 HAD	4 HAD	4 AD	1 HAD	1 HAD
Wheat Non-Grade Data:									
Dockage (%)	1.7	1.5	2.2	0.5	0.8	0.8	0.7	0.5	0.6
Moisture (%)	12.0	11.0	11.5	6.5	7.2	11.7	11.7	6.9	7.0
Protein (%) 12%/0% moisture basis	14.0/16.0	14.4/16.3	14.2/16.1	13.0/14.8	13.8/15.7	13.8/15.7	14.1/16.0	13.4/15.2	13.8/15.7
Ash (%) 14%/0% moisture basis	1.56/1.81	1.82/2.12	1.71/1.99	1.88/2.19	1.81/2.10	1.76/2.04	1.68/1.95	1.65/1.92	1.69/1.97
1000 Kernel Weight (g)	36.9	36.7	36.3	47.4	46.8	36.7	38.3	47.8	49.8
Kernel Size (%) lg/md/sm	56/39/6	45/44/11	53/39/8	91/9/0	92/8/0	49/42/9	57/35/8	83/14/3	88/10/1
Single Kernel: Hardness	99.8	86.9							
Weight (mg)	38.4	35.7							
Diameter (mm)	2.52	2.44							
Falling Number (sec)	292	355	307	633	651	289	254	1195	1036
Sedimentation (cc)	46	42	40						
Semolina Data:									
Total Extraction (%)	69.7	71.3	70.6	76.7	74.7	70.3	69.8	72.0	71.2
Semolina Extraction (%)	63.3	64.3	63.0	62.9	62.1	62.9	62.8	65.1	64.9
Ash (%) 14%/0% moisture basis	0.67/0.78	0.75/0.87	0.69/0.80	0.83/0.97	0.83/0.97	0.72/0.83	0.71/0.82	0.69/0.80	0.70/0.82
Specks (no/10 sq in)	26	32	26	17	28	28	25	13	14
Protein (%) 14%/0% moisture basis	13.0/15.1	13.5/15.7	13.2/15.3	11.8/13.7	12.6/14.7	12.9/15.0	13.0/15.1	12.3/14.3	12.5/14.5
Wet Gluten (%)	36.5	37.4	38.5	32.1	32.1				
Mixograph Classification	6.0	5.0	5.4			5.4	5.8	7.4	8.0
Alveograph: P (mm)	36	32							
L (mm)	96	94							
W (10-4 joules)	78	67		156	194				
Color: L*	84.2	83.8				84.5	84.2	84.9	83.9
a*	-2.7	-2.6				-2.6	-2.5	-2.5	-2.6
b*	25.9	29.3		26.1	26.6	26.4	26.0	25.8	27.0
Spaghetti Processing Data:									
Color Score	8.7	9.0	9.1	9.0	9.0	8.7	8.6	9.0	9.3
Cooked Weight (gm)	31.4	31.7	31.3	29.6	29.5	30.2	31.1	30.6	31.1
Cooking Loss (%)	5.5	5.9	5.8	7.1	7.1	6.0	6.0	6.2	5.8
Cooked Firmness (g cm)	6.0	6.2	6.2	7.6	7.5	6.2	5.9	5.9	6.4
Sample Count:						30	48	7	5

Durum

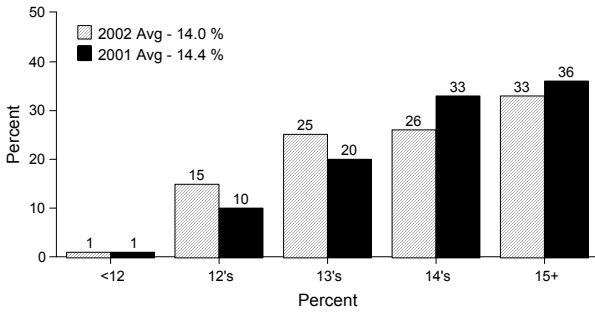
Test Weight



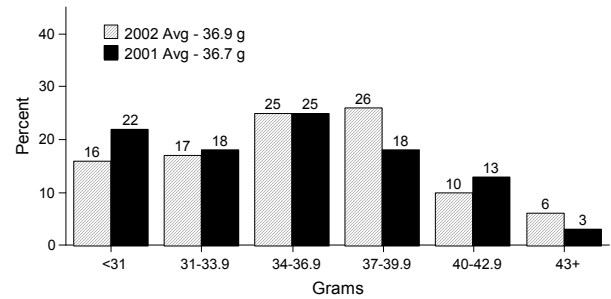
Hectoliter Weight



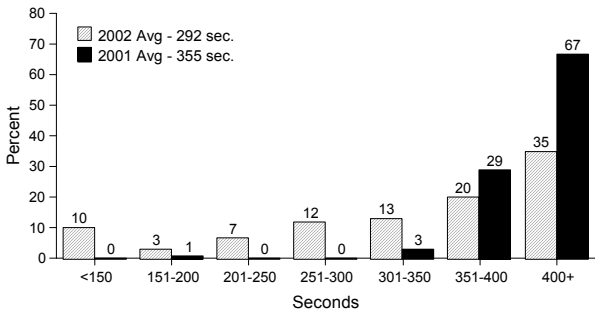
Protein (12% mb)



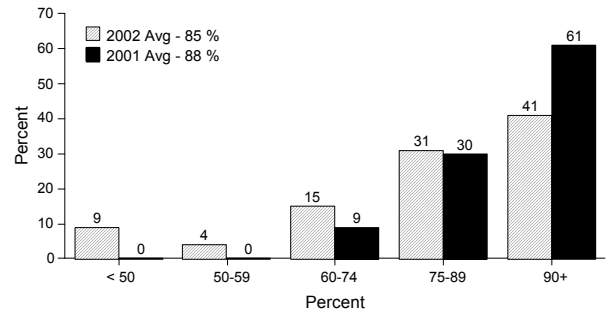
1000 Kernel Weight



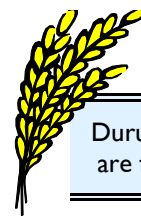
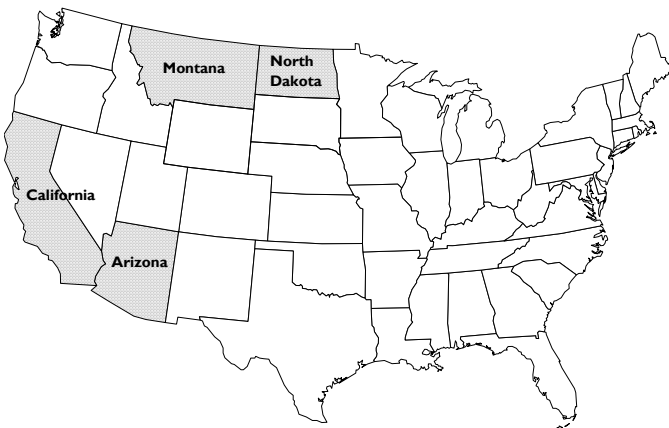
Falling Number



Vitreous Kernels



Note: Charts include Great Plains durum only.



Durum survey results are from four states.

Durum Production by Crop Year

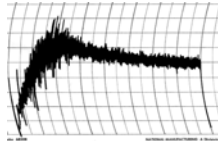
for the major producing states
(million metric tons)

	2002	2001	2000	1999	1998
Arizona	0.23	0.22	0.22	0.20	0.41
California	0.24	0.23	0.26	0.24	0.43
Montana	0.34	0.32	0.36	0.26	0.33
North Dakota	1.36	1.49	2.13	1.96	2.57
Total U.S.	2.18	2.27	2.99	2.70	3.76

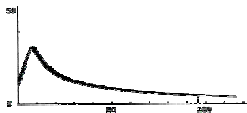
Based on USDA crop estimates of September 30, 2002.

2002 Great Plains Durum Mixogram and Alveogram

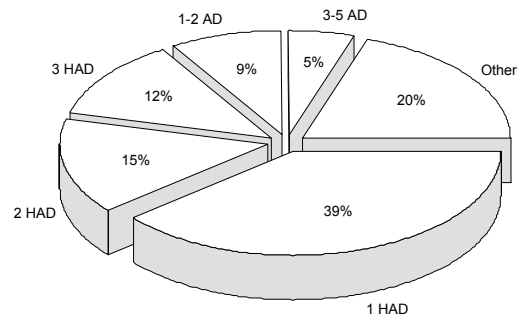
Regional Average Mixogram:
(score = 6)



Alveogram:



Great Plains Durum Grade Distribution



(continued from p. 22)

Export Cargo Survey

The durum export cargo survey shows the results of analysis of 37 individual subplot samples for crop year 2001 (collected from October 2001 through June 2002) and 53 samples for 2000. 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.

Hard White Wheat

Hard White Harvest Survey

Starting this year, hard white wheat composites were tested rather than individual varieties. Samples were made into five composites based on regions and protein levels (high – 12.0% to 13.5%, and very high – greater than 13.5%): PNW High Protein; PNW Very High Protein; Southern Plains High Protein; Southern Plains Very High Protein; and Northern Plains Very High Protein. The hard white (HW) wheat production for the 2002 crop is estimated at 313,000 MT.

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 (10th Edition). Chinese raw and wet noodle testing and Chinese northern-type and Taiwan-type steamed bread evaluation were conducted according to the protocols established by Chinese noodle and steamed bread makers and flour millers at the Wheat Marketing Center during the Asian Products Collaborative Program.

Wheat and Grade Data: All five samples were graded as U.S. No. 1 with test weights that ranged from 60.0 to 61.4 lb/bu (78.9 to 80.7 kg/hl).

Flour, Dough, and Baking Data: Straight grade flour extractions ranged from 70.3% to 71.1% and flour ash contents varied from 0.38% to 0.41% (14% moisture basis). All but Southern Plains High Protein and Northern Plains Very High Protein had amylograph peak viscosities higher than 700 BU. Starch damage values were in the range of 3.8% to 5.7%. Farinograph water absorptions ranged from 54.7% to 59.6% (14% moisture basis), peak times varied from 6.9 to 11.7 min, and stability times were 30 min or longer for all samples. Alveograph and extensigraph results were in the typical ranges of U.S. hard wheat of similar protein content. Bake absorptions ranged from 59.9% to 68.2%, and scores and loaf volumes were comparable to a commercial bread control flour, except that the Northern Plains Very High Protein sample made breads of a relatively lower volume.

Noodle Evaluation: This year, both Chinese raw noodles (white salted) and Chinese wet noodles (yellow alkaline) were made from each of the HW flours. A control noodle

flour was included in each noodle type for evaluation comparison. Chinese raw noodle color was slightly dark for some samples due to high flour protein content. However, the boiled noodle texture was acceptable for most samples. For Chinese wet noodles, most samples had better noodle color than the control; all of the parboiled noodles had higher color scores than the control. The noodle texture of boiled wet noodles was similar to or better than that of the control sample.

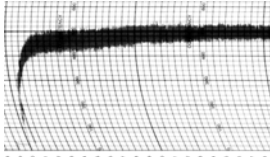
Chinese Steamed Bread: Two types of Chinese steam breads were evaluated for HW flours: Chinese northern-type and Taiwan-type. Each HW wheat flour was blended with a composite 2002 crop soft white (SW) flour at a 50:50 ratio to produce Chinese northern-type steam breads because HW alone was too strong. Taiwan-type steam breads were directly made from each of the HW flours. A control steam bread flour was included in each steam bread type for quality evaluation comparison. Results indicated that the blend of HW and SW composite at 50:50 ratio was still too strong for Chinese northern-type steam bread because there were some shrinkage problems. The potential of HW wheat in this type of steam bread can be optimized by further increasing SW flour in the blend of HW and SW flour blends. For the Taiwan-type steam bread, samples from the Southern Plains performed similar to the control and the sample from PNW High Protein was too strong for the steam bread by itself. It is recommended that very high protein HW be blended with some soft white for better results.

Summary: Most 2002 crop HW wheats surveyed had acceptable breadmaking performance. Chinese raw noodle color was a bit dark for very high protein samples. However, boiled noodle texture was acceptable. Chinese wet noodle color was better than the control sample, and the boiled noodle texture was similar to or better than the control noodles. Because the HW samples tested this year had high to very high protein content, more than 60% SW is needed in the hard/soft wheat flour blends for producing suitable quality northern-type steam breads. For Taiwan-type steam breads, blending HW with some SW would be useful to improve product quality.

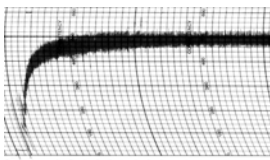
Harvest Data

Composite Average Farinograms

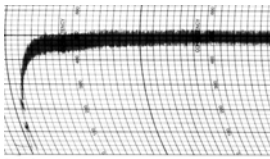
Pacific Northwest - High Protein:



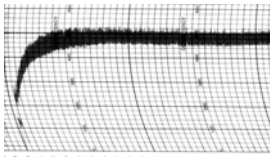
Very High Protein:



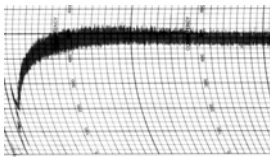
Southern Plains - High Protein:



Very High Protein:



Northern Plains - Very High Protein:



Hard White	Pacific Northwest		Southern Plains		Northern Plains
	High*	Very High	High	Very High	Very High
Wheat Grade Data:					
Test Weight (lb/bu)	60.0	61.0	61.4	60.9	60.3
(kg/hl)	78.9	80.2	80.7	80.1	79.3
Heat Damage (%)	0.0	0.0	0.0	0.0	0.0
Damaged Kernels Total (%)	0.0	0.0	0.0	0.0	0.0
Foreign Material (%)	0.0	0.1	0.1	0.0	0.0
Shrunken & Broken (%)	1.5	0.8	0.6	1.0	1.0
Total Defects (%)	1.5	0.9	0.7	1.0	1.0
Grade	1 HW	1 HW	1 HW	1 HW	1 HW
Wheat Non-Grade Data:					
Dockage (%)	0.5	0.4	0.2	0.3	0.6
Moisture (%)	8.3	8.7	10.7	11.1	10.6
Protein (%) 12%/0% moisture basis	12.2/13.9	14.2/16.2	12.9/14.7	14.5/16.5	15.1/17.2
Ash (%) 14%/0% moisture basis	1.65/1.92	1.42/1.65	1.44/1.67	1.49/1.73	1.53/1.78
1000 Kernel Weight (g)	30.6	34.6	28.4	25.2	27.3
Kernel Size (%) lg/md/sm	57/42/1	66/33/1	37/62/1	16/82/2	29/69/2
Single Kernel: Hardness	78.3	62.9	75.1	73.4	72.1
Weight (mg)	32.4	35.0	28.8	25.4	27.5
Diameter (mm)	2.36	2.44	2.17	1.94	2.10
Sedimentation (cc)	13.9	42.8	28.5	29.3	37.3
Falling Number (sec)	354	380	392	517	478
Flour Data:					
Extraction Rate (%)	71.1	70.3	70.7	70.6	70.6
Color: L*	92.0	92.0	92.0	91.6	91.6
a*	-2.0	-2.2	-2.2	-2.3	-2.5
b*	6.3	7.2	7.3	8.1	9.3
Protein (%) 14%/0% moisture basis	11.0/12.8	12.9/14.9	11.3/13.1	12.5/14.6	13.4/15.6
Ash (%) 14%/0% moisture basis	0.41/0.47	0.39/0.45	0.38/0.44	0.41/0.48	0.41/0.47
Wet Gluten (%)	27.8	33.2	24.6	39.1	37.5
Falling Number (sec)	370	388	406	512	486
Amylograph Viscosity 65 g (BU)	830	910	665	995	690
Starch Damage (%)	5.7	4.2	4.7	4.9	3.8
Dough Properties:					
Farinograph:					
Peak Time (min)	11.7	9.5	7.7	6.9	9.2
Stability (min)	30.0	36.1	33.0	45.9	36.8
Absorption (%)	54.9	56.6	54.7	59.6	56.9
Alveograph: P (mm)		85	85	104	77
L (mm)		146	122	103	149
W (10-4 joules)		450	350	350	380
Extensigraph: Resistance (BU)		650/840	795/930	605/711	857/952
(45/135 min) Extension (cm)		15.1/12.2	12.0/12.0	12.2/11.8	14.2/12.6
Area (sq cm)		125/126	120/142	95/108	148/149
Baking Evaluation:					
Bake Absorption (%)	59.9	62.8	64.2	68.2	64.9
Crumb Grain and Texture	7.0	6.8	7.0	6.5	5.5
Loaf Volume (cc)	882	913	813	825	750

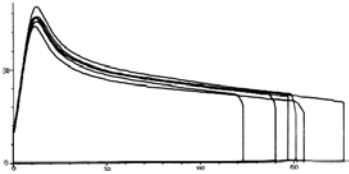
* Protein Range of Samples - High: 12.0% - 13.5%; Very High: Greater than 13.5%

Harvest Data

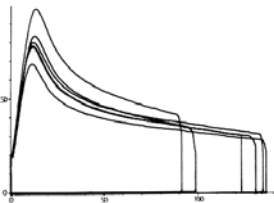
Composite Average Alveograms

Pacific Northwest - High Protein (not available)

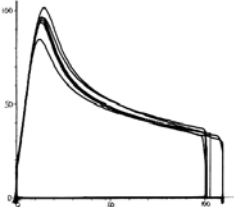
Very High Protein:



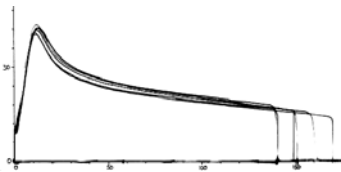
Southern Plains - High Protein:



Very High Protein:



Northern Plains - Very High Protein:



Hard White	Pacific Northwest		Southern Plains		Northern Plains
	High*	Very High	High	Very High	Very High
Chinese Raw Noodle-Making Quality:					
Color at 0/24 hour: L*	83.9/73.4	81.0/70.2	81.5/72.0	83.7/74.8	81.9/71.8
a*	0.2/0.7	0.1/0.7	-0.1/0.4	-0.1/0.4	-0.2/0.6
b*	15.7/20.5	19.7/24.2	20.5/26.1	17.8/23.6	22.2/27.8
Change in L* (0-24 hr)	10.4	10.8	9.6	8.9	10.1
Cooking Yield (%)	131	125	120	121	120
Sensory Color Stability Score	6.7	6.2	6.5	6.7	6.0
Instrumental Texture:					
Firmness (g)	1150	1003	1171	1109	1237
Springiness (%)	94.7	95.6	96.3	95.7	95.2
Cohesiveness	0.65	0.68	0.65	0.66	0.65
Chewiness (g)	711	649	734	696	760
Chinese Wet Noodle-Making Quality:					
Uncooked Color at 0/24 hour: L*	81.1/70.6	78.9/68.3	78.4/68.1	81.4/71.8	78.8/70.5
a*	-1.6/-1.0	-1.9/-1.3	-1.8/-0.8	-1.6/-0.9	-1.8/-1.3
b*	18.4/19.9	22.5/23.1	23.6/24.4	20.5/23.8	26.9/27.8
Change in L* (0-24 hr)	10.4	10.6	10.3	9.6	8.3
Parboiled Color at 0/24 hour: L*	75.9/76.5	75.4/76.6	76.8/77.5	77.8/78.5	76.4/77.2
a*	-3.0/-2.9	-3.0/-3.2	-2.9/-3.1	-3.1/-3.1	-3.4/-3.3
b*	25.6/24.8	26.8/25.9	27.3/26.8	27.2/26.3	29.5/29.1
Cooking Yield (1.5 min, %)	63	66	70	70	64
Uncooked Color Stability Score	6.7	6.8	8.0	7.8	8.7
Parboiled Color Stability Score	7.0	7.5	7.3	8.0	8.0
Instrumental Texture:					
Firmness (g)	737	754	859	893	1014
Springiness (%)	96.8	95.4	96.8	96.4	95.1
Cohesiveness	0.65	0.67	0.65	0.65	0.63
Chewiness (g)	465	478	541	563	606
Chinese Northern-Type Steamed Bread Evaluation:					
Specific Volume (ml/g)		2.08	1.83	2.42	2.00
Total Score		61.5	61.3	70.3	64.3
Taiwan-Type Steamed Bread Evaluation:					
Specific Volume (ml/g)		2.29	2.86	2.36	2.66
Total Score		57.0	68.6	65.8	63.3

* Protein Range of Samples - High: 12.0% - 13.5%; Very High: Greater than 13.5%

U.S. Production by Class

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

	2002	2001	2000	1999	1998
Hard Red Winter	16.58	20.87	23.03	28.60	32.10
Soft Red Winter	9.04	10.88	12.83	12.36	12.05
Hard Red Spring	9.91	12.94	13.67	12.19	13.24
Soft White	6.42	6.31	8.25	6.72	8.11
Hard White	0.27	0.33	0.26	n/a	n/a
Durum	2.18	2.27	2.99	2.70	3.76
Total	44.22	53.26	60.76	62.57	69.33

Estimates are based on USDA crop estimates of September 30, 2002. 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 2002/2003 (year beginning June 1)
(million metric tons)

	HRW	HRS	SRW	White	Durum	TOTAL
Supply:						
Beginning Stocks	9.9	6.3	2.1	2.0	0.9	21.1
Production	16.6	9.9	9.0	6.5	2.2	44.2
Total Supply	26.5	17.1	11.3	8.7	4.0	67.7
Demand:						
Domestic Use	12.5	7.1	7.0	2.7	2.3	31.7
Exports	9.8	7.6	3.3	4.2	1.0	25.9
Total Demand	22.3	14.8	10.3	7.0	3.3	57.6
Ending Stocks	4.2	2.4	1.1	1.7	0.7	10.1

Based on USDA Supply/Demand estimates of October 11, 2002.

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 - $\text{kg/hl} = \text{lb/bu} \times 1.292 + 0.630$, for other wheats - $\text{kg/hl} = \text{lb/bu} \times 1.292 + 1.419$.

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: 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: SW - AACC 26-31; HW - AACC 26-31A; HRW (Midwestern), SRW, 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) - AACC 38-12; SW - AACC 38-12 (water reduced from 4.8 to 4.2ml); HRW (CA) - Glutomatic Method (ICC 137).

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.

Solvent Retention Capacity (SRC): AACC Method 56-11.

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.

Color: Minolta Method using Minolta Chroma Meter CR-310

Protein: AACC 46-30 (Combustion Nitrogen Analysis technique).

Wet Gluten: AACC 38-12 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 (15 SKB units/100 g flour) replacing malt dry powder; instant dry yeast (1%); 10 ppm bromate, 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: Two types of Chinese noodles were prepared from each of the HW flours: Chinese raw noodles and Chinese wet noodles. The Chinese raw noodle formula was: flour, 1000 g; salt, 12 g; and distilled water, 280 g. The Chinese wet noodle formula was: flour, 1000 g; salt, 20 g; K₂CO₃, 4.5 g; Na₂CO₃, 4.5 g; and water, 320 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. For Chinese wet noodles, noodle sheet color was measured on both uncooked and parboiled (boiling for 1.5 min) sheets.

Cooking Yield is % of weight gain after cooking for 5 min for Chinese raw noodles and for 1.5 min for Chinese wet noodles, rinsing in 27°C water and draining. Sensory Noodle Color Stability Score is a total score of noodle color rated at 2 hr and 24 hr against a control sample (an assigned score of 7) and is reported based on a scale of 1-10; higher scores indicate better color stability. 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 is a single parameter that incorporates the three textural parameters. Higher values of these textural parameters are generally more desirable for Chinese-style noodles.

Chinese Steamed Bread: Three types of Chinese steamed breads were prepared: Chinese southern-type steamed bread from each of the SW and club wheat flours; Chinese northern-type steamed bread from each of the HW and SW flour blends; and Taiwan-type steamed bread from each of the HW flours. The Chinese southern-type steamed bread formula was: flour, 400 g; sugar, 60 g; shortening, 16 g; baking powder, 4 g; yeast, 4 g; and water, 160-165 g. The Chinese northern-type steamed bread formula was: flour, 400 g, yeast, 4 g; and water, 180-208 g. The Taiwan-type steamed bread formula was: flour, 400 g; yeast, 4 g; sugar, 16 g; shortening, 16 g; and water, 170-180 g. Yeast was dissolved in water before use. All steamed breads were prepared using straight dough methods (Wheat Marketing Center Protocol). The Total Score 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. The Specific Volume is the volume per unit weight product (volume divided by weight).

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 (1000 gram sample)					
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		