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Quality of western Canadian wheat 2004

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Summary

A combination of low moisture levels in the western Prairies, wet weather in the eastern Prairies and cool temperatures delayed seeding. Planting was completed by mid-June, but some fields in Manitoba and Saskatchewan went unplanted due to wet conditions. Temperatures improved in July in the western Prairies allowing rapid crop development. Yield potential was above average due to adequate rainfall and lack of heat stress, however those estimates have since been tempered by frost, excessive moisture and prolonged cool weather. Frost in the third week of August across parts of Saskatchewan and Manitoba caused damage to immature crops. Persistent rainfall and cool temperatures in August and early September delayed harvest progress across the Prairies. Drier, milder weather in late September and early October resulted in rapid harvest progress.

Spring wheat production levels are estimated at 18.0 million tonnes by Statistics Canada, an increase of 13% over last year. Durum wheat production is 5.0 million tonnes, higher than the 4.0 million tonnes reported in 2003. Both increases are the result of increases in agronomic yield.

Overall protein content of Canada Western Red Spring wheat, at 13.3 %, is lower than last year. High grade Canada Western Red Spring wheat shows lower test weight, larger seed size, similar wheat falling number, higher absorption and comparable dough properties relative to last year. Overall protein content of Canada Western Amber Durum wheat at 12.4% is lower than last year. High grade Canada Western Amber Durum wheat shows larger kernel size, good overall milling quality, and slightly increased dough strength over last year. Overall protein content of Canada Western Hard White wheat at 13.1% is 0.5% lower than last year, where it was reported as Canada Western Experimental Hard White wheat.

Analyses are reported for Canada Western Hard White wheat, in its first year as a new Canadian wheat class.

Methodology used to obtain quality data is described in a separate report available on the CGC website at http://grainscanada.gc.ca/Quality/Methods/wheatmethods-e.htm.

Eight classes of Canadian wheat

This report presents information on the quality of the top grades of Canada Western Red Spring, and Canada Western Amber Durum wheat for the 2004 crop. Information is also provided on Canada Western Hard White (CWHW) wheat, a new Canadian wheat class as of August 1, 2004. Further information on other classes of western Canadian wheat is not reported for the 2004 crop where insufficient material was available to provide statistically valid information.

Canada Western Red Spring (CWRS) wheat is a hard wheat with superior milling and baking quality. It is offered at various guaranteed protein levels. There are four milling grades in the CWRS class.

Canada Western Hard White (CWHW) wheat is a hard white spring wheat with superior milling quality producing flour with excellent colour. It is suitable for bread and noodle production. There are three milling grades in the CWHW class.

Canada Western Amber Durum (CWAD) wheat is a durum wheat producing a high yield of semolina with excellent pasta-making quality. There are four milling grades in the CWAD class.

Canada Western Extra Strong (CWES) wheat is a hard red spring wheat with extra-strong gluten suitable for blending purposes and for special breads. There are two milling grades in the CWES class.

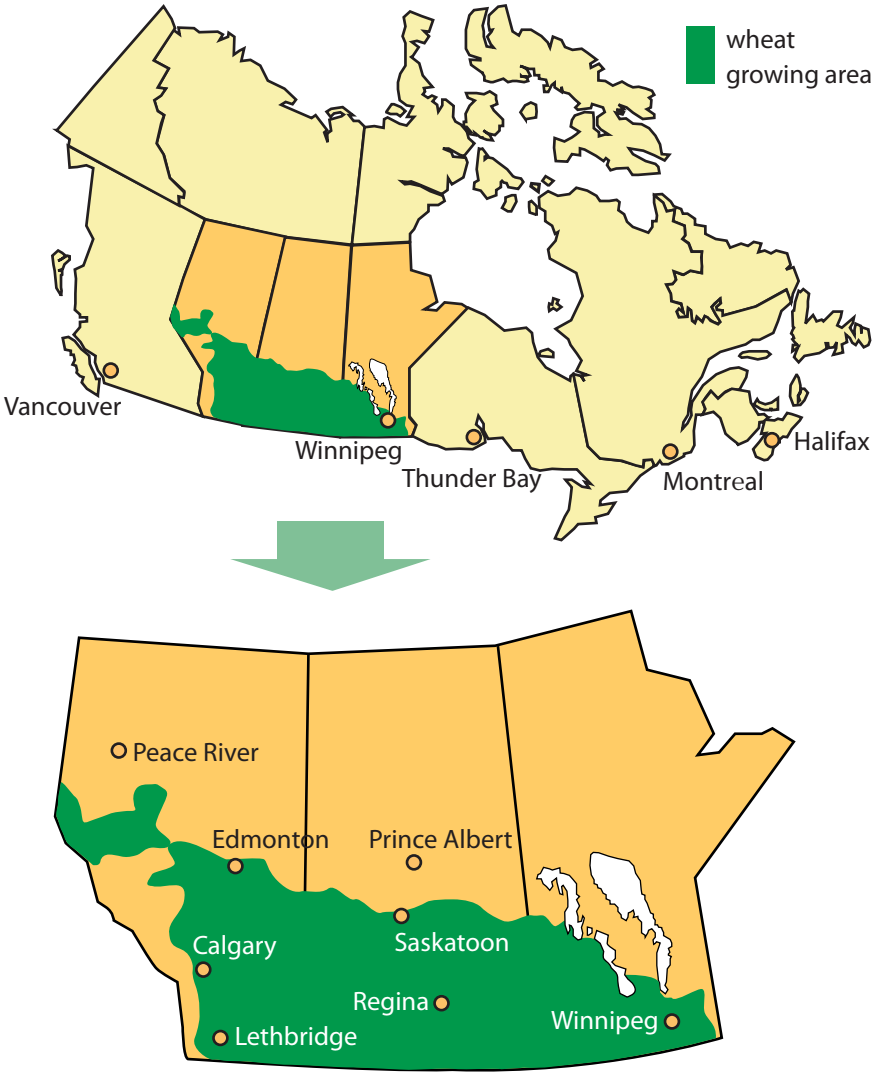
Canada Prairie Spring Red (CPSR) wheat is a medium-strength wheat suitable for the production of certain types of hearth breads, flat breads, steamed breads, noodles and related products. There are two milling grades in the CPSR class.

Canada Western Red Winter (CWRW) wheat is a hard wheat with very good milling quality suitable for the production of a wide variety of products including French breads, flat breads, steamed breads, noodles and related products. There are two milling grades in the CWRW class.

Canada Prairie Spring White (CPSW) wheat is a medium-strength wheat suitable for the production of various types of flat breads, noodles, chapatis and related products. There are two milling grades in the CPSW class.

Canada Western Soft White Spring (CWSWS) wheat is a soft wheat of low protein content suitable for the production of cookies, cakes and pastry as well as various types of flat breads, noodles, steamed breads and chapatis. There are three milling grades in the CWSWS class.

Figure 1 - Map of Canada showing major wheat producing areas in the prairies



Introduction

What data in this report represent

Figure 1 highlights the wheat producing regions in the Prairie provinces of, from east to west, Manitoba, Saskatchewan and Alberta. Data presented in this report were generated from quality tests carried out on composites representing approximately 3000 individual samples submitted by producers and primary elevator managers from the three Prairie provinces. These data are not quality specifications for Canadian wheat. Rather, they represent our best estimate of overall quality. How closely they represent the exact quality characteristics of wheat of any given grade exported during the coming crop year depends on

- The amounts and relative quality of carryover stocks of each grade
- The degree to which the harvest survey composites are representative of 2004 production

Background for the 2004 crop

The Canadian Wheat Board provided background information for the 2004 crop.

Seeding conditions

Extremely low soil moisture levels were present in Alberta and Saskatchewan at the beginning of the 2004 growing season. The dry soils delayed fieldwork in many areas of both provinces, until significant precipitation arrived in May. Planting of cereal crops began in early May across the Prairies and advanced rapidly in the western growing areas. Cool temperatures and frequent frosts in the eastern growing areas slowed progress in Saskatchewan and Manitoba. General rains and snow in the third week of May slowed planting but provided much needed moisture for germination. The cool temperatures and frequent rains persisted in eastern areas well into June, resulting in late planting of some cereal and oilseed crops. Seeding was complete by mid-June, although some fields were not planted due to the wet conditions in parts of Manitoba and eastern Saskatchewan.

Growing conditions

Cool, wet weather persisted through the month of June in the eastern Prairies, which delayed crop growth. The May through June period was one of the coolest on record in the eastern Prairies. Although western areas of the Prairies were warmer, below normal temperatures were also reported in Alberta and western Saskatchewan. Crop development was generally two to three weeks behind normal in the eastern Prairies by the end of June, while crops in the west were only one week behind normal.

Temperatures improved in the month of July, allowing crops to develop rapidly. Western growing areas received the warmest temperatures, with most locations normal or slightly above normal for the month. Temperatures also improved in eastern areas, but the region still reported below normal temperatures for the month. Rainfall during July

was close to normal across the Prairies, which encouraged good crop growth. Yield potential for most crops was above average due to the adequate rainfall and lack of heat stress. Temperatures in August returned to dramatically below normal levels, further delaying crop development. Freezing temperatures during the third week of August caused significant damage to immature crops in parts of Saskatchewan and Manitoba. The cool temperatures persisted into September, resulting in delayed maturity of most crops. Growing season temperatures (May through August) during the 2004 season were among the coolest reported in over 100 years.

Harvest conditions

Persistent rains in late August and early September delayed harvest progress across the Prairie region. Only five per cent of the harvest was completed by the first week of September. The rains caused grade reduction to wheat and barley crops, especially in northern areas of the Prairies. Drier, milder weather in late September and early October resulted in rapid harvest progress. Over 50 per cent of the crop was harvested by the first week in October and over 80 per cent was completed by the middle of the month.

Production and grade information

Western Canada's wheat production was above 10 year average levels in 2004 despite the poor conditions experienced throughout the growing season. Total wheat production for Western Canada is estimated at 23.9 million tonnes by Statistics Canada[1], with spring wheat production at 18.0 million tonnes. Durum wheat production increased to 5.0 million tonnes. Increased agronomic yields accounted for increased production with spring wheat yields estimated at 2.6 tonnes/hectare, and durum wheat yielding 2.3 tonnes/hectare on average across western Canada.

Much of the crop has been downgraded due to the cool wet harvest. The lower grade CWRS resulted from a range of degrading factors including frosted, green, mildew, sprouted and hard vitreous kernels count. The lower grade CWAD resulted primarily from smudge, mildew and hard vitreous kernel content. Tight grading tolerances for these factors ensure that the high inherent quality of the top milling grades of Canada Western Red Spring and Canada Western Amber Durum wheat is protected.

[1] Statistics Canada, *Field Crop Reporting Series* Vol. 83, No. 8, Dec. 2004

Protein

Table 1 compares available mean protein values for each of the eight classes of western Canadian wheat surveyed in 2004 to corresponding values obtained in the 2003 and 2002 harvest surveys as of November 4, 2004. This year includes Canada Western Hard White wheat (CWHW), along with the 2003 value. Canada Western Red Spring (CWRS) wheat and Canada Western Amber Durum (CWAD) show lower protein values compared to 2003. The Canada Prairie Spring Red (CPSR) wheat class shows a decrease over 2003. The protein content of CWHW wheat is lower than last year. Insufficient sample was available to assess the protein content of Canada Western Extra Strong (CWES), Canada Western Red Winter, Canada Prairie Spring White (CPSW) and Canada Soft White Spring (CWSWS) wheat accurately.

Table 1 - Mean protein content of milling grades of western Canadian wheat classes, 2004, 2003 and 2002

	Protein content, %[1]		
Class	2004	2003	2002
CWRS	13.3	14.1	14.6
CWAD	12.4	13.6	13.3
CWHW	13.1	13.6	N/A
CWES	N/A	N/A	N/A
CPSR	11.7	12.4	14.5
CWRW	N/A	11.2	11.5
CPSW	N/A	N/A	N/A
CWSWS	N/A	11.4	11.2

[1] Mean value, N x 5.7; 13.5% moisture content basis
N/A = not available

Canada Western Red Spring wheat

Protein and variety survey

Table 2 lists mean protein values for Canada Western Red Spring (CWRS) wheat by grade and province for 2004. Comparative values for western Canada by grade are shown for 2003 and for the previous 10 years (1994-2003). Figure 2 shows the fluctuations in annual mean protein content since 1927.

The average protein content of the 2004 western Canadian wheat crop is 13.3%, a decrease of 0.8% from 2003 and 0.4% lower than the long term average protein content. The decline in protein content is in large part, due to the wet, cool conditions experienced this year. Protein content is relatively constant across grades, ranging from 13.2% to 13.4%. Manitoba and Alberta show higher protein content than Saskatchewan.

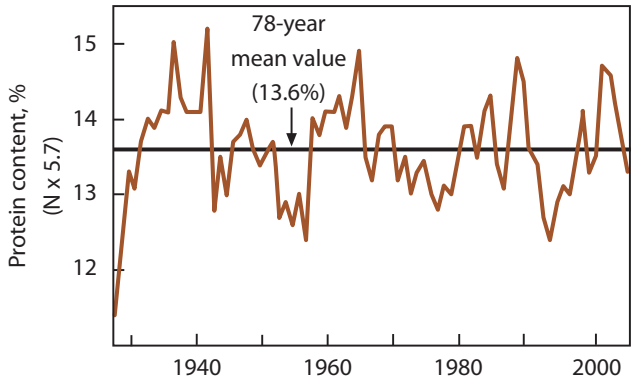
Preliminary results from the Canadian Wheat Board 2004 Variety Survey show that AC Barrie is the predominant variety in the CWRS class with 26% of the seeded acreage, down from 32% in 2003. Superb production increased significantly with 14% of the seeded acreage, up from 4% last year. Five varieties, including Prodigy, CDC Teal, AC Intrepid, McKenzie and AC Splendor, each account for 5-7% of the acreage.

Table 2 - Mean protein content of 2004 Canada Western Red Spring wheat, by grade, year and province

	Protein content, %[1]					
	Western Canada			2004		
Grade	2004	2003	1994-2003	Manitoba	Saskatchewan	Alberta
Wheat, No. 1 Canada Western Red Spring	13.3	14.2	13.7	13.9	12.8	13.7
Wheat, No. 2 Canada Western Red Spring	13.4	13.9	13.8	13.8	12.6	14.1
Wheat, No. 3 Canada Western Red Spring	13.2	13.5	13.4	13.4	12.9	13.5
All milling grades	13.3	14.1	13.7	13.6	12.8	13.7

[1] N x 5.7; 13.5% moisture content basis

Figure 2 - Mean protein content of harvest survey Canada Western Red Spring wheat - 1927 to 2004



Milling and baking quality - Allis-Chalmers laboratory mill

To assess the quality of the 2004 CWRS wheat crop, composites were prepared from harvest survey samples representing the top two milling grades. The Wheat, No. 1 CWRS and Wheat No. 2 CWRS samples were segregated into composites having minimum protein levels of 14.5%, 13.5% and 12.5%.

Wheat, No. 1 Canada Western Red Spring

Table 3 summarizes quality data for the Wheat, No. 1 CWRS composites. Corresponding data are provided at the 13.5% minimum protein level for both last year's composite and the ten-year average, 1994-2003.

Test weight of the 2004 Wheat, No. 1 CWRS grade protein segregates is lower than last year, but similar to the long term average. Kernel weight is higher than last year and higher than the long term average. Wheat ash is higher compared to last year but lower than the long term average. Falling number values are comparable to last year. Although lower than last year the top grades show flour amylograph peak viscosities indicative of sound kernel characteristics.

Wheat particle size index and flour starch damage values are similar to last year but starch damage is higher than the long term average. Flour yield, when corrected for ash content, is lower than last year, and slightly higher than the long term average. Flour grade colour values are similar to last year, while AGTRON values are lower than last year, but both are superior to the long term average.

Farinograph absorption is about 1% higher than both 2003 and the long term value. Farinograph and extensograph results indicate comparable dough strength properties to last year, but are stronger than the long term average. The Canadian short process (CSP) baking formulation was altered this year, reducing salt concentration to 2% from 2.4% so as to be in line with current commercial practices. We have also changed from the GRL mixer to the more rigorous Swanson pin-type mixer in order to provide more definitive mixing curves and to increase throughput. As a result there are no comparisons available against 2003 or long term data for the CSP bake test. Studies in our laboratory have indicated that absorption and loaf volume remain comparable between the current and previous methods. CSP baking absorption and loaf volumes are typical for the grade and protein content. During processing, the superior dough handling properties of this wheat class are clearly evident.

No. 2 Canada Western Red Spring wheat

Quality data for the 2004 Wheat, No. 2 CWRS composites and comparative data for the 13.5% minimum protein level for last year's composite and the ten-year average, 1994-2003 are shown in Table 4. Test weight values are comparable to last year. Wheat ash is slightly higher than last year, but is lower than the long term average value. Wheat falling number and amylograph peak viscosity are lower than last year.

Wheat particle size index and flour starch damage values indicate that the kernel texture is somewhat harder than both last year and the long term average. Milling extraction level of the Wheat, No. 2 CWRS grade 13.5% protein is similar to last year and the long term average on 0.50% ash basis. Flour grade and AGTRON colour values are lower than last year, but are slightly better than the long term values.

Farinograph absorption is about 2% higher than 2003, and 2.5% higher than the long term average. Dough strength is slightly weaker than 2003, but is slightly higher than the long term average. Baking absorption of the Wheat, No. 2 CWRS 13.5% protein is slightly higher than the corresponding Wheat, No. 1 CWRS 13.5% protein flour. Loaf volumes of the Wheat, No. 2 CWRS 13.5% protein and Wheat, No. 1 CWRS 13.5% protein are comparable, but the Wheat, No. 2 CWRS has slightly longer mixing requirements and higher mixing energy.

Table 3 - Wheat, No. 1 Canada Western Red Spring
Quality data for 2004 and 2003 harvest survey grade composite samples

	Minimum protein content			Wheat, No. 1 CWRS – 13.5	
Quality parameter[1]	14.5	13.5	12.5	2003	1994-03 mean
Wheat					
Test weight, kg/hL	80.6	81.4	81.7	82.4	81.7
Weight per 1000 kernels, g	33.2	32.5	33.7	31.3	31.9
Protein content, %	14.7	13.8	12.9	13.8	13.7
Protein content, % (dry matter basis)	17.0	15.9	14.9	16.0	15.9
Ash content, %	1.55	1.54	1.51	1.50	1.56
α-amylase activity, units/g	4.5	4.5	5.0	2.5	4.9
Falling number, s	405	395	365	395	386
PSI,%	55	53	52	52	53
Milling					
Flour yield					
Clean wheat basis, %	74.8	75.3	75.6	75.7	75.5
0.50% ash basis, %	76.3	76.8	77.1	77.7	76.5
Flour					
Protein content, %	14.3	13.3	12.4	13.3	13.1
Wet gluten content, %	39.3	36.3	33.0	35.0	36.3[2]
Ash content, %	0.47	0.47	0.47	0.46	0.48
Grade colour, Satake units	-1.9	-2.2	-2.4	-2.2	-1.7
AGTRON colour, %	74	76	78	79	73
Starch damage, %	7.7	8.1	8.5	8.1	7.5[3]
α-amylase activity, units/g	1.5	1.0	1.5	0.5	1.3
Amylograph peak viscosity, BU	510	560	495	715	681
Maltose value, g/100g	2.5	2.7	2.8	2.6	2.4
Farinogram					
Absorption, %	67.8	66.8	66.1	65.7	65.7
Development time, min	6.5	6.0	5.25	5.75	5.2
Mixing tolerance index, BU	25	25	25	20	27
Stability, min	10.5	12.5	10.0	11.0	9.7
Extensogram					
Length, cm	24	22	19	21	21
Height at 5 cm, BU	325	365	405	365	310
Maximum height, BU	600	700	745	690	560
Area, cm^2	200	195	185	190	160
Alveogram					
Length, mm	122	106	94	105	116
P (height x 1.1), mm	134	138	134	124	113
W, x 10^{-4} joules	556	497	441	468	440
Baking (Canadian short process baking test)					
Absorption, %	71	70	70	N/A[4]	N/A[4]
Mixing energy, W-h/kg	7.6	6.0	6.3	N/A[4]	N/A[4]
Mixing time, min	4.3	3.7	3.9	N/A[4]	N/A[4]
Loaf volume, cm^3/100 g flour	1120	1115	1070	N/A[4]	N/A[4]

[1] Unless otherwise specified, data are reported on a 13.5% moisture basis for wheat and a 14.0% moisture basis for flour.

[2] Mean of data generated starting in 1996

[3] Mean of data generated starting in 1997

[4] Not available due to change in method. See http://grainscanada.gc.ca/Quality/Methods/wheatmethods-e.htm

Table 4 - Wheat, No. 2 Canada Western Red Spring
Quality data for 2004 and 2003 harvest survey grade composite samples

	Minimum protein content			Wheat, No. 2 CWRS – 13.5	
Quality parameter[1]	14.5	13.5	12.5	2003	1994-03 mean
Wheat					
Test weight, kg/hL	79.9	80.5	80.9	80.8	80.4
Weight per 1000 kernels, g	33.3	33.3	34.7	34.6	32.3
Protein content, %	14.7	13.7	12.8	13.8	13.7
Protein content, % (dry matter basis)	17.0	15.8	14.8	16.0	15.9
Ash content, %	1.60	1.59	1.57	1.57	1.63
α-amylase activity, units/g	11.0	6.5	9.5	5.0	8.2
Falling number, s	310	355	315	395	378
PSI,%	54	52	51	53	54
Milling					
Flour yield					
Clean wheat basis, %	74.2	74.8	74.8	75.4	75.4
0.50% ash basis, %	75.2	75.3	74.8	75.4	75.4
Flour					
Protein content, %	14.1	13.2	12.2	13.1	13.1
Wet gluten content, %	40.6	37.5	34.0	34.7	36.6[2]
Ash content, %	0.48	0.49	0.50	0.50	0.50
Grade colour, Satake units	-1.3	-1.6	-2.0	-2.1	-1.4
AGTRON colour, %	69	71	74	76	71
Starch damage, %	8.2	8.7	9.1	7.6	7.2[3]
α-amylase activity, units/g	3.5	3.0	3.0	1.0	2.3
Amylograph peak viscosity, BU	325	370	335	590	563
Maltose value, g/100g	2.8	2.9	3.2	2.5	2.3
Farinogram					
Absorption, %	68.7	68.0	67.7	65.9	65.5
Development time, min	6.25	5.5	3.0	5.75	5.13
Mixing tolerance index, BU	30	30	20	25	31
Stability, min	9.5	9.0	8.0	10.0	8.4
Extensogram					
Length, cm	21	20	19	24	23
Height at 5 cm, BU	335	350	380	305	286
Maximum height, BU	595	655	635	600	511
Area, cm^2	165	170	160	190	156
Alveogram					
Length, mm	115	100	75	134	124
P (height x 1.1), mm	144	146	151	128	108
W, x 10^{-4} joules	579	513	428	562	439
Baking (Canadian short process baking test)					
Absorption, %	72	72	71	N/A[4]	N/A[4]
Mixing energy, W-h/kg	6.7	6.4	6.2	N/A[4]	N/A[4]
Mixing time, min	3.9	4.1	4.0	N/A[4]	N/A[4]
Loaf volume, cm^3/100 g flour	1120	1115	1045	N/A[4]	N/A[4]

[1] Unless otherwise specified, data are reported on a 13.5% moisture basis for wheat and a 14.0% moisture basis for flour.

[2] Mean of data generated starting in 1996

[3] Mean of data generated starting in 1997

[4] Not available due to change in method. See http://grainscanada.gc.ca/Quality/Methods/wheatmethods-e.htm

Comparative Bühler laboratory mill flour data

Milling and baking quality

Samples of 2004 and stored 2003 harvest survey Wheat, No. 1 and No. 2 CWRS 13.5 composites were milled consecutively on the same day on the tandem Bühler laboratory mill into 74% extraction straight grade, 60% long patent and 45% extraction patent flour. Wheat, No. 1 and No. 2 CWRS flour analytical and physical dough properties, and baking quality of the straight grade and 45% patent composites are shown in Tables 5 and 6, respectively. Noodle data using the straight grade and 60% patent flours are shown in Tables 7 and 8 for the Wheat, No. 1 CWRS and No. 2 CWRS respectively.

Straight grade and patent flours from the 2004 composites show increased wet gluten content and slightly higher starch damage values relative to the composite flours from last year. Flour ash values are similar to those from 2003. Flour grade and AGTRON colour values tend to be lower for this year's straight grade and patent flours.

Farinograph data show higher absorption in this year's straight grade and patent flours compared to 2003. The dough development time for the straight grade flour is consistent with the 2003 flour, but stability is shorter for the 2004 flour. All patent flours show longer dough development times and stabilities relative to the corresponding straight grade flours. The 2004 Wheat, No. 2 CWRS patent flours show longer dough development times than the corresponding 2003 patent flours.

Sponge-and-dough and CSP baking quality of the Wheat, No. 1 CWRS 13.5% protein segregate are shown in Table 6. Both baking methods show higher baking absorption for the 2004 straight grade and 45% patent flour compared with the re-milled 2003 flour. CSP mixing times and mixing energy for this year's crop are comparable to 2003. CSP loaf volume was marginally lower for both 2004 flours, and sponge-and-dough 45% patent flour relative to the 2003 flours. Sponge-and-dough mixing time and mixing energy are somewhat lower for 2004 45% patent flour relative to the 2003 flour, and may indicate some degree of greenness in the flour. Similar trends are evident for the Wheat, No. 2 CWRS 13.5% protein.

Yellow alkaline noodles

The intrinsic quality of CWRS for the manufacture of yellow alkaline noodles remained consistent with that of previous years (Table 7). Noodles prepared from the 2004 Wheat, No.1 CWRS 13.5% protein patent (60%) flour displayed similar raw noodle brightness, L* values, at both 2 and 24 hours after production compared to those of the 2003 crop with a modest improvement in the L* value at 24 hours noted. A slight increase in noodle redness, a*, was observed at both time intervals while yellowness, b*, at 2 or 24 hours remained consistent across the crop years.

Noodles prepared from the 2004 straight grade flour exhibit noodle brightness comparable at both 2 and 24 hours to those prepared using the 2003 straight grade flour. A slight elevation in noodle redness, a*, was observed for the 2004 crop compared to 2003, consistent with that observed in the patent flour noodles. Noodle yellowness from

the 2004 straight grade flour offered a modest improvement over the 2003 straight grade noodles for both time periods.

All 2004 Wheat, No. 1 CWRS 13.5% protein, 60% patent and straight grade cooked noodle texture attributes were found to be comparable to those of the 2003 crop sample although a slight reduction in resistance to compression (RTC) was noted.

Raw alkaline noodles prepared from 2004 Wheat, No. 2 CWRS 13.5% protein patent flour exhibited a slight reduction in noodle brightness, L*, and a modest increase in redness, a*, at both 2 and 24 hours compared to 2003. The yellowness, b*, of noodles made from 2004 straight grade flours revealed a desirable increase in b* values at both 2 and 24 hours as compared to last year.

Evaluation of Wheat, No. 2 CWRS noodle texture attributes (Table 8) prepared from the 2004 crop, as compared to the 2003 crop, indicated a slight reduction in all characteristics for both patent and straight grade flours. This reduction was most evident in resistance to compression (RTC) measurements.

White salted noodles

Examination of the 2004 Wheat, No. 1 CWRS 13.5% wheat protein noodles prepared from the 60% patent flour indicated equivalent raw noodle colour attributes at 2 hours compared to the 2003 sample (Table 7).

Noodles prepared from the 2004 straight grade flour (74%) did display a slight reduction in noodle brightness at both 2 and 24 hours as compared to the 2003 crop. A slight elevation in noodle redness a* was detected in the 2004 noodles compared to the 2003 counterparts. Noodle yellowness was consistent across both years with the 2004 noodles displaying a slight improvement in b* values with aging.

Analysis of the texture of the white salted noodles prepared from the 2004 Wheat, No. 1 CWRS 13.5% patent flour indicated a modest reduction in all texture parameters relative to the 2003 crop. Conversely, noodles prepared with 2004 straight grade flour showed improved recovery and MCS values relative to those of 2003.

Evaluation of Wheat, No. 2 CWRS white salted noodles (Table 8) prepared from 2004 patent and straight grade flours indicated a reduction in noodle brightness, L*, at both 2 and 24 hours. Noodle redness was also slightly elevated in noodles prepared with both 2004 flours relative to 2003. While 2004 patent flour noodle yellowness, b*, was comparable to that of 2003, a slight reduction was observed in 2004 straight grade noodle values in comparison to 2003 at the 2 hour mark

Assessment of the texture characteristics of Wheat, No. 2 CWRS 2004 white salted noodles indicated an improvement in most texture attributes relative to 2003. Noticeable improvements in recovery and bite (MCS) were observed in both 2004 patent and straight grade white salted noodles relative to 2003.

Table 5 - Wheat, No. 1 and No. 2 Canada Western Red Spring –13.5% protein segregate
Analytical data
Comparative Bühler mill flour data – 2004 and 2003 harvest survey composites[1]

Wheat, No. 1 Canada Western Red Spring

	74% Straight grade		60% Patent		45% Patent	
Quality parameter[2]	2004	2003	2004	2003	2004	2003
Flour						
Yield, %	74.0	74.0	60.0	60.0	45.0	45.0
Protein content, %	13.2	13.1	13.0	12.8	12.4	12.4
Wet gluten content, %	37.2	35.8	36.2	35.3	34.9	34.0
Ash content, %	0.41	0.41	0.37	0.37	0.35	0.34
Grade colour, Satake units	-2.9	-3.2	-3.8	-4.1	-4.3	-4.4
AGTRON colour, %	82	85	92	92	94	96
Amylograph peak viscosity, BU	570	805	650	885	690	880
Starch damage, %	6.1	5.9	6.2	6.2	6.5	6.3
Farinogram						
Absorption, %	62.7	60.7	63.4	61.7	63.1	61.9
Development time, min	6.0	6.0	7.5	7.3	7.0	12.5
Mixing tolerance index, BU	30	20	15	15	10	15
Stability, min	11.5	15.3	26.3	23.0	20.3	18.8

Wheat, No. 2 Canada Western Red Spring

	74% Straight grade		60% Patent		45% Patent	
Quality parameter[2]	2004	2003	2004	2003	2004	2003
Flour						
Yield, %	74.0	74.0	60.0	60.0	45.0	45.0
Protein content, %	13.3	12.9	12.8	12.6	12.3	12.3
Wet gluten content, %	36.2	34.3	35.0	33.9	35.3	34.3
Ash content, %	0.41	0.40	0.36	0.36	0.34	0.34
Grade colour, Satake units	-2.2	-3.2	-3.5	-4.0	-3.9	-4.4
AGTRON colour, %	77	86	88	93	93	97
Amylograph peak viscosity, BU	375	730	415	785	450	795
Starch damage, %	6.3	5.8	6.4	6.1	6.8	6.3
Farinogram						
Absorption, %	63.8	61.7	63.4	61.3	63.2	61.5
Development time, min	5.5	5.5	6.3	3.8	6.5	5.3
Mixing tolerance index, BU	30	20	20	10	20	5
Stability, min	10.5	13.8	16.0	13.0	17.0	17.0

[1] The 2003 composite was stored and milled the same day as the 2004

[2] Data reported on 14.0% moisture basis

Table 6 - Wheat, No. 1 and No. 2 Canada Western Red Spring –13.5% protein segregate
Baking quality data
Comparative Bühler mill flour data – 2004 and 2003 harvest survey composites[1]

Wheat, No. 1 Canada Western Red Spring

	74% Straight grade		45% Patent	
Quality parameter[2]	2004	2003	2004	2003
Sponge-and-dough baking test	40 ppm ascorbic acid		20 ppm ascorbic acid	
Absorption, %	66	64	64	63
Mixing energy dough stage, W-h/kg	7.0	7.3	6.9	8.4
Mixing time dough stage, min	6.7	6.9	6.8	8.0
Loaf volume, cm^3/100 g flour	1090	1090	1005	1060
Appearance	7.5	7.5	7.2	7.3
Crumb structure	6.0	6.2	6.2	6.0
Crumb color	7.7	7.8	7.8	7.8
Canadian short process baking test	150 ppm ascorbic acid		150 ppm ascorbic acid	
Absorption, %	68	65	66	65
Mixing energy, W-h/kg	5.8	6.5	6.5	6.4
Mixing time, min	3.8	4.0	4.0	4.3
Loaf volume, cm^3/100 g flour	1145	1175	1090	1130
Appearance	7.7	7.9	7.5	7.6
Crumb structure	6.0	6.0	6.0	6.2
Crumb color	7.7	7.8	8.0	7.8

Wheat, No. 2 Canada Western Red Spring

	74% Straight grade		45% Patent	
Quality parameter[2]	2004	2003	2004	2003
Sponge-and-dough baking test	40 ppm ascorbic acid		20 ppm ascorbic acid	
Absorption, %	65	63	63	64
Mixing energy dough stage, W-h/kg	7.2	6.5	6.8	7.8
Mixing time dough stage, min	5.9	6.1	6.3	7.8
Loaf volume, cm^3/100 g flour	1055	1045	965	1070
Appearance	7.4	7.3	6.9	7.4
Crumb structure	6.0	6.3	5.9	6.3
Crumb color	7.7	7.8	7.5	7.8
Canadian short process baking test	150 ppm ascorbic acid		150 ppm ascorbic acid	
Absorption, %	68	65	67	66
Mixing energy, W-h/kg	6.6	6.2	6.9	6.3
Mixing time, min	4.0	3.7	4.2	4.2
Loaf volume, cm^3/100 g flour	1135	1175	1140	1200
Appearance	8.0	8.2	8.0	8.2
Crumb structure	6.3	6.6	6.3	6.2
Crumb color	7.7	7.9	7.7	7.4

[1] The 2003 composite was stored and milled the same day as the 2004

[2] Data reported on 14.0% moisture basis

Table 7 - Wheat, No. 1 Canada Western Red Spring – 13.5% protein segregate
Noodle quality data
Comparative Bühler mill data – 2004 and 2003 harvest survey composite samples[1]

	74% Straight grade		60% patent	
Quality parameter[2]	2004	2003	2004	2003
Fresh alkaline noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	79.0 (72.6)	79.4 (73.0)	81.7 (76.2)	81.5 (75.6)
Redness, a*	0.32 (0.76)	0.08 (0.33)	0.21 (0.41)	0.04 (0.13)
Yellowness, b*	28.4 (28.5)	27.8 (27.7)	26.8 (27.9)	27.2 (27.2)
Cooked colour				
Brightness, L*	70.6	70.8	71.9	72.3
Redness, a*	-1.46	-1.35	-1.64	-1.42
Yellowness, b*	28.6	28.9	29.2	28.9
Texture				
Thickness, mm	2.42	2.35	2.42	2.41
RTC, %	27.3	28.1	27.5	28.2
Recovery, %	32.0	32.0	31.9	32.3
MCS, g/mm^2	29.7	29.1	30.1	30.5
Fresh white salted noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	80.8 (74.9)	81.7 (76.8)	82.4 (77.1)	83.0 (77.9)
Redness, a*	2.97 (3.57)	2.82 (3.20)	2.65 (2.92)	2.59 (2.82)
Yellowness, b*	24.7 (25.2)	24.7 (24.6)	24.4 (25.4)	24.9 (25.4)
Cooked colour				
Brightness, L*	77.3	77.6	77.8	78.2
Redness, a*	0.92	0.77	0.60	0.58
Yellowness, b*	19.7	19.7	20.0	20.2
Texture				
Thickness, mm	2.70	2.61	2.68	2.68
RTC, %	21.5	22.0	21.6	22.4
Recovery, %	24.9	24.1	24.4	24.8
MCS, g/mm^2	23.1	22.2	22.8	23.7

[1] The 2003 composites were stored and milled the same day as the respective 2004 composite and replicated the following day in reverse order

[2] Data reported on 14.0% moisture basis.

Table 8 - Wheat, No. 2 Canada Western Red Spring – 13.5% protein segregate
Noodle quality data
Comparative Bühler mill data – 2004 and 2003 harvest survey composite samples[1]

	74% Straight grade		60% patent	
Quality parameter[2]	2004	2003	2004	2003
Fresh alkaline noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	76.9 (71.3)	79.5 (73.4)	81.2 (75.8)	81.7 (76.4)
Redness, a*	0.64 (1.25)	0.10 (0.51)	0.34 (0.72)	0.10 (0.29)
Yellowness, b*	28.2 (28.5)	27.6 (27.8)	26.0 (28.1)	26.8 (27.1)
Cooked colour				
Brightness, L*	68.0	70.5	69.7	71.1
Redness, a*	-0.97	-1.38	-1.2	-1.33
Yellowness, b*	28.8	28.6	29.1	28.7
Texture				
Thickness, mm	2.36	2.37	2.38	2.38
RTC, %	26.5	28.1	26.6	27.7
Recovery, %	31.3	32.1	31.8	32.1
MCS, g/mm^2	28.1	29.9	29.4	30.0
Fresh white salted noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	80.4 (73.3)	81.6 (76.3)	82.3 (76.2)	82.8 (78.2)
Redness, a*	3.07 (3.71)	2.80 (3.28)	2.73 (3.03)	2.55 (2.77)
Yellowness, b*	23.9 (24.7)	24.8 (25.0)	24.7 (25.5)	24.9 (25.7)
Cooked colour				
Brightness, L*	77.0	77.9	77.3	78.3
Redness, a*	1.04	0.79	0.63	0.59
Yellowness, b*	19.3	19.7	19.8	20.1
Texture				
Thickness, mm	2.65	2.59	2.71	2.62
RTC, %	21.9	21.6	21.3	21.4
Recovery, %	25.3	23.9	24.7	23.1
MCS, g/mm^2	22.8	21.1	22.1	20.9

[1] The 2003 composites were stored and milled the same day as the respective 2004 composite and replicated the following day in reverse order.

[2] Data reported on 14.0% moisture basis

Canada Western Amber Durum wheat

Protein and variety survey

Table 9 lists the mean protein content values for Canada Western Amber Durum (CWAD) wheat by grade. Comparative values are shown for 2004 and for the previous 10 years (1994-2003). Figure 3 shows the variation in annual mean protein content since 1963.

The average protein content of the 2004 durum crop is 12.4%, which is 1.2% lower than 2003 and 0.9% lower than the 10-year mean. Protein content for Wheat, No. 1 CWAD decreased by 0.6% but is 0.1% higher than the 10 year mean. Wheat, No. 2 CWAD is lower by 1.2% but is similar to the 10-year mean. Annual mean protein content values since 1963 (Figure 3) demonstrate that this quality factor is highly variable, primarily in response to environmental conditions.

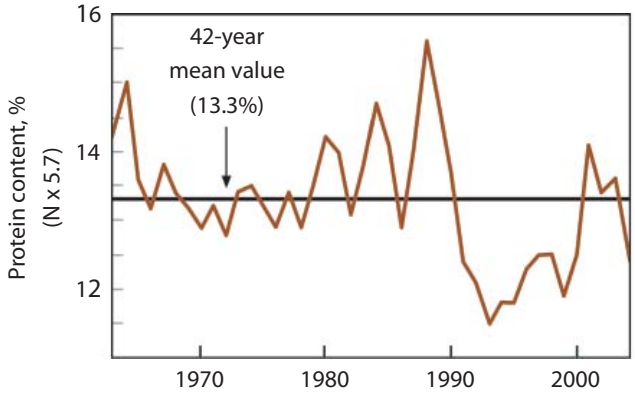
Canadian Wheat Board 2004 variety survey information indicates that AC Avonlea continues to gain popularity with western Canadian producers showing an increase in seeded acreage to 39.7% from 31.0% in 2003. Kyle remains the most popular variety grown on the prairies by only a slight margin at 41.2% of acreage, a decline of 8% from 2003. AC Morse decreased slightly to 6.2% while AC Navigator increased to 7.4% of acreage seeded. Electrophoretic analysis of grade composites confirmed the increasing popularity of AC Avonlea.

Table 9 - Mean protein content of 2004 Canada Western Amber Durum wheat, by grade and year

	Protein content, %[1]		
Grade	2004	2003	1994-2003
Wheat, No. 1 Canada Western Amber Durum	13.1	13.7	13.0
Wheat, No. 2 Canada Western Amber Durum	12.3	13.5	12.5
Wheat, No. 3 Canada Western Amber Durum	12.2	13.7	12.3
All milling grades	12.4	13.6	12.6

[1] N x 5.7; 13.5% moisture content basis

Figure 3 - Mean protein content of harvest survey Canada Western Amber Durum wheat - 1963 to 2004



Wheat and pasta processing quality

Data describing the quality characteristics for composite samples of Wheat, No. 1 and No. 2 CWAD for the 2004 crop are shown in Table 10. Corresponding data for 2003 composites and mean values for the previous ten years (1994-2003) are provided for comparison. Wheat, No. 1 CWAD for the 2004 crop is comparable in test weight and higher in 1000 kernel weight and hard vitreous kernel count than last year. Wheat, No. 2 CWAD shows an increase in test weight and 1000 kernel weight and comparable hard vitreous kernel count to 2003. Comparison to the ten-year mean data shows that Wheat, No. 1 CWAD test weight and 1000 kernel weight are comparable but hard vitreous kernel count is higher in 2004. Wheat, No. 2 CWAD in 2004 is higher in all three factors in relation to the ten-year mean. Falling numbers in the wheat and semolina of the top two grades are somewhat lower than 2003 values, resulting from cool and wet harvest conditions, but are still indicative of sound wheat. Grading factors in the 2004 crop, which resulted in downgrading, include frost and green, smudge, hard vitreous kernel count and immature kernels.

Wheat, No. 1 CWAD wet gluten content decreased by 0.3% in 2004, in agreement with slightly lower semolina protein content. A larger decrease of 2.2% is observed for Wheat, No. 2 CWAD, which has much lower semolina protein content, this year relative to 2003. SDS sedimentation volumes are lower than in 2003, which is indicative of a decrease in gluten strength. Gluten index values for Wheat, No. 1 CWAD, however, are higher as are alveograph P and W values which indicates stronger gluten properties. Wheat, No. 2 CWAD exhibited a lower gluten index but marginally stronger alveograph properties. Gluten extensibility also decreased in relation to 2003. As noted in past reports, environmental conditions appear to have a variable influence on strength parameters such as SDS sedimentation, gluten index and alveograph P/L.

Total milling and semolina yield is slightly improved from last year for Wheat, No 1 CWAD while Wheat, No. 2 CWAD showed a 2.0% increase in total milling yield but no significant change in semolina yield. Wheat and semolina ash are higher for the Wheat, No. 1 CWAD grade composite but conversely are 0.05% lower for Wheat, No. 2 CWAD when compared to 2003. AGTRON values are higher this year than the ten-year mean for both Wheat, No. 1 and Wheat, No. 2 CWAD. The Wheat, No. 1 CWAD grade AGTRON, on the other hand, is not as high as in 2003 while the Wheat, No. 2 CWRS grade is the same. Taking all of these results into consideration, the overall milling quality of the 2004 crop is equal to or slightly better than last year.

Wheat and semolina yellow pigment values for both Wheat, No. 1 and No. 2 CWAD decreased, exhibiting values 1 ppm lower compared to 2003 but only 0.3 ppm lower than the ten-year mean. The decrease in pigment content for 2004 leads to lower b* values in both semolina and dried spaghetti. Brightness of semolina is similar for the 2004 crop as indicated by an increase in L* values. These results illustrate the significant impact of environment on the colour characteristics of both semolina and pasta.

Cooking quality for spaghetti from Wheat, No. 1 CWAD, as indicated by firmness (peak force) values, is comparable to last year but higher than the ten year mean. Firmness for Wheat, No. 2 CWAD is lower than in 2003, which can be attributed to the lower protein content in this year's harvest.

Table 10 - Wheat, No. 1 and No. 2 Canada Western Amber Durum
Quality data for 2004 and 2003 harvest survey grade composite samples

Quality parameter[1]	No. 1 CWAD			No. 2 CWAD		
	2004	2003	1994-03 mean	2004	2003	1994-03 mean
Wheat						
Test weight, kg/hL	82.3	82.3	82.4	82.4	81.5	82.0
Weight per 1000 kernels, g	42.7	40.0	42.2	44.2	40.3	42.3
Vitreous kernels, %	95	90	89	85	84	78
Protein content, %	13.2	13.6	13.0	12.3	13.5	12.5
Protein content, % (dry matter basis)	15.3	15.7	15.1	14.2	15.6	14.5
SDS sedimentation, mL	36	43	38	29	42	35
Ash content, %	1.58	1.48	1.55	1.51	1.54	1.61
Yellow pigment content, ppm	8.3	9.1	8.5	8.1	8.8	8.4
Falling number, s	395	420	407	375	400	380
Milling yield, %	75.0	74.1	74.5	76.0	74.0	74.5
Semolina yield, %	66.1	65.4	66.2	66.2	66.0	66.0
PSI, %	37	37	37[2]	39	38	38[2]
Semolina						
Protein content, %	12.1	12.5	12.0	11.2	12.4	11.5
Wet gluten content, %	32.1	32.4	32.5[2]	29.1	31.3	31.1[2]
Dry gluten content, %	11.1	11.6	11.7[2]	10.1	10.5	11.3[2]
Gluten index, %	35	21	27[3]	27	37	28[3]
Ash content, %	0.63	0.62	0.65	0.61	0.66	0.66
Yellow pigment content, ppm	7.7	8.7	8.0	7.4	8.4	7.7
AGTRON colour, %	83	86	80	83	83	79
Minolta colour:						
Brightness, L*	87.9	87.8	87.9[3]	87.8	87.4	87.8[3]
Redness, a*	-3.1	-2.8	-3.1[3]	-3.1	-2.8	-3.1[3]
Yellowness, b*	32.2	34.2	33.2[3]	31.5	33.6	32.6[3]
Speck count per 50 cm^2	28	18	24	28	22	29
Falling number, s	435	530	486	390	490	455
Alveogram						
Length, mm	82	106	89[3]	81	108	90[3]
P (height x 1.1), mm	64	47	49[3]	55	45	46[3]
P/L	0.8	0.4	0.6[3]	0.7	0.4	0.5[3]
W, x 10-4 joules	146	122	115[3]	120	117	106[3]
Spaghetti						
Dried at 70°C						
Minolta colour:						
Brightness, L*	77.4	77.8	78.2[3]	77.5	77.2	77.9[3]
Redness, a*	1.8	2.5	2.1[3]	1.7	2.7	2.3[3]
Yellowness, b*	65.1	68.6	66.8[3]	63.6	67.7	67.4[3]
Firmness, g-cm	1003	1012	943[4]	873	930	887[4]

[1] Unless otherwise specified, data are reported on a 13.5% moisture basis for wheat and a 14.0% moisture basis for semolina.

[2] Mean of data generated starting in 1995

[3] Mean of data generated starting in 1997

[4] Mean of data generated starting in 1998

Canada Western Hard White wheat

As noted in the description of classes of Canadian wheat on page 5, Canada Western Hard White wheat is a new Canadian wheat class effective August 1, 2004 after having been grown commercially in 2003 as an experimental class. Data for this year's composite of the 13.5% and 12.5% protein segregates of the Wheat, No. 1 and No. 2 CWHW grades milled on the Allis-Chalmers laboratory mill are shown in Tables 11 and 12 respectively.

Milling and baking quality - Allis-Chalmers laboratory mill

Wheat, No. 1 Canada Western Hard White

Table 11 summarizes quality data for the No. 1 CWHW composites. Corresponding data are provided at the 13.5% minimum protein level for last year's composite.

Test weight is somewhat lower than last year, but 1000 kernel weight is higher. Hardness (PSI and starch damage) is similar to 2003. Falling number values for both protein segregates, while lower than last year, are indicative of sound wheat. Allis-Chalmers milled flour yield is lower than 2003, and flour grade and AGTRON colour show less brightness than last year. Ash content is the same as in 2003.

Farinograph absorption is higher than last year, corresponding with the higher wet gluten content for 2004. Stability is longer relative to last year, while dough development times are similar. Physical dough tests show strong yet extensible dough properties, with extensograph values comparable to the top grade CWRS wheat flour. Alveograph measurements exhibit somewhat less extensibility this year, probably resulting from the greater water absorbing capacity with this year's crop. Canadian short process baking test results show dough water absorption and loaf volume comparable to the top grade CWRS.

Wheat, No. 2 Canada Western Hard White

Table 12 summarizes the quality data for the Wheat, No. 2 CWHW composite 13.5% and 12.5% protein segregates. There are no data available from previous years for comparison.

Test weight and hardness (PSI and starch damage) are comparable to the corresponding Wheat, No. 2 CWRS composite values (Table 4). The 1000 kernel weight values are slightly lower for the Wheat, No. 2 CWHW when compared with CWRS. Falling number values are similar to Wheat, No. 2 CWRS, while amylograph peak viscosities are higher. Milling yields, flour grade and AGTRON colour of the Wheat, No. 2 CWHW and Wheat, No. 2 CWRS are comparable.

Farinograph properties of the Wheat, No. 2 CWHW and Wheat, No. 1 CWHW at 13.5% protein content are similar. At 12.5% protein content the Wheat, No. 2 CWHW has higher absorption, and is somewhat weaker than the Wheat, No. 1 CWHW of the same protein segregate. Farinograph absorption of the Wheat, No. 2 CWHW is slightly higher than that of the Wheat, No. 2 CWRS at corresponding protein content, while stabilities are comparable. Dough development time is comparable at 13.5% protein content, and higher at 12.5% protein content for Wheat, No. 2 CWHW compared with Wheat, No. 2 CWRS. Alveograph extensibility for the Wheat, No. 2 CWHW at 13.5% protein is less than that of the Wheat, No. 2 CWRS. The baking absorption and loaf volumes for both protein

segregates of the Wheat, No. 2 CWHW are comparable to those of the corresponding Wheat, No. 1 CWHW and Wheat, No. 2 CWRS segregates.

Table 11 - Wheat, No. 1 Canada Western Hard White
Quality data for 2004 and 2003 harvest survey grade composite samples

	Minimum protein content		2003[2]
Quality parameter[1]	13.5	12.5	13.5
Wheat			
Test weight, kg/hL	80.6	81.3	82.2
Weight per 1000 kernels, g	32.1	31.4	31.3
Protein content, %	13.8	12.9	13.7
Protein content, % (dry matter basis)	16.0	14.9	15.8
Ash content, %	1.48	1.50	1.45
α-amylase activity, units/g	6.0	5.0	1.0
Falling number, s	370	390	425
PSI,%	52	51	51
Milling			
Flour yield			
Clean wheat basis, %	74.5	74.4	75.4
0.50% ash basis, %	76.5	75.9	77.4
Flour			
Protein content, %	13.4	12.2	13.1
Wet gluten content, %	36.9	33.0	33.6
Ash content, %	0.46	0.47	0.46
Grade colour, Satake units	-2.3	-2.7	-2.9
AGTRON colour, %	78	80	83
Starch damage, %	8.3	8.8	8.1
α-amylase activity, units/g	2.5	2.0	0.5
Amylograph peak viscosity, BU	540	680	1075
Maltose value, g/100g	2.8	2.9	2.7
Farinogram			
Absorption, %	68.3	67.2	66.1
Development time, min	5.5	5.25	5.75
Mixing tolerance index, BU	30	30	30
Stability, min	8.5	9.5	8.0
Extensogram			
Length, cm	23	20	20
Height at 5 cm, BU	355	365	310
Maximum height, BU	650	610	580
Area, cm^2	195	165	155
Alveogram			
Length, mm	86	69	107
P (height x 1.1), mm	154	159	143
W, x 10^{-4} joules	504	419	556
Baking (Canadian short process baking test)			
Absorption, %	71	71	N/A[3]
Mixing energy, W-h/kg	6.7	7.0	N/A[3]
Mixing time, min	4.3	4.8	N/A[3]
Loaf volume, cm^3/100 g flour	1095	1025	N/A[3]

[1] Unless otherwise specified, data are reported on a 13.5% moisture basis for wheat and a 14.0% moisture basis for flour.

[2] Data published in the 2003 Crop Quality Report as Canada Western Experimental Hard White wheat

[3] Not available due to change in method. See http://grainscanada.gc.ca/Quality/Methods/wheatmethods-e.htm

Table 12 - Wheat, No. 2 Canada Western Hard White
Quality data for 2004 harvest survey grade composite samples[1]

Quality parameter [2]	Minimum protein content 13.5	Minimum protein content 12.5
Wheat		
Test weight, kg/hL	79.9	79.8
Weight per 1000 kernels, g	31.6	32.1
Protein content, %	13.6	12.7
Protein content, % (dry matter basis)	15.7	14.7
Ash content, %	1.51	1.52
α-amylase activity, units/g	10.0	9.5
Falling number, s	350	345
PSI,%	53	51
Milling		
Flour yield		
Clean wheat basis, %	73.7	73.5
0.50% ash basis, %	75.2	74.5
Flour		
Protein content, %	13.1	12.3
Wet gluten content, %	35.8	33.5
Ash content, %	0.47	0.48
Grade colour, Satake units	-1.6	-1.7
AGTRON colour, %	71	72
Starch damage, %	8.8	9.3
α-amylase activity, units/g	3.5	4.0
Amylograph peak viscosity, BU	445	420
Maltose value, g/100g	3.0	3.1
Farinogram		
Absorption, %	68.7	68.6
Development time, min	5.5	4.75
Mixing tolerance index, BU	35	35
Stability, min	8.5	7.5
Extensogram		
Length, cm	21	20
Height at 5 cm, BU	320	340
Maximum height, BU	540	580
Area, cm^2	165	160
Alveogram		
Length, mm	71	70
P (height x 1.1), mm	165	163
W, x 10^{-4} joules	445	445
Baking (Canadian short process baking test)		
Absorption, %	73	72
Mixing energy, W-h/kg	6.7	6.7
Mixing time, min	4.6	4.7
Loaf volume, cm^3/100 g flour	1095	1020

[1] This is the first year of extensive testing for this grade. No data available from 2003 for comparison.

[2] Unless otherwise specified, data are reported on a 13.5% moisture basis for wheat and a 14.0% moisture basis for flour.

Comparative Bühler laboratory mill flour data

Milling and baking quality

Samples of 2004 and stored 2003 harvest survey Wheat, No. 1 CWHW 13.5 composites were milled consecutively on the same day on the tandem Bühler laboratory mill into 74% extraction straight grade, 60% long patent and 45% extraction patent flour. There was no Wheat, No. 2 CWHW wheat available from 2003 for comparison, and no 45% extraction flour was produced from the 2004 Wheat, No. 2 CWHW. Flour analytical and physical dough properties of the composites are shown in Table 13 for the Wheat, No. 1 and No. 2 CWHW 13.5% minimum protein segregates. Baking data using the Wheat, No. 1 CWHW straight grade and 45% patent flours and the Wheat, No. 2 CWHW straight grade flour are shown in Table 14 while noodle data using the straight grade and 60% patent flours are shown in Table 15.

Wet gluten content of the 2004 and 2003 Wheat, No. 1 CWHW straight grade flour was similar, while the 2004 patent flours exhibited higher wet gluten content. The Wheat, No. 2 CWHW straight grade and 60% patent flour wet gluten content was higher than those obtained for the Wheat, No. 1 CWHW. Flour grade colour and AGTRON values tend to be lower for this year's straight grade and patent flours.

Farinograph data show higher absorption in this year's Wheat, No. 1 CWHW straight grade and patent flours compared to 2003. The 2004 Wheat, No. 2 CWHW farinograph absorption values are higher than those of the corresponding Wheat, No. 1 CWHW values. Dough development time for the Wheat, No. 1 CWHW straight grade flour is consistent with the 2003 flour, but stability is shorter for the 2004 flour. The Wheat, No. 1 CWHW patent flours show shorter dough development times than the corresponding 2003 flours, and similar stabilities.

Data are shown in Table 14 for sponge-and-dough and CSP baking quality of the Wheat, No. 1 CWHW straight grade and 45% patent 13.5% protein segregate, and for the Wheat, No. 2 CWHW straight grade 13.5% protein segregate. The 2004 baking absorption is higher for the Wheat, No. 1 CWHW straight grade using the CSP baking method compared to 2003, and slightly higher for the patent flour. Mixing times and mixing energy requirements are similar. CSP loaf volumes are marginally lower this year relative to 2003. Sponge-and-dough mixing time and mixing energy are lower for 2004 straight grade flour. Mixing energy is slightly higher for the 2004 patent flour, while mixing time is shorter. Sponge-and-dough loaf volumes are marginally lower this year.

Yellow alkaline noodles

Data for CWHW noodles are shown in Table 15. Raw alkaline noodles prepared from Wheat, No. 1 CWHW 2004 wheat flours, patent and straight grade, displayed reduced noodle brightness at both 2 and 24 hours compared to their corresponding 2003 flours. A modest increase in noodle redness, a*, was observed while noodle yellowness, b*, remained comparable to last year. These changes observed in the colour of the 2004 crop patent and straight grade flours relative to 2003 were largely attributable to the unique growing conditions of 2004.

Analysis of patent noodle texture indicated a minor reduction in all parameters relative to 2003. However, noodles prepared from 2004 straight grade flour displayed a modest improvement in texture relative to 2003.

No data for 2003 Wheat, No. 2 CWHW was available for comparative purposes. The 2004 Wheat, No. 2 CWHW patent flour noodles displayed a reduction in noodle brightness, L* when compared to their No. 1 counterpart. This reduction was significant for noodles prepared from Wheat, No. 2 CWHW straight grade flour. Elevated noodle redness, a*, was also observed in noodles prepared from both flours.

Cooked noodle texture characteristics prepared from Wheat, No. 2 CWHW patent flour were almost identical to those prepared from the corresponding 2004 Wheat, No. 1 CWHW patent flour. The texture of noodles prepared from Wheat, No.2 CWHW straight grade flour revealed a slight reduction relative to their No.1 counterparts.

White salted noodles

Examination of the colour of raw white salted noodles prepared from 2004 Wheat, No. 1 CWHW flours (Table 15), patent or straight grade, showed a reduction in noodle brightness, L*, compared to 2003. Noodle redness, a*, and yellowness, b*, remained equivalent to the previous year.

Noodles prepared from either 2004 Wheat, No. 1 CWHW patent or straight grade flours displayed the same textural characteristics as those of 2003.

Raw white salted noodle color of 2004 Wheat, No. 2 CWHW flours displayed a reduction in noodle brightness, L*, and elevation of redness, a*, compared to their corresponding Wheat, No. 1 CWHW noodles.

The texture characteristics of 2004 Wheat, No. 2 CWHW noodles prepared from either patent or straight grade flours were comparable to those achieved for Wheat, No. 1 CWHW.

Table 13 - Wheat, No. 1 and Wheat No. 2 Canada Western Hard White – 13.5% protein segregate
Analytical data
Comparative Bühler mill flour data – 2004 and 2003 harvest survey composites[1]

Wheat, No. 1 Canada Western Hard White

	74% Straight grade		60% Patent		45% Patent	
Quality parameter[2]	2004	2003	2004	2003	2004	2003
Flour						
Yield, %	74.0	74.0	60.0	60.0	45.0	45.0
Protein content, %	13.2	13.1	12.9	12.8	12.4	12.5
Wet gluten content, %	35.8	35.4	35.8	34.5	34.4	33.8
Ash content, %	0.40	0.38	0.35	0.33	0.33	0.33
Grade colour, Satake units	-2.9	-3.6	-3.9	-4.3	-4.3	-4.7
AGTRON colour, %	82	89	92	95	96	98
Amylograph peak viscosity, BU	720	1150	815	1180	915	1240
Starch damage, %	5.9	5.8	6.0	5.9	6.2	6.1
Farinogram						
Absorption, %	63.9	61.5	63.6	61.6	63.4	62.0
Development time, min	6.5	7.0	6.3	9.0	6.8	8.0
Mixing tolerance index, BU	35	25	25	10	20	10
Stability, min	7.5	13.0	15.5	19.5	17.5	17.0

Wheat, No. 2 Canada Western Hard White[3]

	74% Straight grade	60% Patent	45% Patent[4]
Quality parameter[2]	2004	2004	2004
Flour			
Yield, %	74.0	60.0	
Protein content, %	13.3	12.7	
Wet gluten content, %	36.3	36.2	
Ash content, %	0.44	0.37	
Grade colour, Satake units	-1.4	-2.9	
AGTRON colour, %	70	83	
Amylograph peak viscosity, BU	375	445	
Starch damage, %	6.2	6.3	
Farinogram			
Absorption, %	64.4	64.3	
Development time, min	4.9	6.0	
Mixing tolerance index, BU	40	30	
Stability, min	6.5	8.0	

Not available

[1] The 2003 composite was stored and milled the same day as the 2004

[2] Data reported on 14.0% moisture basis

[3] This is the first year of extensive testing for this grade. No data available from 2003 for comparison.

[4] 45% patent flour not produced

Table 14 - Wheat, No. 1 and Wheat No. 2 Canada Western Hard White – 13.5% protein segregate
Baking quality data
Comparative Bühler mill data - 2004 and 2003 harvest survey composites[1]

	Wheat, No. 1 CWHW				Wheat, No. 2 CWHW
	74% Straight grade		45% Patent		74% Straight grade[3]
Quality parameter[2]	2004	2003	2004	2003	2004
Sponge-and-dough baking test	40 pp, ascorbic acid		20 ppm ascorbic acid		40 ppm ascorbic acid
Absorption, %	66	65	65	65	66
Mixing energy dough stage, W-h/kg	6.3	7.8	9.0	8.6	6.5
Mixing time dough stage, min	5.6	7.4	7.9	8.5	5.4
Loaf volume, cm^3/100 g flour	1055	1125	1000	1060	1010
Appearance	7.4	7.5	7.1	7.3	7.5
Crumb structure	6.0	6.2	6.0	6.0	6.0
Crumb color	7.8	7.6	7.8	7.9	7.1
Canadian short process baking test	150 ppm ascorbic acid		150 ppm ascorbic acid		150 ppm ascorbic acid
Absorption, %	69	66	67	66	68
Mixing energy, W-h/kg	6.7	6.7	7.1	6.9	6.4
Mixing time, min	4.5	4.9	4.6	4.8	3.9
Loaf volume, cm^3/100 g flour	1115	1130	1085	1140	1115
Appearance	7.6	7.8	7.8	7.8	7.8
Crumb structure	6.4	6.2	6.2	6.2	6.0
Crumb color	7.9	8.0	7.9	8.0	7.8

[1] The 2003 composite was stored and milled the same day as the 2004

[2] Data reported on 14.0% moisture basis

[3] This is the first year of extensive testing for this grade. No data available from 2003 for comparison and no 45% patent flour was produced.

Table 15 - Wheat, No. 1 and Wheat, No. 2 Canada Western Hard White – 13.5% protein segregate Noodle quality data
Comparative Bühler mill data – 2004 and 2003 harvest survey composite samples[1]

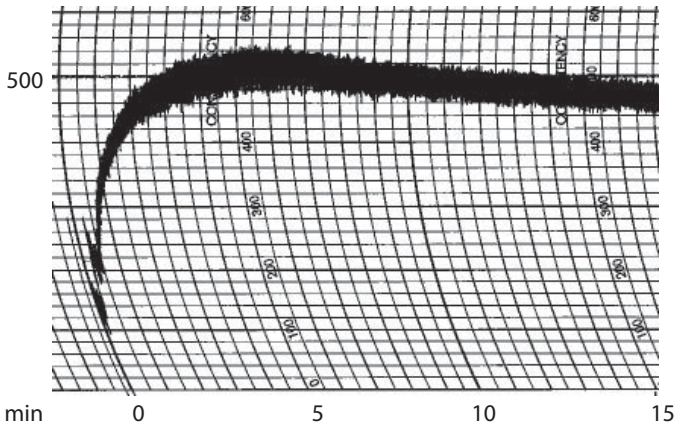
	Wheat, No. 1 CWHW				Wheat, No. 2 CWHW[2]	
	74% Straight grade		60% Patent		74% Straight grade	60% Patent
Quality parameter	2004	2003	2004	2003	2004	2004
Fresh alkaline noodles						
Raw colour at 2 hrs (24 hrs)						
Brightness, L*	78.5 (72.8)	80.3 (74.9)	80.4 (75.4)	81.4 (76.9)	74.8 (69.0)	79.3 (73.2)
Redness, a*	0.10 (0.68)	-0.15 (0.23)	0.02 (0.39)	-0.09 (0.09)	0.49 (1.44)	0.20 (0.74)
Yellowness, b*	29.0 (28.7)	29.2 (28.7)	27.7 (28.7)	28.0 (28.3)	28.5 (28.9)	26.9 (28.5)
Cooked colour						
Brightness, L*	70.1	71.6	71.5	72.4	68.4	68.8
Redness, a*	-1.86	-1.93	-2.14	-2.04	-1.34	-1.70
Yellowness, b*	28.8	29.6	29.3	29.7	28.5	29.3
Texture						
Thickness, mm	2.43	2.43	2.40	2.45	2.44	2.40
RTC, %	29.4	28.7	28.0	29.0	28.5	27.6
Recovery, %	35.0	34.0	33.6	34.3	34.1	33.7
MCS, g/mm^2	33.2	33.0	31.5	33.9	30.8	31.6
Fresh white salted noodles						
Raw colour at 2 hrs (24 hrs)						
Brightness, L*	80.7 (74.6)	82.1 (77.3)	82.0 (76.4)	82.9 (78.5)	79.2 (70.7)	81.0 (74.5)
Redness, a*	2.70 (3.22)	2.61 (3.09)	2.40 (2.65)	2.43 (2.65)	3.03 (3.74)	2.56 (2.80)
Yellowness, b*	23.9 (23.7)	24.1 (24.4)	23.7 (24.1)	23.9 (24.3)	23.9 (23.4)	23.0 (23.0)
Cooked colour						
Brightness, L*	77.4	78.2	78.4	78.9	76.0	77.1
Redness, a*	0.59	0.47	0.32	0.24	0.93	0.55
Yellowness, b*	18.7	19.1	18.7	19.2	18.1	18.4
Texture						
Thickness, mm	2.66	2.64	2.66	2.66	2.67	2.67
RTC, %	21.3	21.3	20.5	20.4	21.1	20.8
Recovery, %	27.3	27.1	26.4	26.1	27.6	27.0
MCS, g/mm^2	23.7	23.4	23.5	23.2	23.9	23.7

[1] The 2003 composites were stored and milled the same day as the 2004

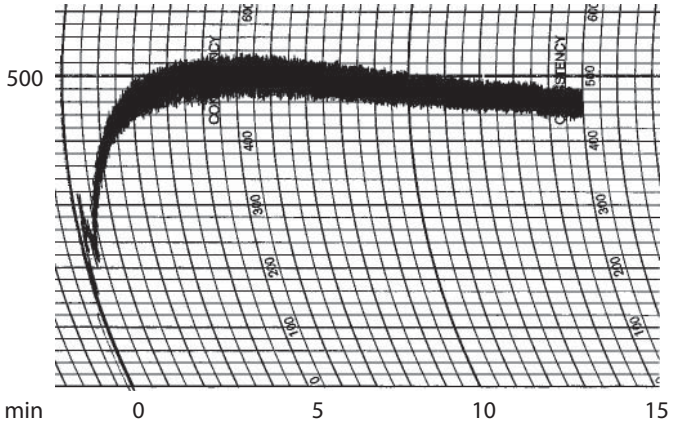
[2] This is the first year of extensive testing for this grade. No data available from 2003 for comparison.

Farinograms
2004 crop composite samples

Wheat, No. 1 Canada Western Red Spring – 13.5% protein segregate



Wheat, No. 2 Canada Western Red Spring – 13.5% protein segregate



Wheat, No. 1 Canada Western Hard White – 13.5% protein segregate