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Quality of
Western Canadian wheat

2005

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Canada

Quality Innovation Service

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Summary

Heavy rainfall during the spring of 2005 provided excellent moisture for the growth of crops over most of western Canada. However, persistent heavy rainfall caused flooding losses in Alberta and southern Manitoba. Manitoba was hardest hit, with nearly one million hectares going unseeded or drowned out. Most of the rest of the Prairies received normal rainfall and moderate temperatures over the summer months, boosting crop growth. The last week of August and first two weeks of September were unseasonably wet, causing down-grades for areas with the heaviest rainfall.

Spring wheat and durum production was above 10 year average levels, despite the production losses of approximately 29% in Manitoba. Spring wheat production levels are estimated at 18.3 million tonnes by Statistics Canada. Durum wheat production is estimated at 5.9 million tonnes, an increase of more than 19% over last year. The production increases are the result of increases in agronomic yield.

Overall protein content of Canada Western Red Spring wheat, at 13.1 %, is lower than last year. High grade Canada Western Red Spring wheat shows similar test weight, smaller seed size, similar wheat falling number, slightly higher absorption and comparable dough properties relative to last year. Overall protein content of Canada Western Amber Durum wheat at 12.3% is slightly lower than last year. High grade Canada Western Amber Durum wheat shows comparable test weight, slightly lower milling yield, and slightly increased dough strength over last year. Overall protein content of Canada Western Hard White Spring wheat at 12.9% is 0.3% lower than last year. High grade Canada Western Hard White Spring wheat shows superior flour colour, and slightly weaker dough properties compared to last year.

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, Canada Western Hard White Spring wheat, Canada Western Amber Durum wheat and Canada Prairie Spring Red wheat for the 2005 crop. Further information on other classes of western Canadian wheat is not reported for the 2005 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 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 Hard White Spring (CWHWS) 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 CWHWS 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

Data presented in this report were generated from quality tests carried out on composites representing approximately 4000 individual samples submitted by producers and primary elevator managers from the three Prairie provinces. Figure 1 highlights the wheat producing regions in the provinces of, from east to west, Manitoba, Saskatchewan, and Alberta. These data are not quality specifications for Canadian wheat. Rather, they represent our best estimate of overall quality which will provide information on relative performances among successive harvests. As with any estimate, some variation in the quality characteristics of wheat of any given grade exported during the coming year from the data presented here is to be expected. The amounts and relative quality of carryover stocks of each grade will also contribute to this variation.

Background for the 2005 crop

The Canadian Wheat Board provided background information for the 2005 crop.

Seeding conditions

Heavy rainfall during the spring of 2005 provided excellent moisture for the growth of crops over most of western Canada. The soil moisture, combined with moderate temperatures through the growing season, resulted in above average production prospects.

Improvement in the soil moisture situation began during the difficult harvest of 2004, which was delayed by persistent rains in August and September. However, this precipitation did boost soil moisture levels in the fall of 2004. Winter snowfall was also above normal in all areas, except southern Alberta. Precipitation from the beginning of April to the end of May 2005 was normal to above-normal in the Prairie region. Planting progress during the spring was dependent on location; the general trend saw western regions planted more rapidly than the eastern growing areas. The overall planting pace in western Canada was two-to-five days ahead of normal during the first three weeks of May, but rains slowed progress in the latter half of the month. Heavy rains in June delayed the completion of planting and caused some crop area to be left unseeded.

Growing conditions

Persistent heavy rains throughout the southern Prairies in June caused flooding losses in Alberta and southern Manitoba. Manitoba was hardest hit by the wet conditions, with unseeded and drowned out areas reaching approximately one million hectares. Southern Alberta also experienced heavy rainfall in June, which caused serious flood damage in the region. The rest of the Prairies received normal to above normal amounts of precipitation during the June period, which helped increase crop yield potential. Precipitation during July was mostly normal across the Prairie region, with temperatures slightly below normal in western regions and above normal in the east. The moderate temperatures boosted crop growth, without causing stress to the crop. Crop development was significantly ahead of last year in most regions, due to the warmer temperatures received throughout the growing season. Cooler temperatures and frequent rainfall slowed crop development in Alberta and western Saskatchewan in August. The cooler weather also resulted in a number of locations in north-western Saskatchewan and northern Alberta reporting spotty frost events in the first two weeks of the month. Eastern regions reported warmer than normal temperatures, which increased stress to crops in the late filling stage. Warm temperatures also boosted crop development in eastern Saskatchewan and Manitoba.

Harvest conditions

South-eastern areas of the Prairies began harvesting in the middle of August. The last week of August and the first two weeks of September were unseasonably wet, with heavy rainfall covering an area from southern Alberta to north-eastern Saskatchewan. Crops in the regions that received the heaviest rainfall were down graded by excess moisture. Weather conditions in the southern Prairies were better, with most of the harvest in Manitoba and the southern areas of Saskatchewan complete by the end of September. Harvesting in the northern areas of Saskatchewan and Alberta stretched into October, with approximately 95 per cent of the harvest complete by the end of October.

Production and grade information

The favourable weather in much of western Canada during 2005 resulted in wheat and durum production that was above 10 year average levels despite production losses of approximately 29% experienced in Manitoba. Total wheat production for western Canada is estimated at 24.8 million tonnes by Statistics Canada[1] , with spring wheat production at 18.3 million tonnes, exceeding the 10 year average of 17.7 million tonnes. Durum wheat production was 5.9 million tonnes, an increase of 19.2% over last year. The 10 year average production of durum wheat is 4.6 million tonnes. Increased agronomic yields accounted for increased production with spring wheat yields of 2.7 tonnes/hectare, and durum wheat yielding 2.6 tonnes/hectare on average across western Canada.

The quality of the wheat crop was hurt by the wet conditions experienced in August and September. The lower grade CWRS resulted from a range of grading factors including low hard vitreous kernel count, immature, green, fusarium damage and mildew. Lower grade CWAD resulted primarily from low hard vitreous kernel count, smudge, mildew and the presence of immature kernels. Lower grade CWHWS resulted from mildew, fusarium damage, frost and green. Tight grading tolerances for these factors ensure that the high inherent quality of the top milling grades of Canadian wheat is protected.

[1]Statistics Canada, *Field Crop Reporting Series* Vol. 84, No. 8, Dec. 2005

Protein

Table 1 compares available mean protein values for each of the eight classes of western Canadian wheat surveyed in 2005 to corresponding values obtained in the 2004 and 2003 harvest surveys as of December 6, 2005. Canada Western Red Spring (CWRS) wheat and Canada Western Amber Durum (CWAD) show lower protein values compared to 2004. The protein content of CWHWS wheat is lower than last year. The Canada Prairie Spring Red (CPSR) wheat class shows a decrease over 2004. Insufficient sample was available to assess the protein content of Canada Western Extra Strong (CWES), and Canada Prairie Spring White (CPSW) wheat accurately.

Table 1 - Mean protein content of milling grades of western Canadian wheat classes, 2005, 2004 and 2003

	Protein content, %[1]		
Class	2005	2004	2003
CWRS	13.1	13.3	14.1
CWAD	12.3	12.4	13.6
CWHWS	12.9	13.2	13.6
CWES	N/A	N/A	N/A
CPSR	11.1	11.7	12.4
CWRW	10.6	N/A	11.2
CPSW	N/A	N/A	N/A
CWSWS	10.1	N/A	11.4

[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 2005. Comparative values for western Canada by grade are shown for 2004 and for the previous 10 years (1995-2004). Figure 2 shows the fluctuations in annual mean protein content since 1927.

The average protein content of the 2005 western Canadian wheat crop is 13.1%, a decrease of 0.2% from 2004 and 0.6% lower than the long term average protein content. Protein content decreases with decreasing grades, ranging from 13.4% for 1 CWRS to 12.9% for 3 CWRS. Manitoba and Alberta show higher protein content than Saskatchewan.

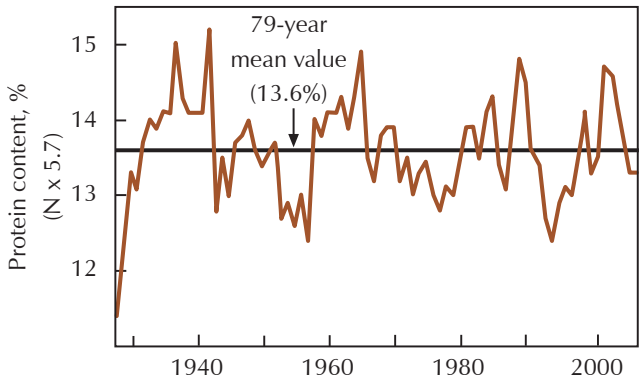
Preliminary results from the Canadian Wheat Board 2005 Variety Survey show that AC Barrie is the predominant variety in the CWRS class with 21% of the seeded acreage, down from 26% in 2004. Superb production increased significantly with 19% of the seeded acreage, up from 14% last year. Five varieties, including Prodigy, CDC Teal, AC Intrepid, McKenzie and AC Splendor, each account for 5-8% of the acreage

Table 2 - Mean protein content of 2005 Canada Western Red Spring wheat, by grade, year and province

	Protein content, %[1]					
	Western Canada			2005		
Grade	2005	2004	1995-2004	Manitoba	Saskatchewan	Alberta
Wheat, No. 1 Canada Western Red Spring	13.4	13.3	13.7	13.9	13.0	13.7
Wheat, No. 2 Canada Western Red Spring	13.3	13.4	13.9	14.1	13.0	13.1
Wheat, No. 3 Canada Western Red Spring	12.9	13.2	13.5	14.0	12.6	12.5
All milling grades	13.1	13.3	13.7	14.0	12.8	12.9

[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 2005



Milling and baking quality - Allis-Chalmers laboratory mill

To assess the quality of the 2005 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%. Data are also provided for Wheat, No. 3 CWRS.

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, 1995-2004.

Test weight of the 2005 Wheat, No. 1 CWRS grade protein segregates is the same as last year, and similar to the long term average. Kernel weight is lower than last year and the long term average. Wheat ash is higher than last year and the long term average, probably as a response to the growing environment. Flour ash, however, is only 0.01% higher than the long term average. Falling number values and α-amylase activities are comparable to last year, while flour amylograph peak viscosities are higher than last year and are comparable to the long term average, indicative of sound kernel characteristics.

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

Farinograph absorption is somewhat higher than 2004 and 1.7% higher than the long term value. We have changed to a new farinograph (model Farinograph-E) starting with this year's harvest. All farinographs give slightly different results, and this new farinograph tends to show slightly stronger results. In order make direct comparisons of dough strength between the 2005 and 2004 data the reader is referred to the 'Comparative Bühler mill flour data' on page 19 (Table 6) of this report, where the 2005 and 2004 composites are milled and tested side by side. Alveograph results indicate generally comparable dough strength properties to last year, and are similar to the long term average. Extensograph results show less strength than 2004 but are comparable to the long term values. CSP baking absorption and loaf volume are comparable to last year and are typical for the grade and protein content. During processing, the superior dough handling properties of this wheat class are clearly evident.

Wheat, No. 2 Canada Western Red Spring

Quality data for the 2005 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, 1995-2004 are shown in Table 4. Test weight values are comparable to last year. Wheat ash is higher than last year, but is comparable to the long term average value. Wheat falling number and flour amylograph peak viscosity are higher than last year and are indicative of sound wheat.

Wheat particle size index is slightly lower than last year, but harder than the long term average. In contrast, flour starch damage values indicate that the kernel texture is somewhat softer than last year but still harder than 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 both indicate superiour flour colour to both last year and the long term average.

Farinograph absorption is about 1% lower than 2004, but 1.3% higher than the long term average, corresponding with starch damage levels that are lower than last year, but higher than the long term average. We have changed to a new farinograph (model Farinograph-E) starting with this year's harvest. All farinographs give slightly different results, and this new farinograph tends to show slightly stronger results. In order make direct comparisons of dough strength between the 2005 and 2004 data the reader is referred to the 'Comparative Buhler mill flour data' section page 21 of this report, where the 2005 and 2004 composites are milled and tested side by side. Extensograph and alveograph results are consistent with the long term average.

Baking absorption and mixing requirements of the 2005 13.5% protein are slightly lower last year. Loaf volumes are comparable with 2004 and consistent with the expected values for a 2 CWRS 13.5% protein wheat. Data are provided for Wheat, No. 3 CWRS in Table 5.

Comparative Bühler laboratory mill flour data

Milling and baking quality

Samples of 2005 and stored 2004 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 6 and 7, respectively. Noodle data using the straight grade and 60% patent flours are shown in Tables 8 and 9 for the Wheat, No. 1 CWRS and No. 2 CWRS respectively.

Straight grade and patent flours from the 2005 No. 1 composites show similar wet gluten content and starch damage values relative to the composite flours from last year, while the No. 2 composites were slightly lower this year. Flour ash values are similar to those from 2004 for both grades. Amylograph peak viscosities are higher in all cases for 2005. Flour grade and AGTRON colour values are similar to last year.

Farinograph data show similar absorption in this year's No. 1 straight grade and 60% patent flours compared to 2004, but the 45% patent flour is running 0.5% lower this year. Dough development times for the No. 1 straight grade were similar to last year, while both patent flours were shorter. Farinograph absorption for the No. 2 straight grade and 45% patent were lower this year, while dough development times were similar. Farinograph stabilities were generally shorter this year.

Sponge-and-dough and CSP baking quality of the Wheat, No. 1 and No. 2 CWRS 13.5% protein segregate are shown in Table 7. Both grades and baking methods show similar to slightly lower baking absorption for the 2005 straight grade and 45% patent flour compared with the re-milled 2004 flour. CSP mixing times and mixing energy for this year's crop are comparable to 2004. Sponge-and-dough mixing time and mixing energy are marginally higher for 2005 No. 1 CWRS straight grade and 45% patent flour relative to the 2004 flour. CSP loaf volume was marginally lower for the 2005 No. 1 CWRS flours, and the No. 2 CWRS flours are similar to last year.

Yellow alkaline noodles

Noodles prepared from the 2005 No. 1 CWRS 13.5 60% patent flour (Table 8) displayed a slightly better raw noodle brightness, L* values, at 2 hours after production to those of the 2004 crop. No differences were observed in noodle redness, a*, or yellowness, b*, at 2 or 24 hours between the crop years.

Noodles prepared from the 2005 straight grade flour exhibited noodle brightness and redness comparable at both 2 and 24 hours to those prepared using the 2004 straight grade flour. An improvement in noodle yellowness, b*, was noted for the 2005 crop compared to the 2004 crop at 2 hours and was still present after 24 hours.

All 2005 13.5% protein 60% patent cooked noodle texture attributes were found to be equivalent to those of the 2004 crop sample. A similar finding was observed for noodles prepared from the straight grade flour.

Raw alkaline noodles prepared from 2005 Wheat, No. 2 CWRS 13.5 60% patent flour (Table 9) exhibited a significant improvement in noodle brightness, L*, at 2 hours post production relative to their 2004 counterpart. Redness, a*, of the noodle was moderately better while a slight improvement in yellowness, b*, was detected. Aging the noodles for 24 hours resulted in comparable L* and b* values while a slight improvement in a* was retained in the 2005 material relative to the 2004 noodles.

Noodles prepared using the 2005 No. 2 13.5% protein straight grade flour also reflected the improvement in noodle brightness at 2 hours as well as preferred b* values. No differences were observed in a* values. When aged for 24 hours the 2005 straight grade noodles continued to display elevated brightness and yellowness relative to their 2004 counterpart.

Examination of cooked patent flour noodle texture indicated an improvement in chewiness (RTC and recovery) for the 2005 material relative to 2004, while bite, MCS, was comparable. No differences in noodle texture were observed for straight grade noodles from either year.

White salted noodles

Examination of the 2005 Wheat, No. 1 CWRS 13.5 noodles prepared from the 60% patent flour (Table 8) indicated no significant changes in their raw noodle brightness or redness at 2 hours compared with 2004. A slight elevation in noodle yellowness was noted in the 2005 sample relative to 2004. Aging the noodles for 24 hours resulted in a modest improvement in the 2005 noodle brightness over the corresponding 2004 sample. The 2005 noodles retained slightly higher b* values compared to the 2004 sample.

Noodles prepared from the 2005 straight grade flour (74%) were comparable to the 2004 noodles in terms of brightness and redness at 2 hours. An increase in noodle creaminess, b*, was detected in the 2005 at 2 hours. Colour attributes of noodles aged 24 hours were comparable for both years.

Noodle texture characteristics of the white salted noodles prepared from either patent or straight grade flours were similar across both years. A slight decrease in cooked noodle bite, MCS, was observed in noodles prepared from 2005 flours compared to the corresponding 2004 noodles.

White salted noodles prepared with 2005 Wheat, No. 2 CWRS 13.5 60% patent flour (Table 9) were improved in brightness at 2 hours compared to the 2004 counterpart. The benefit in brightness was still present after aging 24 hours. At both 2 and 24 hours the 2005 noodles displayed higher b* values than those noodles prepared form 2004 patent flour.

Noodles prepared using the 2005 straight grade flour also displayed improved brightness relative to the 2004 noodles at both 2 and especially at 24 hours after production. As observed in the patent flours, 2005 straight grade noodles showed higher b* values at both time intervals than those prepared from 2004 crop material.

Examination of the cooked noodle texture characteristics of either patent or straight grade noodles indicated no differences between years.

Table 3 - Wheat, No. 1 Canada Western Red Spring
Quality data for 2005 and 2004 harvest survey grade composite samples

	Minimum protein content			Wheat, No. 1 CWRS – 13.5	
Quality parameter[1]	14.5	13.5	12.5	2004	1995-04 mean
Wheat					
Test weight, kg/hL	80.9	81.4	81.7	81.4	81.7
Weight per 1000 kernels, g	31.0	30.9	32.3	32.5	32.1
Protein content, %	14.8	13.8	12.8	13.8	13.7
Protein content, % (dry matter basis)	17.1	16.0	14.8	15.9	15.9
Ash content, %	1.63	1.66	1.55	1.54	1.55
α-amylase activity, units/g	3.5	3.5	4.0	4.5	4.8
Falling number, s	400	400	390	395	388
PSI,%	53	52	50	53	53
Milling					
Flour yield					
Clean wheat basis, %	75.7	75.4	75.5	75.3	75.5
0.50% ash basis, %	75.7	75.9	75.5	76.8	75.5
Flour					
Protein content, %	14.3	13.3	12.3	13.3	13.2
Wet gluten content, %	39.1	36.1	33.3	36.3	36.2[2]
Ash content, %	0.50	0.49	0.50	0.47	0.48
Grade colour, Satake units	-2.0	-2.4	-2.5	-2.2	-1.8
AGTRON colour, %	76	79	80	76	73
Starch damage, %	7.9	8.2	8.8	8.1	7.6[3]
α-amylase activity, units/g	1.0	1.0	1.0	1.0	1.2
Amylograph peak viscosity, BU	645	630	600	560	670
Maltose value, g/100g	2.4	2.6	2.9	2.7	2.4
Farinogram					
Absorption, %	68.6	67.7	67.8	66.8	66.0
Development time, min	6.75	7.25	4.75	6.00	5.25
Mixing tolerance index, BU	20	20	25	25	25
Stability, min	9.5	11.5	8.5	12.5	10.0
Extensogram					
Length, cm	22	22	20	22	21
Height at 5 cm, BU	275	290	300	365	315
Maximum height, BU	535	575	570	700	580
Area, cm^2	150	155	145	195	165
Alveogram					
Length, mm	118	104	95	106	115
P (height x 1.1), mm	125	127	139	138	117
W, x 10^{-4} joules	497	471	458	497	450
Baking (Canadian short process baking test)					
Absorption, %	73	70	69	70	N/A[4]
Mixing energy, W-h/kg	6.0	6.3	6.1	6.0	N/A[4]
Mixing time, min	3.9	3.8	3.9	3.7	N/A[4]
Loaf volume, cm^3/100 g flour	1100	1125	1095	1115	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 2005 and 2004 harvest survey grade composite samples

	Minimum protein content			Wheat, No. 2 CWRS – 13.5	
Quality parameter[1]	14.5	13.5	12.5	2004	1995-04 mean
Wheat					
Test weight, kg/hL	79.6	79.9	80.6	80.5	80.5
Weight per 1000 kernels, g	31.3	31.4	31.8	33.3	32.6
Protein content, %	14.7	13.7	12.7	13.7	13.7
Protein content, % (dry matter basis)	16.9	15.9	14.7	15.8	15.9
Ash content, %	1.65	1.64	1.56	1.59	1.63
α-amylase activity, units/g	4.5	4.0	5.5	6.5	7.2
Falling number, s	405	405	395	355	376
PSI,%	53	51	50	52	54
Milling					
Flour yield					
Clean wheat basis, %	75.7	75.5	75.3	74.8	75.4
0.50% ash basis, %	75.2	75.5	75.3	75.3	75.4
Flour					
Protein content, %	14.1	13.2	12.3	13.2	13.1
Wet gluten content, %	39.2	35.6	32.5	37.5	36.4[2]
Ash content, %	0.51	0.50	0.50	0.49	0.50
Grade colour, Satake units	-1.6	-2.1	-2.4	-1.6	-1.5
AGTRON colour, %	74	76	79	71	71
Starch damage, %	7.7	8.0	8.4	8.7	7.4[3]
α-amylase activity, units/g	2.0	2.0	2.0	3.0	22
Amylograph peak viscosity, BU	515	470	495	370	555
Maltose value, g/100g	2.4	2.6	2.7	2.9	2.4
Farinogram					
Absorption, %	68.0	67.2	67.6	68.0	65.9
Development time, min	7.25	7.50	7.00	5.50	5.25
Mixing tolerance index, BU	25	25	40	30	30
Stability, min	9.5	11.0	7.5	9.0	8.5
Extensogram					
Length, cm	21	22	21	20	22
Height at 5 cm, BU	290	320	335	350	295
Maximum height, BU	545	575	600	655	530
Area, cm^2	145	165	165	170	160
Alveogram					
Length, mm	128	118	104	100	120
P (height x 1.1), mm	107	114	125	146	113
W, x 10^{-4} joules	448	445	438	513	447
Baking (Canadian short process baking test)					
Absorption, %	71	70	71	72	N/A[4]
Mixing energy, W-h/kg	5.6	5.7	6.6	6.4	N/A[4]
Mixing time, min	3.6	3.7	4.3	4.1	N/A[4]
Loaf volume, cm^3/100 g flour	1130	1095	1105	1115	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 5 - Wheat, No. 3 Canada Western Red Spring
Quality data for 2005 and 2004 harvest survey grade composite samples

Quality parameter [1]	No. 3 CWRS 2005	No. 3 CWRS 2004	No. 3 CWRS 1995-04 mean
Wheat			
Test weight, kg/hL	79.0	79.6	79.2
Weight per 1000 kernels, g	33.5	34.6	32.9
Protein content, %	12.9	13.3	13.5
Protein content, % (dry matter basis)	14.9	15.3	15.7
Ash content, %	1.59	1.59	1.61
α-amylase activity, units/g	7.0	18.5	18.0
Falling number, s	370	300	337
PSI,%	53	53	54[3]
Milling			
Flour yield			
Clean wheat basis, %	75.2	73.9	74.9
0.50% ash basis, %	76.2	74.4	74.9
Flour			
Protein content, %	12.1	12.8	12.9
Wet gluten content, %	32.4	34.7	35.2[2]
Ash content, %	0.48	0.49	0.50
Grade colour, Satake units	-2.1	-1.0	-1.2
AGTRON colour, %	77	68	69
Starch damage, %	8.1	8.8	7.2[3]
α-amylase activity, units/g	3.5	5.0	7.4
Amylograph peak viscosity, BU	335	230	373
Maltose value, g/100g	2.7	3.2	2.5
Farinogram			
Absorption, %	67.3	68.1	65.5
Development time, min	4.75	4.75	4.90
Mixing tolerance index, BU	25	30	33
Stability, min	8.50	8.50	8.00
Extensogram			
Length, cm	19	22	22
Height at 5 cm, BU	300	350	295
Maximum height, BU	510	625	509
Area, cm^2	125	200	154
Alveogram			
Length, mm	97	90	120
P (height x 1.1), mm	135	151	110
W, x 10^{-4} joules	435	494	427
Baking (Canadian short process baking test)			
Absorption, %	69	69	N/A[4]
Mixing energy, W-h/kg	5.6	6.1	N/A[4]
Mixing time, min	3.6	4.0	N/A[4]
Loaf volume, cm^3/100 g flour	1075	1115	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.
[3] Not available due to change in method. See http://grainscanada.gc.ca/Quality/Methods/wheatmethods-e.htm

Table 6 - Wheat, No. 1 and Wheat, No. 2 Canada Western Red Spring – 13.5% protein segregate
Analytical data and physical dough properties
Comparative Bühler mill flour data – 2005 and 2004 harvest survey composites[1]

Wheat, No. 1 Canada Western Red Spring

	74% Straight grade		60% Patent		45% Patent	
Quality parameter[2]	2005	2004	2005	2004	2005	2004
Flour						
Yield, %	74.0	74.0	60.0	60.0	45.0	45.0
Protein content, %	13.0	13.1	12.7	12.8	12.3	12.3
Wet gluten content, %	35.7	35.8	35.0	35.4	34.1	34.0
Ash content, %	0.42	0.41	0.37	0.36	0.35	0.35
Grade colour, Satake units	-3.2	-3.1	-4.0	-3.9	-4.3	-4.3
AGTRON colour, %	87	86	94	93	97	97
Amylograph peak viscosity, BU	700	620	750	705	765	720
Starch damage, %	6.2	6.3	6.4	6.4	6.5	6.6
Farinogram						
Absorption, %	63.8	63.8	64.3	64.1	63.7	64.2
Development time, min	8.25	8.00	9.50	11.75	14.00	17.50
Mixing tolerance index, BU	25	20	20	10	10	5
Stability, min	18.5	22.0	26.0	30.5	28.5	30.0

Wheat, No. 2 Canada Western Red Spring

	74% Straight grade		60% Patent		45% Patent	
Quality parameter[2]	2005	2004	2005	2004	2005	2004
Flour						
Yield, %	74.0	74.0	60.0	60.0	45.0	45.0
Protein content, %	13.0	13.1	12.8	12.7	13.4	13.3
Wet gluten content, %	35.8	36.5	34.6	35.3	34.2	34.3
Ash content, %	0.43	0.42	0.39	0.37	0.37	0.35
Grade colour, Satake units	-2.8	-2.3	-3.7	-3.5	-4.2	-3.9
AGTRON colour, %	84	79	93	91	96	94
Amylograph peak viscosity, BU	600	430	655	505	685	535
Starch damage, %	6.2	6.5	6.5	6.7	6.5	6.9
Farinogram						
Absorption, %	63.7	65.2	64.0	64.4	63.7	64.8
Development time, min	6.75	6.75	9.25	8.50	9.25	9.25
Mixing tolerance index, BU	25	20	20	20	15	25
Stability, min	12.0	10.0	24.0	30.0	24.0	30.0

[1] The 2004 composite was stored and milled the same day as the 2005

[2] Data reported on 14.0% moisture basis

Table 7 - Wheat, No. 1 and Wheat, No. 2 Canada Western Red Spring – 13.5% protein segregate
Baking quality data
Comparative Bühler mill flour data – 2005 and 2004 harvest survey composites[1]

Wheat, No. 1 Canada Western Red Spring

	74% Straight grade		45% Patent	
Quality parameter	2005	2004	2005	2004
Sponge-and-dough baking test	40 ppm ascorbic acid		40 ppm ascorbic acid	
Absorption, %	66	68	66	66
Mixing energy dough stage, W-h/kg	4.4	4.2	4.6	4.4
Mixing time dough stage, min	2.7	2.6	3.1	2.9
Loaf volume, cm^3/100 g flour	1125	1105	1035	1065
Appearance	7.9	8.3	7.8	7.8
Crumb structure	5.9	6.0	6.2	6.0
Crumb color	7.9	7.5	7.5	7.8
Canadian short process baking test	150 ppm ascorbic acid		150 ppm ascorbic acid	
Absorption, %	67	69	67	68
Mixing energy, W-h/kg	5.9	6.5	6.5	6.1
Mixing time, min	3.8	4.1	4.0	4.0
Loaf volume, cm^3/100 g flour	1100	1175	1110	1125
Appearance	7.5	7.5	7.4	7.5
Crumb structure	6.3	6.3	6.2	6.3
Crumb color	7.9	7.7	7.8	7.9

Wheat, No. 2 Canada Western Red Spring

	74% Straight grade		45% Patent	
Quality parameter	2005	2004	2005	2004
Sponge-and-dough baking test	40 ppm ascorbic acid		40 ppm ascorbic acid	
Absorption, %	65	65	65	67
Mixing energy dough stage, W-h/kg	4.1	6.5	4.7	5.1
Mixing time dough stage, min	2.4	4.0	2.8	3.0
Loaf volume, cm^3/100 g flour	1065	1030	1010	1005
Appearance	7.7	7.7	7.7	7.5
Crumb structure	6.0	6.0	6.0	6.2
Crumb color	7.5	7.7	7.7	7.7
Canadian short process baking test	150 ppm ascorbic acid		150 ppm ascorbic acid	
Absorption, %	67	69	67	67
Mixing energy, W-h/kg	6.6	6.5	6.4	6.6
Mixing time, min	3.9	4.0	4.0	3.9
Loaf volume, cm^3/100 g flour	1105	1070	1100	1105
Appearance	7.7	7.5	7.4	7.5
Crumb structure	6.2	6.3	6.2	6.7
Crumb color	7.8	7.8	7.7	7.8

[1] The 2004 composite was stored and milled the same day as the 2005

Table 8 - Wheat, No. 1 Canada Western Red Spring – 13.5% protein segregate
Noodle quality data
Comparative Bühler mill data – 2005 and 2004 harvest survey composite samples[1]

	74% Straight grade		60% patent	
Quality parameter	2005	2004	2005	2004
Fresh alkaline noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	79.2 (73.8)	79.0 (72.9)	80.9 (75.6)	80.3 (76.1)
Redness, a*	0.05 (0.50)	0.01 (0.45)	-0.03 (0.11)	-0.02 (0.17)
Yellowness, b*	29.1 (28.9)	27.8 (28.2)	27.0 (27.8)	26.9 (27.5)
Cooked colour				
Brightness, L*	71.3	70.5	71.5	71.8
Redness, a*	-1.76	-1.38	-1.75	-2.02
Yellowness, b*	29.0	28.6	28.9	28.5
Texture				
Thickness, mm	2.33	2.32	2.37	2.36
RTC, %	24.3	24.3	23.7	23.6
Recovery, %	33.9	34.1	33.8	33.6
MCS, g/mm^2	29.5	30.1	29.9	30.0
Fresh white salted noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	80.4 (75.6)	80.7 (75.5)	81.9 (77.6)	81.8 (77.2)
Redness, a*	2.77 (3.51)	2.68 (3.59)	2.53 (2.97)	2.45 (2.88)
Yellowness, b*	25.2 (25.9)	23.9 (25.5)	25.1 (26.6)	24.0 (25.4)
Cooked colour				
Brightness, L*	76.6	75.8	76.6	77.2
Redness, a*	0.93	0.90	0.76	0.60
Yellowness, b*	20.7	20.0	21.3	20.0
Texture				
Thickness, mm	2.48	2.56	2.51	2.52
RTC, %	18.9	19.1	18.7	18.3
Recovery, %	25.7	26.1	25.4	25.7
MCS, g/mm^2	25.5	26.6	25.3	26.6

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

Table 9 - Wheat, No. 2 Canada Western Red Spring – 13.5% protein segregate
Noodle quality data
Comparative Bühler mill data – 2005 and 2004 harvest survey composite samples[1]

	74% Straight grade		60% patent	
Quality parameter	2005	2004	2005	2004
Fresh alkaline noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	78.1 (72.6)	77.3 (71.7)	81.1 (75.9)	80.0 (75.7)
Redness, a*	0.27 (0.84)	0.30 (0.91)	-0.19 (0.48)	0.34 (0.70)
Yellowness, b*	28.8 (29.0)	27.3 (28.0)	27.6 (28.3)	27.0 (28.6)
Cooked colour				
Brightness, L*	70.6	69.5	71.2	70.9
Redness, a*	-1.61	-1.52	-1.72	-1.89
Yellowness, b*	27.9	27.8	28.5	28.3
Texture				
Thickness, mm	2.34	2.37	2.35	2.34
RTC, %	23.1	23.2	23.7	22.6
Recovery, %	32.2	33.2	33.1	32.8
MCS, g/mm^2	29.2	30.7	30.5	30.4
Fresh white salted noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	80.3 (75.2)	79.8 (73.2)	82.1 (77.1)	81.4 (76.8)
Redness, a*	2.82 (3.82)	2.90 (3.64)	2.51 (3.21)	2.43 (2.84)
Yellowness, b*	25.3 (26.2)	24.1 (24.7)	23.7 (26.7)	23.1 (25.1)
Cooked colour				
Brightness, L*	75.9	75.8	77.3	77.2
Redness, a*	0.98	1.08	0.71	0.60
Yellowness, b*	20.3	19.6	20.7	20.0
Texture				
Thickness, mm	2.51	2.56	2.53	2.56
RTC, %	18.7	19.0	18.7	18.5
Recovery, %	25.4	25.8	25.0	25.6
MCS, g/mm^2	25.9	28.5	27.5	28.0

[1] The 2004 composites were stored and milled the same day as the respective 2005 composite and replicated the following day in reverse order.

Canada Western Amber Durum wheat

Protein and variety survey

Table 10 lists the mean protein content values for Canada Western Amber Durum (CWAD) wheat by grade. Comparative values are shown for 2005 and for the previous 10 years (1995-2004). Figure 3 shows the variation in annual mean protein content since 1963.

The average protein content of the 2005 durum crop is 12.3%, which is 0.1% lower than 2004 and 0.4% lower than the 10-year mean. Protein content for the top three milling grades is similar to last year and slightly lower than 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.

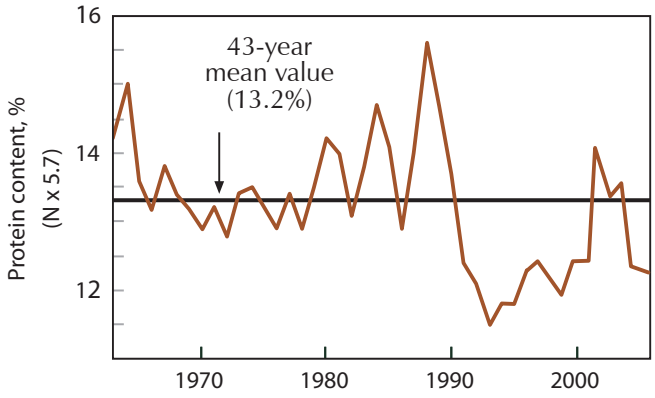
Canadian Wheat Board 2005 variety survey information indicates that AC Avonlea continues to gain popularity with western Canadian producers showing an increase in seeded acreage to 45.9% from 39.6% in 2004. Kyle continues to decline in popularity, decreasing by 7.0% from the previous year to 34.2% while AC Navigator increased to 9.2% and AC Morse decreased slightly to 5.7% of acreage seeded.

Table 10 - Mean protein content of 2005 Canada Western Amber Durum wheat, by grade and year

Grade	Protein content, %[1]		
	2005	2004	1995-2004
Wheat, No. 1 Canada Western Amber Durum	12.9	13.1	13.1
Wheat, No. 2 Canada Western Amber Durum	12.4	12.3	12.6
Wheat, No. 3 Canada Western Amber Durum	12.1	12.2	12.6
All milling grades	12.3	12.4	12.7

[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 2005



Wheat and pasta processing quality

Data describing the quality characteristics for composite samples of No. 1 and No. 2 CWAD for the 2005 crop are shown in Table 11. Corresponding data for 2004 composites and mean values for the previous ten-years (1995-2004) are provided for comparison. Test weight and 1000 kernel weight for No. 1 CWAD for the 2005 and 2004 crops and long term means are comparable. No. 2 CWAD shows a decrease in test weight and 1000 kernel weight in comparison to 2004 and 10-year mean data. Hard vitreous kernel counts are lower than last year but comparable to the ten-year mean for both top grades. Falling numbers in the wheat and semolina of the top two grades are somewhat higher than 2004 values and ten-year means and are indicative of sound kernel characteristics. Degrading factors in the 2005 crop include lower hard vitreous kernel count and the presence of immature and smudge and mildew damaged kernels.

Wet gluten content for No. 1 and No. 2 CWAD decreased by 2.7% and 0.5%, respectively, from 2004, and dry gluten values decreased concomitantly. SDS sedimentation volumes for 2005 are somewhat higher for both grades compared to last year and the 10 year mean. Gluten index values and Alveograph W values also increased indicating marginally stronger gluten properties when compared to last year. The increasing gluten strength of No.1 and No. 2 CWAD is more evident in comparison to the 10-year mean and is indicative of the introduction of stronger gluten varieties such as AC Morse and AC Navigator.

Total milling and semolina yield is equivalent to last year and the ten-year mean for No. 1 CWAD while No. 2 CWAD showed a 1.2% and 0.5% decrease in total milling yield and semolina yield, respectively, from 2004. The total milling yield for the No. 2 CWAD is comparable to the 10 year mean while semolina yield is only 0.4% lower and within the limits of repeatability of the laboratory milling process. Wheat ash is substantially lower (0.11%) for the No. 1 grade composite but is equal to 2004 results for No. 2 CWAD. Both grades are well below the ten-year mean values for wheat ash. Conversely, semolina ash values were above those reported in 2004 for No. 1 (0.03%) and No. 2 (0.06%) CWAD but they are consistent with the long term means. AGTRON values are similar to last year's results and the ten-year means for both No. 1 and No. 2 CWAD. Overall milling quality of the 2005 crop is comparable to the ten-year mean.

Table 11 - Wheat, No. 1 and Wheat, No. 2 Canada Western Amber Durum
Quality data for 2005 and 2004 harvest survey grade composite samples

Quality parameter[1]	No. 1 CWAD			No. 2 CWAD		
	2005	2004	1995-04 mean	2005	2004	1995-04 mean
Wheat						
Test weight, kg/hL	82.2	82.3	82.4	81.5	82.4	82.1
Weight per 1000 kernels, g	41.6	42.7	42.2	42.1	44.2	42.6
Vitreous kernels, %	91	95	90	80	85	80
Protein content, %	12.9	13.2	13.0	12.5	12.3	12.6
Protein content, % (dry matter basis)	14.9	15.3	15.1	14.5	14.2	14.6
SDS sedimentation, mL	40	36	38	37	29	34
Ash content, %	1.47	1.58	1.55	1.51	1.51	1.60
Yellow pigment content, ppm	9.1	8.3	8.4	8.7	8.1	8.3
Falling number, s	425	395	405	395	375	379
Milling yield, %	75.1	75.0	74.6	74.8	76.0	74.7
Semolina yield, %	66.3	66.1	66.2	65.7	66.2	66.1
PSI, %	37	37	37	37	39	38
Semolina						
Protein content, %	11.9	12.1	12.0	11.6	11.2	11.5
Wet gluten content, %	29.4	32.1	32.5	28.6	29.1	31.1
Dry gluten content, %	9.9	11.1	11.7	9.7	10.1	11.2
Gluten index, %	40	35	28[2]	40	27	28[2]
Ash content, %	0.66	0.63	0.65	0.67	0.61	0.66
Yellow pigment content, ppm	8.6	7.7	7.9	8.3	7.4	7.7
AGTRON colour, %	83	83	81	81	83	80
CIELAB colour:						
Brightness, L*	87.1	87.9	87.9[2]	87.2	87.8	87.8[2]
Redness, a*	-3.2	-3.1	-3.1[2]	-3.2	-3.1	-3.1[2]
Yellowness, b*	33.8	32.2	33.1[2]	32.5	31.5	32.5[2]
Speck count per 50 cm[2]	27	28	24	26	28	29
Falling number, s	525	435	480	500	390	448
Alveogram						
Length, mm	91	82	88[2]	86	81	89[2]
P (height x 1.1), mm	59	64	51[2]	58	55	47[2]
P/L	0.6	0.8	0.6[2]	0.7	0.7	0.5[2]
W, x 10-4 joules	143	146	119[2]	132	120	108[2]
Spaghetti						
Dried at 70°C						
CIELAB colour:						
Brightness, L*	76.6	77.4	78.1[2]	76.8	77.5	77.9[2]
Redness, a*	2.2	1.8	2.0[2]	1.9	1.7	2.2[2]
Yellowness, b*	67.2	65.1	66.6[3]	66.4	63.6	66.9[2]
Firmness, g-cm	950	1003	951[3]	910	873	885[3]

[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 1999
[3] Mean of data generated starting in 1997

Table 12 - Wheat, No. 3 Canada Western Amber Durum
Quality data for 2005 and 2004 harvest survey grade composite samples

Quality parameter[1]	No. 3 CWAD 2005	No. 3 CWAD 2004	No. 3 CWAD 1995-04 mean[2]
Wheat			
Test weight, kg/hL	81.0	82.0	81.2
Weight per 1000 kernels, g	43.8	44.7	42.3
Vitreous kernels, %	60	72	67
Protein content, %	12.0	12.2	12.4
Protein content, % (dry matter basis)	13.9	14.2	14.4
SDS sedimentation, mL	29	28	31
Ash content, %	1.53	1.57	1.62
Yellow pigment content, ppm	8.0	7.9	8.1
Falling number, s	385	315	342
Milling yield, %	74.2	75.9	75.0
Semolina yield, %	65.4	65.6	65.4
PSI, %	37	37	39
Semolina			
Protein content, %	11.1	11.1	11.5
Wet gluten content, %	27.6	28.6	30.5
Dry gluten content, %	9.4	10.2	11.0
Gluten index, %	38	32	22[3]
Ash content, %	0.64	0.61	0.68
Yellow pigment content, ppm	7.8	7.3	7.5
AGTRON colour, %	86	81	76
CIELAB colour:			
Brightness, L*	88.1	87.6	87.5[4]
Redness, a*	-3.1	-3.0	-3.0[4]
Yellowness, b*	32.1	30.1	31.2[4]
Speck count per 50 cm^2	36	34	38
Falling number, s	485	370	391
Alveogram			
Length, mm	91	82	87[4]
P (height x 1.1), mm	59	64	48[4]
P/L	0.6	0.8	0.56[4]
W, x 10-4 joules	143	146	104[4]
Spaghetti			
Dried at 70°C			
CIELAB colour:	77.5	77.3	76.4[3]
Brightness, L*	1.9	1.7	3.4[3]
Redness, a*	65.5	60.8	62.1[3]
Yellowness, b*	837	873	866[3]
Firmness, g-cm			

[1] Unless otherwise specified, data are reported on a 13.5% moisture basis for wheat and a 14.0% moisture basis for semolina.
[2] No. 3 CWAD results for 1998 or 2003
[3] Mean of data generated starting in 1999
[4] Mean of data generated starting in 1997

Wheat and semolina yellow pigment values for both No. 1 and No, 2 CWAD are superior to those seen last year and slightly higher than long term mean values. The increase in pigment content for 2005 resulted in correspondingly higher b* values in both semolina and dried spaghetti as compared to 2004. Brightness of semolina and pasta is somewhat lower for the 2005 crop as indicated by a decrease in L* values which is indicative of the significant impact of environment on both semolina and pasta colour characteristics.

Cooking quality for spaghetti from No. 1 CWAD, as indicated by firmness (peak force) values, is slightly lower than last year but equal to the ten-year mean. No. 2 CWAD firmness is up slightly from last year. These small differences are largely attributable to the slight differences in protein content of composites seen from year to year.

Quality data for 3 CWAD can be found in Table 12. Protein content of the composite was 12.0%, slightly down from last year and 0.4% lower than the 10 year average. The wheat was sound, as indicated by the high falling number value. Semolina yield was comparable to last year and to the long term average. Wet gluten content was lower than the long term average, however, gluten index was considerably higher, at 38, versus the long term average of 22, indicative of the improvement seen in durum varieties released over that time. Alveograph strength was comparable to last year, and slightly improved over the long term. Spaghetti cooking quality showed a slight decline in firmness over 2004 and the long term average.

Canada Western Hard White Spring wheat

Protein and variety survey

Mean protein content data for the milling grades of CWHWS are shown in Table 13. Data for this year's composite of the 13.5% and 12.5% protein segregates of the Wheat, No. 1 and No. 2 CWHWS grades milled on the Allis-Chalmers laboratory mill are shown in Tables 14 and 15 respectively.

Table 13 - Mean protein content of 2005 Canada Western Hard White Spring wheat, by grade and year

Grade	Protein content, %[1]		
	2005	2004	1995-2004
Wheat, No. 1 Canada Western Hard White Spring	12.7	13.1	N/A
Wheat, No. 2 Canada Western Hard White Spring	13.1	13.4	N/A
Wheat, No. 3 Canada Western Hard White Spring	13.2	13.0	N/A
All milling grades	12.9	13.1	N/A

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

Milling and baking quality Allis-Chalmers laboratory mill

Wheat, No. 1 Canada Western Hard White Spring

Table 14 summarizes quality data for the No. 1 CWHWS 13.5 and 12.5% protein composites. Corresponding data are provided at the 13.5% minimum protein level for last year's composite.

Test weight is comparable to last year, but 1000 kernel weight is lower. Hardness (PSI) is similar to 2004, but starch damage is lower. Falling number values for both protein segregates, are both higher than last year and are indicative of sound wheat. Allis-Chalmers milled flour yield is lower than 2004 when compared on a constant ash basis, but flour grade and AGTRON colour show considerably improved brightness over last year. Both wheat and flour ash content are slightly higher than last year. Amylograph peak viscosity is significantly higher this year in comparison to 2004.

Farinograph absorption is 0.8% lower than last year. Stability is slightly shorter than last year, while dough development times are longer for 2005. Physical dough tests show extensible dough properties, but lower strength than last year. Canadian short process baking test results show dough water absorption and loaf volume similar to last year and comparable to the top grade CWRS.

Wheat, No. 2 Canada Western Hard White Spring

Table 15 summarizes the quality data for the Wheat, No. 2 CWHWS composite 13.5% and 12.5% protein segregates with the 13.5% protein segregate from 2004 included for comparison.

Test weight is slightly higher than last year, while 1000 kernel weight is slightly lower. Hardness (PSI) is comparable to last year, but starch damage is considerably lower. Falling number values are slightly higher than 2004, and amylograph peak viscosities are significantly higher. Milling yields are 1% lower than last year, but flour grade and AGTRON colour show improvement over 2004. Wheat and flour ash contents are higher than seen in 2004.

Farinograph properties of the Wheat, No. 2 CWHWS shows slightly lower absorption than last year, with longer development time, but shorter stability. Alveograph extensibility for the Wheat, No. 2 CWHWS shows improvement over last year with similar overall alveograph strength. The baking absorption and mixing requirements of the Wheat, No. 2 CWHWS are lower than last year, although loaf volume is comparable.

Table 14 - Wheat, No. 1 Canada Western Hard White Spring
Quality data for 2005 and 2004 harvest survey grade composite samples

	Minimum protein content		2004
Quality parameter [1]	13.5	12.5	13.5
Wheat			
Test weight, kg/hL	80.7	81.0	80.6
Weight per 1000 kernels, g	29.9	31.2	32.1
Protein content, %	13.8	12.8	13.8
Protein content, % (dry matter basis)	15.9	14.8	16.0
Ash content, %	1.53	1.53	1.48
α-amylase activity, units/g	3.5	3.5	6.0
Falling number, s	420	420	370
PSI,%	52	50	52
Milling			
Flour yield			
Clean wheat basis, %	75.2	75.0	74.5
0.50% ash basis, %	75.7	76.0	76.5
Flour			
Protein content, %	13.1	12.2	13.4
Wet gluten content, %	35.4	32.5	36.9
Ash content, %	0.49	0.48	0.46
Grade colour, Satake units	-3.0	-3.3	-2.3
AGTRON colour, %	84	86	78
Starch damage, %	7.7	7.9	8.3
α-amylase activity, units/g	0.5	1.0	2.5
Amylograph peak viscosity, BU	925	870	540
Maltose value, g/100g	2.5	2.7	2.8
Farinogram			
Absorption, %	67.5	67.0	68.3
Development time, min	6.25	6.75	5.50
Mixing tolerance index, BU	25	30	30
Stability, min	8.0	9.0	8.5
Extensogram			
Length, cm	21	20	23
Height at 5 cm, BU	270	290	355
Maximum height, BU	480	505	650
Area, cm^2	130	135	195
Alveogram			
Length, mm	103	87	86
P (height x 1.1), mm	132	134	154
W, x 10^{-4} joules	491	432	504
Baking (Canadian short process baking test)			
Absorption, %	70	68	71
Mixing energy, W-h/kg	6.9	6.6	6.7
Mixing time, min	4.7	4.5	4.3
Loaf volume, cm^3/100 g flour	1090	1025	1095

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

Table 15 - Wheat, No. 2 Canada Western Hard White Spring
Quality data for 2005 and 2004 harvest survey grade composite samples

	Minimum protein content		2004
Quality parameter [1]	13.5	12.5	13.5
Wheat			
Test weight, kg/hL	80.2	80.3	80.6
Weight per 1000 kernels, g	30.9	30.4	32.1
Protein content, %	13.7	12.7	13.8
Protein content, % (dry matter basis)	15.8	14.7	16.0
Ash content, %	1.64	1.61	1.48
α-amylase activity, units/g	8.0	6.0	6.0
Falling number, s	395	395	370
PSI,%	52	52	52
Milling			
Flour yield			
Clean wheat basis, %	75.2	75.5	73.7
0.50% ash basis, %	74.2	74.5	75.2
Flour			
Protein content, %	13.1	12.2	13.1
Wet gluten content, %	35.9	32.4	35.8
Ash content, %	0.52	0.52	0.47
Grade colour, Satake units	-2.0	-2.6	-1.6
AGTRON colour, %	77	82	71
Starch damage, %	7.7	8.0	8.8
α-amylase activity, units/g	2.0	3.0	3.5
Amylograph peak viscosity, BU	715	640	445
Maltose value, g/100g	2.5	2.6	3.0
Farinogram			
Absorption, %	68.0	67.9	68.7
Development time, min	6.50	6.50	5.50
Mixing tolerance index, BU	40	35	35
Stability, min	6.5	8.5	8.5
Extensogram			
Length, cm	21	21	21
Height at 5 cm, BU	285	270	320
Maximum height, BU	445	480	540
Area, cm^2	136	136	165
Alveogram			
Length, mm	109	93	71
P (height x 1.1), mm	116	128	165
W, x 10^{-4} joules	415	415	445
Baking (Canadian short process baking test)			
Absorption, %	69	69	73
Mixing energy, W-h/kg	5.8	6.7	6.7
Mixing time, min	3.8	4.5	4.6
Loaf volume, cm^3/100 g flour	1085	1085	1095

[1] 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 2005 and stored 2004 harvest survey Wheat, No. 1 CWHWS 13.5 and 12.5 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. Note that the 2004 Wheat, No. 2 CWHWS 13.5 straight grade flour is at 72% due to insufficient extraction rate. Flour analytical and physical dough properties of the composites are shown in Table 16 for the Wheat, No. 1 and No. 2 CWHWS 13.5% minimum protein segregates. Baking data using the Wheat, No. 1 CWHWS 13.5 straight grade and 45% patent flours and the Wheat, No. 2 CWHWS 13.5 straight grade flour are shown in Table 17. Yellow alkaline and white salted noodle data using the straight grade and 60% patent flours are shown in Table 18 and 19. The flour analytical and physical dough properties and baking data are also available for Wheat, No. 1 CWHWS and No. 2 CWHWS 12.5 (Tables 20 and 21).

Wet gluten content of the 2005 Wheat, No. 1 CWHWS 13.5 straight grade flour and patent flours was lower than in 2004. The Wheat, No. 2 CWHWS 13.5 straight grade and patent flours had wet gluten content that was comparable to last year. Flour grade colour and AGTRON values for the all of the 2005 straight grade and patent flours showed improvement over 2004.

Farinograph data show lower absorption in this year's Wheat, No. 1 and No. 2 CWHWS straight grade and patent flours compared to 2004. Dough strength for the Wheat, No. 1 CWHWS and Wheat, No. 2 CWHWS straight grade and patent flours was generally comparable to the 2004 flours. The Wheat, No. 1 CWHWS flours show slightly longer dough development times than the corresponding 2004 flours.

Data are shown in Table 17 for sponge-and-dough and CSP baking quality of the Wheat, No. 1 CWHWS and Wheat, No. 2 CWHWS straight grade and 45% patent 13.5% protein segregates. The 2005 baking absorption is 1% lower for the Wheat, No. 1 CWHWS straight grade and patent flour using the CSP baking method compared to 2004, while the Wheat, No. 2 CWHWS shows similar absorption for the straight grade flour and 2% lower absorption for the patent flour. Mixing times and mixing energy requirements are higher for both Wheat, No.1 CWHWS flours and for the Wheat, No. 2 CWHWS straight grade flour. CSP loaf volumes are similar to 2004, and the straight grade flour shows an improvement in crumb structure. Sponge-and-dough mixing time is slightly longer for 2005 straight grade flour. Mixing time and mixing energy are slightly higher for the Wheat, No. 1 CWHWS 2005 patent flour, but are slightly lower for the No. 2. Sponge-and-dough loaf volumes are comparable to slightly better relative to last year.

Table 16 - Wheat, No. 1 and Wheat, No. 2 Canada Western Hard White Spring – 13.5% protein segregate
Analytical data and physical dough properties
Comparative Bühler mill flour data – 2005 and 2004 harvest survey composites[1]

Wheat, No. 1 Canada Western Hard White Spring

	74% Straight grade		60% Patent		45% Patent	
Quality parameter[2]	2005	2004	2005	2004	2005	2004
Flour						
Yield, %	74.0	74.0	60.0	60.0	45.0	45.0
Protein content, %	13.0	13.2	12.7	12.8	12.3	12.3
Wet gluten content, %	35.2	36.3	35.0	35.8	33.9	34.4
Ash content, %	0.40	0.39	0.37	0.36	0.35	0.32
Grade colour, Satake units	-3.6	-3.1	-4.3	-4.1	-4.6	-4.4
AGTRON colour, %	89	84	96	95	100	97
Amylograph peak viscosity, BU	970	820	980	880	1015	920
Starch damage, %	5.8	5.9	6.0	6.1	6.2	6.3
Farinogram						
Absorption, %	63.6	64.6	64.2	65.0	64.0	64.8
Development time, min	8.25	7.50	9.25	8.00	9.00	10.00
Mixing tolerance index, BU	30	25	15	15	15	20
Stability, min	10.0	9.5	17.0	17.0	20.5	19.0

Wheat, No. 2 Canada Western Hard White Spring

	Straight grade		60% Patent		45% Patent	
Quality parameter[2]	74% - 2005	72% - 2004[3]	2005	2004	2005	2004
Flour						
Yield, %	74.0	72.0	60.0	60.0	45.0	45.0
Protein content, %	13.0	13.1	12.7	12.7	12.4	12.3
Wet gluten content, %	36.6	36.6	35.4	35.5	34.7	34.1
Ash content, %	0.45	0.43	0.38	0.35	0.36	0.34
Grade colour, Satake units	-2.7	-1.9	-3.5	-3.2	-3.9	-3.6
AGTRON colour, %	84	76	92	88	95	92
Amylograph peak viscosity, BU	790	515	875	560	890	575
Starch damage, %	5.8	6.1	5.9	6.4	6.1	6.6
Farinogram						
Absorption, %	63.6	65.4	64.9	64.8	63.3	64.7
Development time, min	6.75	6.75	9.00	8.50	7.00	9.00
Mixing tolerance index, BU	30	35	25	25	20	30
Stability, min	8.5	8.0	11.0	11.5	10.0	13.0

[1] The 2004 composite was stored and milled the same day as the 2005
[2] Data reported on 14.0% moisture basis
[3] Insufficient extraction rate

Table 17 - Wheat, No. 1 and Wheat, No. 2 Canada Western Hard White Spring – 13.5% protein segregate
Baking quality data
Comparative Bühler mill flour data – 2005 and 2004 harvest survey composites[1]

Wheat, No. 1 Canada Western Hard White Spring

Quality parameter	74% Straight grade		45% Patent	
	2005	2004	2005	2004
Sponge-and-dough baking test	40 ppm ascorbic acid		40 ppm ascorbic acid	
Absorption, %	66	66	66	66
Mixing energy dough stage, W-h/kg	4.5	4.5	5.1	4.6
Mixing time dough stage, min	3.1	2.8	3.3	3.1
Loaf volume, cm^3/100 g flour	1080	1055	1005	1010
Appearance	7.9	7.9	7.7	7.8
Crumb structure	6.6	6.3	6.0	6.0
Crumb color	7.8	7.8	7.8	7.9
Canadian short process baking test	150 ppm ascorbic acid		150 ppm ascorbic acid	
Absorption, %	67	68	67	68
Mixing energy, W-h/kg	6.6	5.7	6.9	6.2
Mixing time, min	4.3	4.2	4.8	4.4
Loaf volume, cm^3/100 g flour	1125	1095	1080	1085
Appearance	7.7	7.9	7.8	7.9
Crumb structure	6.8	6.3	6.2	6.2
Crumb color	7.9	7.8	8.0	8.0

Wheat, No. 2 Canada Western Hard White Spring

Quality parameter	Straight grade		45% Patent	
	74% - 2005	72% - 2004[2]	2005	2004
Sponge-and-dough baking test	40 ppm ascorbic acid		40 ppm ascorbic acid	
Absorption, %	65	66	64	66
Mixing energy dough stage, W-h/kg	4.1	4.1	4.4	4.8
Mixing time dough stage, min	2.6	2.5	2.8	3.1
Loaf volume, cm^3/100 g flour	1020	995	1040	995
Appearance	7.5	7.7	7.8	7.6
Crumb structure	5.9	6.2	6.2	6.2
Crumb color	7.7	7.8	7.8	7.7
Canadian short process baking test	150 ppm ascorbic acid		150 ppm ascorbic acid	
Absorption, %	68	68	66	68
Mixing energy, W-h/kg	6.4	5.7	6.3	6.7
Mixing time, min	4.2	4.1	4.4	4.7
Loaf volume, cm^3/100 g flour	1110	1105	1115	1095
Appearance	7.5	7.7	7.8	7.7
Crumb structure	6.3	6.2	6.3	6.2
	7.8	7.8	7.8	8.0

[1] The 2004 composite was stored and milled the same day as the 2005
[2] Insufficient extraction rate

Yellow alkaline noodles

Data for Wheat, No. 1 CWHWS 13.5 and Wheat, No. 2 CWHWS 13.5 noodles are shown in Tables 18 and 19, respectively. Examination of the colour characteristics of the raw yellow alkaline noodles prepared from 13.5% protein segregate 60% patent flour at 2 hours indicated a slight improvement in brightness, L*, relative to 2004. While almost identical a* values were observed a significant improvement in noodle b* was detected in the 2005 noodles relative to 2004. Aging the patent noodles for 24 hours showed the 2005 material maintained improved noodle brightness and a modest improvement in b* values. Noodles prepared from the CWHWS straight grade flour continued to demonstrate the improved noodle brightness and yellowness at 2 hours after production over last year's corresponding samples. These benefits were retained with aging but the differences between the crop years were minimized. Analysis of the 2005 CWHWS cooked noodle texture characteristics for noodles prepared from the patent flour indicated a modest decrease in all texture characteristics relative to the corresponding 2004 material. No differences were observed in straight grade flour noodle texture attributes from either year with exception of bite, MCS, where a slight decline was noted in the 2005 sample.

White salted noodles

Data for the colour of raw white salted noodles prepared from 2005 Wheat, No. 1 CWHWS 13.5 flours and Wheat, No. 2 CWHWS 13.5 flours can be seen in Tables 18 and 19, respectively. White salted noodles prepared from CWHWS using 60% patent flour continued to display improved brightness, L*, relative to the corresponding 2004 noodles at both time intervals. The CWHWS noodles, however, did display a slightly higher yellowness, b*, at both 2 and 24 hours. Noodles prepared from the straight grade flour also displayed a slightly improved brightness, L*, over the 2004 sample. This improvement in brightness relative to 2004 was enhanced when the noodles were allowed to age 24 hours. As observed in the 2005 patent noodles, the 2005 straight grade noodles did exhibit slightly higher b* values than the 2004 material.

Minimal differences were observed between 2005 and 2004 60% patent noodle cooked texture attributes with the exception of noodle bite, MCS, which was slightly lower in 2005 as compared to last year. Examination of the texture characteristics of noodles prepared from the straight grade flour reflected a similar trend with the greatest difference being noted with MCS.

Comparative Buhler milling flour analytical and physical dough property data may be found for Wheat, No. 1 and No. 2 CWHWS 12.5% protein segregate in Table 20. Corresponding CSP and sponge-and-dough baking data are in Table 21. Wheat, No. 1 and No. 2 CWHWS 12.5% noodle data are shown in Tables 22 and 23, respectively.

Table 18 - Wheat, No. 1 Canada Western Hard White Spring – 13.5% protein segregate
Noodle quality data
Comparative Bühler mill data – 2005 and 2004 harvest survey composite samples[1]

	74% Straight grade		60% patent	
Quality parameter	2005	2004	2005	2004
Fresh alkaline noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	79.3 (73.4)	78.4 (73.0)	80.5 (76.7)	79.8 (76.0)
Redness, a*	-0.17 (0.29)	-0.24 (0.44)	-0.16 (0.20)	0.17 (0.27)
Yellowness, b*	28.4 (28.6)	26.5 (27.8)	28.1 (28.9)	26.2 (28.3)
Cooked colour				
Brightness, L*	71.5	70.6	72.3	71.6
Redness, a*	-2.34	-2.16	-2.51	-2.39
Yellowness, b*	29.2	28.7	29.3	29.1
Texture				
Thickness, mm	2.31	2.34	2.33	2.35
RTC, %	24.6	24.2	23.8	24.8
Recovery, %	35.8	35.6	35.0	36.3
MCS, g/mm^2	33.5	35.0	33.8	35.9
Fresh white salted noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	80.5 (76.2)	80.1 (74.7)	82.6 (77.9)	81.9 (77.4)
Redness, a*	2.42 (3.13)	2.46 (3.24)	2.12 (2.43)	2.12 (2.45)
Yellowness, b*	24.2 (24.7)	23.0 (24.2)	23.1 (24.4)	22.6 (24.1)
Cooked colour				
Brightness, L*	77.0	76.4	78.1	77.5
Redness, a*	0.57	0.76	0.36	0.35
Yellowness, b*	19.4	19.3	19.6	19.2
Texture				
Thickness, mm	2.47	2.52	2.45	2.50
RTC, %	18.9	19.8	18.5	18.4
Recovery, %	27.2	28.2	26.7	27.1
MCS, g/mm^2	28.0	30.0	28.1	29.3

[1] The 2004 composites were stored and milled the same day as the respective 2005 composite and replicated the following day in reverse order.

Table 19 - Wheat, No. 2 Canada Western Hard White Spring – 13.5% protein segregate
Noodle quality data
Comparative Bühler mill data – 2005 and 2004 harvest survey composite samples[1]

	Straight grade		60% patent	
Quality parameter	74% - 2005	72% - 2004[2]	2005	2004
Fresh alkaline noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	77.4 (71.7)	77.0 (71.6)	79.3 (75.3)	79.4 (74.9)
Redness, a*	0.07 (0.94)	0.14 (1.04)	0.01 (0.69)	0.07 (0.38)
Yellowness, b*	26.9 (27.8)	26.9 (28.4)	25.6 (27.8)	25.3 (27.4)
Cooked colour				
Brightness, L*	69.8	69.1	71.4	69.9
Redness, a*	-1.97	-1.86	-2.22	-2.03
Yellowness, b*	27.2	27.9	27.3	28.4
Texture				
Thickness, mm	2.34	2.39	2.36	2.34
RTC, %	24.4	24.5	25.3	24.9
Recovery, %	34.9	36.1	35.3	35.9
MCS, g/mm^2	34.3	36.1	36.3	36.8
Fresh white salted noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	79.5 (74.5)	79.4 (72.2)	80.7 (76.4)	81.4 (75.6)
Redness, a*	2.62 (3.38)	2.58 (3.21)	2.33 (2.85)	2.24 (2.58)
Yellowness, b*	23.0 (24.2)	22.6 (22.3)	23.0 (24.5)	21.7 (23.3)
Cooked colour				
Brightness, L*	76.0	75.6	76.8	76.2
Redness, a*	0.80	0.82	0.93	0.56
Yellowness, b*	18.8	18.3	20.1	18.7
Texture				
Thickness, mm	2.44	2.54	2.44	2.50
RTC, %	19.7	19.9	17.5	19.0
Recovery, %	27.7	29.1	26.5	27.8
MCS, g/mm^2	30.2	31.7	29.1	31.0

[1] The 2004 composites were stored and milled the same day as the respective 2005 composite and replicated the following day in reverse order.

[2] Insufficient extraction rate

Table 20 - Wheat, No. 1 and Wheat, No. 2 Canada Western Hard White Spring – 12.5% protein segregate
Analytical data and physical dough properties
Comparative Bühler mill flour data – 2005 and 2004 harvest survey composites[1]

Wheat, No. 1 Canada Western Hard White Spring

	74% Straight grade		60% Patent		45% Patent	
Quality parameter[2]	2005	2004	2005	2004	2005	2004
Flour						
Yield, %	74.0	74.0	60.0	60.0	45.0	45.0
Protein content, %	12.1	12.3	12.0	11.9	11.6	11.6
Wet gluten content, %	32.2	33.3	32.0	32.5	31.2	31.3
Ash content, %	0.43	0.43	0.38	0.36	0.35	0.34
Grade colour, Satake units	-3.6	-3.2	-4.3	-4.3	-4.7	-4.7
AGTRON colour, %	89	85	98	96	100	100
Amylograph peak viscosity, BU	940	785	1000	840	1010	860
Starch damage, %	6.0	6.3	6.1	6.4	6.5	6.7
Farinogram						
Absorption, %	63.1	64.2	62.9	63.9	62.9	63.7
Development time, min	7.00	7.50	9.75	9.00	11.25	9.00
Mixing tolerance index, BU	30	30	10	15	10	15
Stability, min	10.5	9.5	18.5	16.5	21.5	21.5

Wheat, No. 2 Canada Western Hard White Spring

	74% Straight grade		60% Patent		45% Patent	
Quality parameter[2]	2005	2004	2005	2004	2005	2004
Flour						
Yield, %	74.0	74.0	60.0	60.0	45.0	45.0
Protein content, %	12.2	12.3	11.9	11.9	11.7	11.5
Wet gluten content, %	33.2	33.6	32.5	32.6	31.8	31.6
Ash content, %	0.43	0.43	0.38	0.37	0.36	0.35
Grade colour, Satake units	-2.8	-2.0	-3.7	-3.2	-4.0	-3.7
AGTRON colour, %	84	78	93	88	97	93
Amylograph peak viscosity, BU	725	570	795	645	815	665
Starch damage, %	6.0	6.7	6.1	6.9	6.2	7.0
Farinogram						
Absorption, %	62.9	64.1	62.7	64.2	62.7	64.3
Development time, min	6.70	6.00	7.00	8.50	9.00	10.00
Mixing tolerance index, BU	30	25	20	25	25	25
Stability, min	9.5	9.5	12.0	13.0	12.0	13.5

[1] The 2004 composite was stored and milled the same day as the 2005
[2] Data reported on 14.0% moisture basis

Table 21 - Wheat, No. 1 and Wheat, No. 2 Canada Western Hard White Spring – 12.5% protein segregate
Baking quality data
Comparative Bühler mill data – 2005 and 2004 harvest survey composites[1]

Wheat, No. 1 Canada Western White Spring

	74% Straight grade		45% Patent	
Quality parameter	2005	2004	2005	2004
Sponge-and-dough baking test	40 ppm ascorbic acid		40 ppm ascorbic acid	
Absorption, %	65	66	65	66
Mixing energy dough stage, W-h/kg	4.8	4.6	50	4.5
Mixing time dough stage, min	3.3	2.9	3.7	3.2
Loaf volume, cm^3/100 g flour	1000	1035	985	990
Appearance	7.4	7.7	7.9	7.4
Crumb structure	6.0	6.0	6.2	6.3
Crumb color	7.8	7.8	7.7	7.8
Canadian short process baking test	150 ppm ascorbic acid		150 ppm ascorbic acid	
Absorption, %	66	67	66	67
Mixing energy, W-h/kg	6.7	6.3	7.4	6.7
Mixing time, min	4.8	4.3	5.3	4.6
Loaf volume, cm^3/100 g flour	1075	1065	1070	1070
Appearance	7.8	7.5	7.4	7.7
Crumb structure	6.6	6.3	6.3	6.3
Crumb color	7.7	7.9	7.9	7.8

Wheat, No. 2 Canada Western White Spring

	74% Straight grade		45% Patent	
Quality parameter	2005	2004	2005	2004
Sponge-and-dough baking test	40 ppm ascorbic acid		40 ppm ascorbic acid	
Absorption, %	63	66	64	65
Mixing energy dough stage, W-h/kg	4.7	4.1	4.4	4.4
Mixing time dough stage, min	3.1	2.7	3.3	3.1
Loaf volume, cm^3/100 g flour	970	960	975	960
Appearance	7.2	7.3	6.9	7.4
Crumb structure	6.2	5.9	6.2	6.2
Crumb color	7.7	7.7	7.8	7.7
Canadian short process baking test	150 ppm ascorbic acid		150 ppm ascorbic acid	
Absorption, %	66	67	66	68
Mixing energy, W-h/kg	6.7	6.4	5.6	6.9
Mixing time, min	4.5	4.3	4.2	4.2
Loaf volume, cm^3/100 g flour	1075	1060	1080	1055
Appearance	7.8	7.4	7.5	7.4
Crumb structure	6.0	6.0	6.3	6.3
Crumb color	7.8	7.8	7.8	7.9

[1] The 2004 composite was stored and milled the same day as the 2005

Table 22 - Wheat, No. 1 Canada Western Hard White Spring – 12.5% protein segregate
Noodle quality data
Comparative Bühler mill data – 2005 and 2004 harvest survey composite samples[1]

	74% Straight grade		60% patent	
Quality parameter	2005	2004	2005	2004
Fresh alkaline noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	79.1 (74.0)	78.7 (73.4)	81.3 (77.4)	80.9 (77.2)
Redness, a*	-0.22 (0.45)	-0.13 (0.73)	-0.33 (-0.04)	-0.30 (0.06)
Yellowness, b*	28.5 (29.1)	28.1 (29.1)	27.4 (28.4)	27.1 (28.5)
Cooked colour				
Brightness, L*	70.7	70.3	72.2	71.4
Redness, a*	-2.37	-2.18	-2.49	-2.55
Yellowness, b*	30.0	29.4	30.0	29.8
Texture				
Thickness, mm	2.28	2.30	2.27	2.30
RTC, %	22.5	22.6	22.2	22.0
Recovery, %	32.9	33.5	32.9	32.9
MCS, g/mm^2	29.1	30.7	30.3	30.4
Fresh white salted noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	80.9 (76.4)	81.0 (73.8)	82.1 (78.6)	82.5 (77.3)
Redness, a*	2.28 (2.97)	2.44 (3.00)	2.06 (2.51)	2.04 (2.45)
Yellowness, b*	23.4 (24.4)	23.0 (23.4)	23.4 (25.0)	22.5 (24.2)
Cooked colour				
Brightness, L*	77.0	76.4	77.4	77.2
Redness, a*	0.54	0.67	0.31	0.24
Yellowness, b*	19.3	19.1	19.8	19.5
Texture				
Thickness, mm	2.41	2.49	2.44	2.48
RTC, %	18.3	19.2	17.6	17.8
Recovery, %	27.2	27.7	26.9	26.7
MCS, g/mm^2	26.2	27.8	27.7	27.2

[1] The 2004 composites were stored and milled the same day as the respective 2005 composite and replicated the following day in reverse order.

Table 23 - Wheat, No. 2 Canada Western Hard White Spring – 12.5% protein segregate
Noodle quality data
Comparative Bühler mill data – 2005 and 2004 harvest survey composite samples[1]

	74% Straight grade		60% patent	
Quality parameter	2005	2004	2005	2004
Fresh alkaline noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	78.8 (73.0)	78.1 (72.1)	80.6 (76.3)	80.8 (76.2)
Redness, a*	-0.16 (0.79)	-0.08 (0.94)	-0.15 (0.39)	-0.12 (0.32)
Yellowness, b*	26.5 (28.6)	26.5 (27.9)	26.4 (28.0)	25.2 (27.9)
Cooked colour				
Brightness, L*	70.6	69.2	71.1	71.0
Redness, a*	-2.05	-1.78	-2.25	-2.16
Yellowness, b*	28.7	28.6	28.9	28.9
Texture				
Thickness, mm	2.31	2.35	2.32	2.32
RTC, %	23.3	23.7	23.4	23.1
Recovery, %	33.9	34.7	34.5	33.9
MCS, g/mm^2	31.0	32.1	32.3	31.4
Fresh white salted noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	80.1 (74.7)	80.2 (72.2)	81.9 (76.9)	82.7 (76.0)
Redness, a*	2.42 (3.21)	2.41 (3.04)	2.12 (2.53)	2.08 (2.50)
Yellowness, b*	22.8 (24.1)	21.5 (22.6)	22.3 (24.3)	21.2 (23.0)
Cooked colour				
Brightness, L*	76.3	75.5	76.9	76.0
Redness, a*	0.59	0.83	0.47	0.48
Yellowness, b*	18.8	18.7	19.4	19.0
Texture				
Thickness, mm	2.43	2.46	2.40	2.53
RTC, %	18.3	18.8	17.8	18.7
Recovery, %	27.4	27.7	26.5	27.2
MCS, g/mm^2	27.8	27.3	27.1	28.7

[1] The 2004 composites were stored and milled the same day as the respective 2005 composite and replicated the following day in reverse order.

Canada Prairie Spring Red wheat

The mean protein content for CPSR for 2005 and the previous two years is shown in Table 1. The mean protein content for the 2005 crop is estimated to be 11.1%, 0.6% lower than last year and 1.3% lower than 2003.

Table 24 summarizes the quality for Wheat, No. 1 CPSR and for Wheat, No. 2 CPSR with ten year average data from 1995 to 2004 for both grades for comparison. Test weight for both grades is lower this year compared with the long term averages. Protein and wheat ash content are also lower this year. Falling number indicates that the wheat is sound. Kernel texture is slightly harder than the long term as shown by lower PSI and higher starch damage values. Flour yields are somewhat lower than seen in the long term, however, flour grade and Agtron colour are considerably improved.

Farinograph absorption is higher than seen in the ten year average, and dough strength is considerably improved, largely as the result of new varieties released over the past several years. The increased strength is also evident in the extensograph and alveograph results, and in the remix-to-peak mixing times. Remix-to-peak baking absorptions are slightly higher than the longer term. Loaf volumes are comparable to the ten year average, in spite of the lower protein content of this year's CPSR crop.

Canadian Wheat Board variety survey results indicate that 5700PR has overtaken AC Crystal as the most popular variety, at 35% of the seeded acreage versus 33% for AC Crystal. AC Foremost accounts for approximately 14% of the seeded acreage.

Table 24 - Wheat, No. 1 and Wheat, No. 2 Canada Prairie Spring Red Quality data for 2005 harvest survey grade composite samples[1]

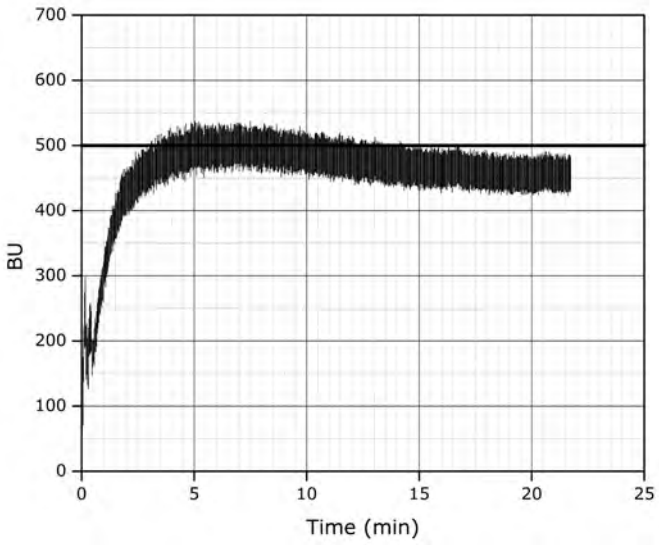
Quality parameter[2]	CPSR No. 1		CPSR No. 2	
	2005	1995-04 mean	2005	1995-04 mean
Wheat				
Test weight, kg/hL	80.8	81.1	78.3	79.0
Weight per 1000 kernels, g	38.8	39.6	38.5	37.4
Protein content, %	11.2	12.1	11.1	11.7
Protein content, % (dry matter basis)	13.0	14.1	12.9	13.6
Ash content, %	1.45	1.51	1.43	1.52
Falling number, s	350	351	315	269
Flour yield, %	74.7	75.1	73.4	74.2
PSI, %	56	57	54	58
Flour				
Protein content, %	10.3	11.3	10.3	10.7
Wet gluten content, %	25.8	29.7	25.2	28.6
Ash content, %	0.49	0.47	0.50	0.49
Grade colour, Satake units	-2.4	-1.6	-1.5	-0.6
AGTRON colour, %	79	70	70	63
Starch damage, %	7.7	6.4	8.2	6.7
Amylograph peak viscosity, BU	575	596	325	249
Maltose value, g/100g	2.5	2.0	2.8	2.4
Farinogram				
Absorption, %	63.9	61.7	64.9	61.8
Development time, min	8.25	5.63	6.25	4.75
Mixing tolerance index, BU	35	42	35	48
Stability, min	8.5	7.8	10.0	6.9
Extensogram				
Length, cm	20	21	18	22
Height at 5 cm, BU	390	321	370	297
Maximum height, BU	690	599	635	507
Area, cm^2	180	167	155	148
Alveogram				
Length, mm	102	131	86	115
P (height x 1.1), mm	115	87	124	90
W, x 10^{-4} joules	373	357	366	329
Baking (Canadian short process baking test)				
Absorption, %	62	61	61	60
Remix time, min	3.3	2.3	3.1	2.0
Loaf volume, cm^3	765	771	750	720

[1] Insufficient number of samples received in 2004 to provide results representative for this class and grade.

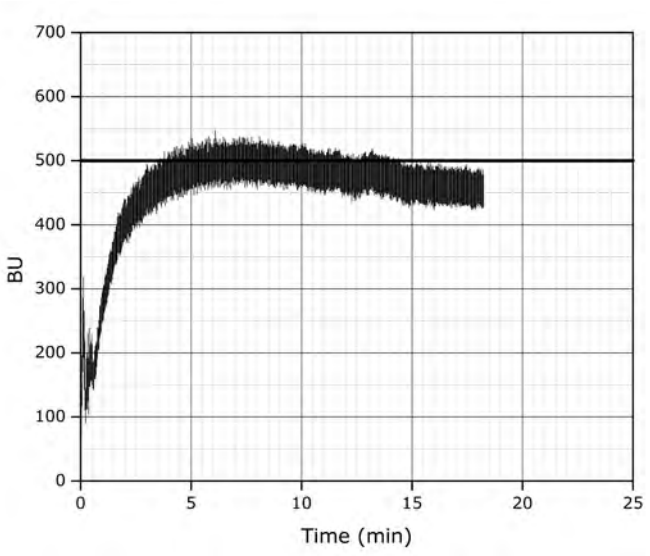
[2] Unless otherwise specified, data are reported on a 13.5% moisture basis for wheat and a 14.0% moisture basis for flour.

Farinograms
2005 crop composite samples

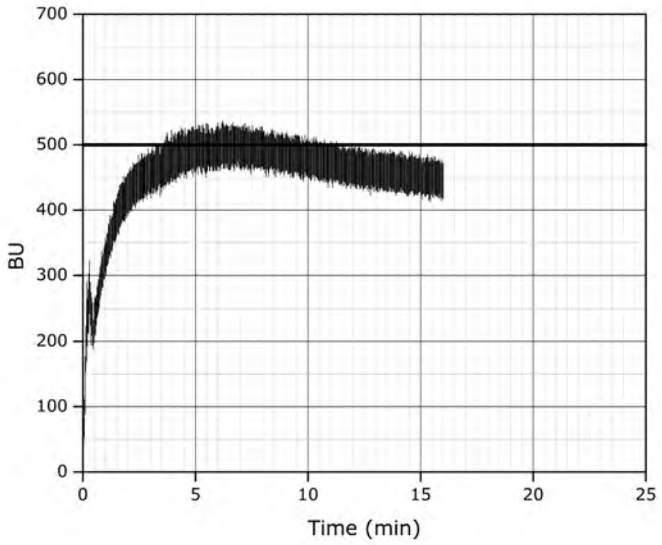
Wheat, No. 1 Canada Western Red Spring – 13.5% protein segregate



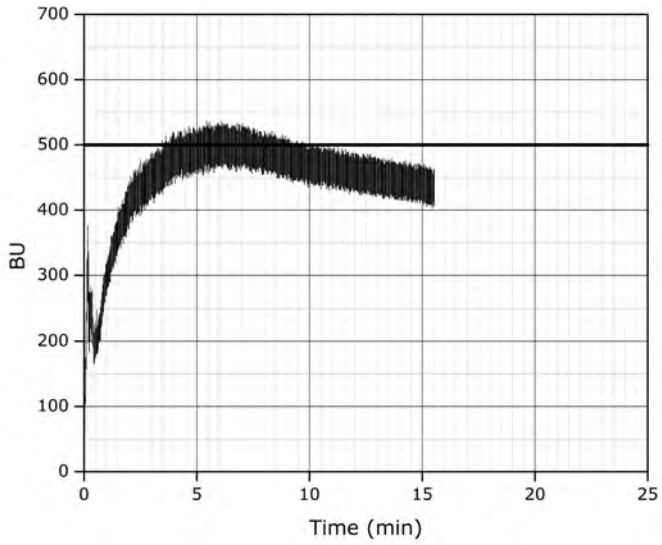
Wheat, No. 2 Canada Western Red Spring – 13.5% protein segregate



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



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



Wheat, No. 1 Canada Prairie Spring Red