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Quality of western Canadian wheat 2006

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Good to excellent moisture levels during seeding in the Prairies combined with above normal temperatures through the growing season resulted in lowered production prospects, but above average quality. Planting progress was dependent on the location. Heavy rains in June in northern growing areas of Saskatchewan resulted in approximately 800,000 hectares going unseeded. Well below average precipitation across the Prairies in July and August combined with high temperatures stressed crops and lowered yield potential. The dry conditions did lower disease pressures and advanced crop development two to three weeks ahead of normal in most growing areas. Spring wheat harvesting proceeded rapidly starting in mid-August and 90 percent of the crop was harvested by mid-September.

Despite the hot, dry conditions during the summer, yields were close to average. Spring wheat production levels are estimated at 18.8 million tonnes by Statistics Canada[1], an increase of about 2.3% over last year, and 10% higher than the 10 year average. Durum wheat production is estimated at 3.5 million tonnes, significantly lower than the 5.5 million tonnes reported in 2005, mainly due to reduced seeded area.

Overall protein content of Canada Western Red Spring wheat, at 13.4 %, is slightly higher than last year. High grade Canada Western Red Spring wheat shows similar test weight, similar seed size, similar wheat falling number, lower absorption and comparable farinograph dough properties relative to last year, but higher extensograph and alveograph strength. Overall protein content of Canada Western Amber Durum wheat at 12.8% is higher than last year. High grade Canada Western Amber Durum wheat shows good falling number values indicative of sound kernel characteristics, milling quality comparable to the long term average and improved gluten strength relative to the long term average. Overall protein content of Canada Western Hard White Spring wheat is higher than last year, at 13.2%. Canada Western Hard White Spring wheat is showing high test weight, high falling number and amylograph peak viscosities and high wet gluten content this year; flour colour is not as bright as last year, and farinograph absorption is lower, but extensograph and alveograph show strong, extensible dough properties.

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.

[1] Statistics Canada, *Field Crop Reporting Series,* Vol. 85, No. 7, Oct. 5, 2006

Eight classes of Canadian wheat

This report presents information on the quality of the top grades of Canada Western Red Spring, Canada Western Amber Durum and Canada Western Hard White Spring wheat for the 2006 crop. Further information on other classes of western Canadian wheat is not reported for the 2006 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 (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 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

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 and provide information on relative performance 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 contribute to this variation.

Background for the 2006 crop

The Canadian Wheat Board provided background information for the 2006 crop.

Seeding conditions

The soil moisture supply in Western Canada was good-to-excellent in most regions for seeding of the 2006 crop, although excess moisture caused delays in northern Saskatchewan. The source of the excess moisture was precipitation received during the 2005 harvest season, as the winter precipitation was generally below normal. The exception to this winter precipitation trend was in northeastern Saskatchewan, which received near record amounts of snowfall during the winter. The combination of above-normal snowfall and excessively wet soils from the fall precipitation caused planting delays in northeastern Saskatchewan. Conversely, the southwestern areas of Saskatchewan and the Peace River region were quite dry during the seeding period. This caused some seeding delays, as farmers waited for rainfall before seeding crops.

Seeding began in the southern areas of the Prairies at the end of April, with slow progress reported until the second week of May. Progress rapidly accelerated during the middle of May and reached 75-per-cent completion by May 22. Planting progress slowed during the next few weeks as heavy rains fell in the northern growing areas of Saskatchewan. Seeding continued in northern Saskatchewan into the third week of June, but farmers were unable to plant all the intended area to annual crops. Approximately 800,000 hectares were left fallow due to the wet conditions in northeastern Saskatchewan. Temperatures were mostly above normal during seeding, which resulted in rapid germination and emergence of the crop. Crops in the southern and central Prairies were about one week ahead of normal development by the end of June.

Compared to 2005-06, the spring wheat area in Western Canada increased by 13.2 per cent this year, to 8.06 million hectares and the winter wheat area jumped to 289,000 hectares (an increase of 77 per cent). Area seeded to durum decreased by 26.4 per cent to 1.72 million hectares.

Growing conditions

The above-normal temperatures experienced during the spring continued through the months of July and August. Average monthly temperatures were generally one to four degrees above normal across the Prairies, with the largest deviations seen in the eastern growing areas. Maximum temperature deviations were even higher, but relatively cool evening temperatures helped crops survive the hot weather. Precipitation amounts were well below normal in all areas of the Prairies during the July through August period. Southern and central areas received between 25 and 50 per cent of normal precipitation, while northern growing areas received between 50 and 75 per cent of normal. The combination of hot temperatures and a lack of moisture stressed crops and lowered yield potential. The dry conditions did keep disease pressure in the crop to a minimum and the stressful conditions advanced crop development two to three weeks ahead of normal in most growing areas. The northeastern areas of Saskatchewan were an exception to this trend, as crop development was close to normal due to the late planting during the spring. Winter cereal crop development was rapid, with harvest beginning in July in some southern areas. Spring cereal harvest was also early and most regions were beginning to harvest by mid-August.

Harvest conditions

The early start to the harvest was a sharp contrast to the delayed harvests of the previous two growing seasons. The hot, mostly dry conditions experienced during August resulted in rapid winter cereal harvest during the first half of the month. Over 90% of the winter wheat was harvested by mid-August. Spring wheat harvesting proceeded rapidly in the second half of August and approximately 40% of the spring cereal crops were harvested at the end of August. The dry, warm conditions continued into September, which allowed 90% most of spring wheat crops to be harvested by the mid-month. Cooler, wet conditions prevailed in the last half of September, which slowed the harvest and prevented completion of the harvest until October.

Production and grade information

The hot, dry growing season with timely rainfalls in Western Canada during 2006 resulted in above-average quality in the wheat and durum crops, with approximately 90% grading No. 2 or better. Total wheat production for Western Canada is estimated at 23.4 million tonnes, with spring wheat production levels are estimated at 18.8 million tonnes by Statistics Canada[1], an increase of 2.3% over last year. Durum wheat production is estimated at 3.5 million tonnes, significantly lower than the 5.5 million tonnes reported in 2005. Winter wheat production in Western Canada is expected to be one million tonnes. Spring wheat yields are forecast to reach 2.4 tonnes per hectare, while durum yields are only 2.1 tonnes per hectare.

Overall protein content of Canada Western Red Spring wheat, at 13.4%, is comparable to last year. High grade Canada Western Red Spring wheat shows similar test weight, similar seed size, similar wheat falling number, lower absorption and comparable farinograph dough properties relative to last year,

but stronger extensograph and alveograph dough properties than last year. Overall protein content of Canada Western Amber Durum wheat at 12.8% is 0.5% higher than last year.

The lower grade CWRS resulted from a range of degrading factors including orange wheat blossom midge damage, hard vitreous kernels content, ergot, immature, green and mildew. Lower grade CWAD resulted primarily from low hard vitreous kernel content, the presence of immature and light weight kernels, and severe midge damage. Lower grade CWHWS resulted from mildew, midge damage, ergot, green and immature. Tight grading tolerances for these factors ensure that the high inherent quality of the top milling grades of Canada Western Red Spring, Canada Western Hard White Spring and Canada Western Amber Durum wheat are protected.

[1] Statistics Canada, *Field Crop Reporting Series*, Vol. 85, No. 7, Oct. 5, 2006

Protein

Table 1 compares available mean protein values for each of the eight classes of western Canadian wheat surveyed in 2006 to corresponding values obtained in the 2005 and 2004 harvest surveys as of November 15, 2006. Canada Western Red Spring (CWRS) wheat protein content is 0.2% higher for 2006 than for 2005. Canada Western Amber Durum (CWAD) show 0.5% higher protein values compared to 2005. Canada Western Hard White Spring (CWHWS) wheat is 13.2%, 0.3% higher than last year. 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, 2006, 2005 and 2004

	Protein content, %[1]		
Class	2006	2005	2004
CWRS	13.4	13.2	13.3
CWAD	12.8	12.3	12.4
CWHWS	13.2	12.9	13.1
CWES	N/A	N/A	N/A
CPSR	11.8	11.1	11.7
CWRW	10.4	10.6	N/A
CPSW	N/A	N/A	N/A
CWSWS	10.8	10.1	N/A

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 2006. Comparative values for western Canada by grade are shown for 2005 and for the previous 10 years (1996-2005). Figure 2 shows the fluctuations in annual mean protein content since 1927.

The average protein content of the 2006 western Canadian wheat crop is 13.4%, slightly higher than 2005 and 0.3% lower than the ten year average protein content. Protein content is relatively constant across grades, ranging from 13.3% to 13.5%. Manitoba shows higher protein content than Saskatchewan and Alberta.

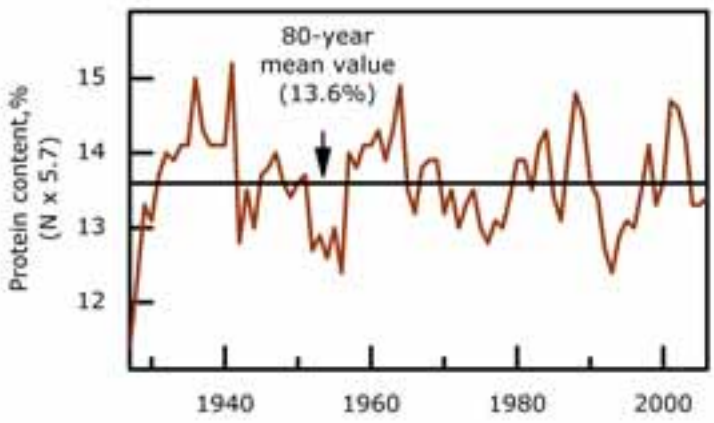
Results from the Canadian Wheat Board 2006 Variety Survey show that Superb has exceeded AC Barrie as the predominant variety in the CWRS class with 18.3% of the seeded acreage, versus 17.8% for AC Barrie. McKenzie ranks third in production with 9.4% of the seeded acreage. The varieties Harvest, AC Intrepid, Prodigy and AC Eatonia each account for 4.5 to 5.6% of the seeded acreage.

Table 2 - Mean protein content of 2006 Canada Western Red Spring wheat, by grade, year and province

	Protein content, %[1]					
	Western Canada			2006		
Grade	2006	2005	1996-2005	Manitoba	Saskatchewan	Alberta
Wheat, No. 1 CWRS	13.3	13.4	13.7	13.9	13.2	13.1
Wheat, No. 2 CWRS	13.5	13.4	13.9	14.1	13.3	13.3
Wheat, No. 3 CWRS	13.5	13.0	13.5	13.8	13.6	12.8
All milling grades	13.4	13.2	13.7	14.0	13.3	13.1

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

Figure 2 – Mean protein content of harvest survey Canada Western Red Spring wheat – 1927-2006



Milling and baking quality – Allis-Chalmers laboratory mill

To assess the quality of the 2006 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 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, 1996-2005.

Test weight of the 2006 No. 1 grade protein segregates is comparable to last year, and to the long term average. Kernel weight is similar to last year and lower than the long term average. Wheat ash is lower compared to last year and is consistent with the long term average. The top grades show similar falling number values to last year, lower α-amylase activities and similar 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 higher than last year, and is consistent with the long term average. Flour grade colour and AGTRON values are similar to last year, and are superior to the long term average.

Farinograph absorption is lower than 2005, but slightly higher than the long term value. Farinograph dough strength properties show stronger than last year and stronger than the long term average. Extensograph and alveograph results

indicate generally stronger dough strength properties compared with last year and the long term average. CSP baking absorption and loaf volume are similar to last year and 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 wheat

Quality data for the 2006 No. 2 CWRS composites and comparative data for the 13.5% minimum protein level for last year's composite and the ten-year average, 1996-2005 are shown in Table 4. Test weight values and kernel weights are higher than last year and the long term average. Wheat ash is lower than last year and the long term average value. Wheat falling number is similar to last year, α-amylase activity is lower and amylograph peak viscosity is considerably higher than last year indicating the soundness of this year's wheat crop.

Wheat particle size index is slightly higher than last year, while flour starch damage values are also higher, suggesting that the wheat is milling harder than last year and the long term average. Milling extraction level of the No. 2 grade 13.5% protein composite is slightly lower than last year and the long term average on 0.50% ash basis. Flour grade and AGTRON colour values are similar to last year, and are better than the long term values. Wet gluten content is slightly higher this year relative to 2005 and is consistent with the long term average.

Farinograph absorption is similar to 2005, and higher than the long term average. Dough strength is comparable to 2005 and stronger than the long term average. Extensograph and alveograph values show stronger dough properties than last year and the long term average. CSP baking absorption and loaf volume are similar to last year and typical for the grade and protein content. Mixing energy requirements are slightly lower than last year.

Quality data can be found for Wheat, No. 3 CWRS in Table 5.

Comparative Bühler laboratory mill flour data

Samples of 2006 and stored 2005 harvest survey No. 1 CWRS 13.5 and 12.5 composites and the No. 2 CWRS 13.5 and 12.5 composites were milled consecutively on the same day on the tandem Buhler laboratory mill into 74% extraction straight grade and 60% long patent flour to allow for direct comparisons.

Milling and baking quality

Wheat, No. 1 Canada Western Red Spring

Data are shown in Table 6 for the Wheat, No. 1 CWRS 13.5% and 12.5% minimum protein segregates. Straight grade and patent flours from the 2006 composites for both the 13.5% and 12.5% protein segregates show similar wet gluten and ash content and starch damage values relative to the composite flours from last year. Flour grade and AGTRON colour values for straight grade and patent flours are comparable to last year.

Farinograph data show comparable absorption in this year's straight grade and patent flours to 2005. Dough development time for the 13.5% protein content straight grade flour is consistent with the 2005 flour, but stability is longer for the 2006 flour. The 2006 patent flours show longer dough development time, but slightly shorter stability than the corresponding 2005 patent flours. The patent flours show longer dough development times and stabilities relative to the corresponding straight grade flours. The 2006 12.5% protein content segregate shows slightly lower absorption than last year for both straight grade and patent flours. The 2006 12.5% straight grade flour is weaker than the corresponding 2005 flour, while the patent flours are comparable in strength.

Data are shown in Table 7 for sponge and dough and CSP baking quality of the 13.5% and 12.5% protein segregates. Sponge and dough baking absorption is similar for both the 2006 straight grade and 60% patent flour compared with the re-milled 2005 flour. Sponge and dough mixing times for this year's crop are comparable to 2005 at both protein levels. Mixing energy is slightly higher for the 13.5% straight grade and patent flour for 2006, but is comparable to the 2005 data at 12.5% protein. Sponge and dough loaf volume is comparable to the 2005 straight grade and 60% patent flours, but the 2006 13.5 % protein 60% patent flour produced loaves with improved appearance and crumb structure.

CSP baking absorptions for 2006 are similar to last year for the 13.5% protein straight grade and for both 13.5% and 12.5% protein patent flours. The 12.5% protein segregate straight grade flour showed lower CSP baking absorption for 2006. Mixing energy requirements are slightly higher this year, with the exception of the 12.5% straight grade flour. The mixing times at both levels of protein were similar when comparing the 2006 flour with their corresponding 2005 flour. Loaf volumes are higher for both the 2006 13.5% protein segregate straight grade and patent flours compared to the 2005 flours, while the 12.5% flours were similar to last year. Loaf appearance showed a significant improvement over last year for both straight grade and patent flours at the 13.5% protein level.

Yellow alkaline noodles

Yellow alkaline noodles were prepared using both protein segregates (12.5% and 13.5%) for straight grade and 60% patent flour with a 1% *kansui* reagent (9:1 sodium and potassium carbonates) at a 32 % water absorption level.

Yellow alkaline noodles from the 2006 Wheat, No. 1 CWRS 13.5 crop composite, for either patent (60%) or straight grade flours, were comparable in raw noodle colour at both 2 and 24 hours after production to that of 2005. Cooked noodle colour was also comparable to last year in all samples. It was not unexpected that the very similar protein contents in both patent and straight grade flours for both years resulted in comparable values for the textural attributes of the cooked noodles (Table 8).

A slight reduction in the patent noodle brightness was observed in the 2006 No. 1 CWRS 12.5 material compared to 2005, although in the straight grade flour this pattern was reversed. In the 2006 noodles a slight improvement in a* values was observed for both patent and straight grade noodles. Aging the noodles for 24 hrs resulted in indistinguishable differences in noodle colour characteristics for either flour between the two years. No meaningful difference was detected in cooked noodle texture attributes for either flour as compared to 2005 samples (Table 9).

White salted noodles

White salted noodles were prepared using a 1% sodium chloride solution at a 30% water absorption level in order to maintain proper dough crumb and sheeting characteristics.

White salted noodle color, prepared from the 2006 Wheat, No. 1 CWRS 13.5 composite using either 60% patent or straight grade flours, was also consistent with the 2005 composite in fresh raw (2 hr) or aged (24 hr) noodle dough. A slight but positive reduction in a* values in the 2006 straight grade noodles was detected. The improved a* values were also noted in the cooked noodle colour measurements, although no discernible difference in either L* or b* from the 2005 composite sample was observed. Texture characteristics of the 2006 composite cooked noodles prepared from both patent and straight grade flours exhibited a slight, but non-significant decrease in texture characteristics as compared with those of the previous year (Table 8).

White salted noodles prepared from either 2006 No. 1 CWRS 12.5 patent or straight grade flours displayed no differences in raw noodle colour characteristics with those prepared from their 2005 counterparts. A slight reduction in cooked texture was observed in both 2006 patent and straight grade flour white salted noodles as compared to the corresponding 2005 noodles (Table 9).

Milling and baking quality

Wheat, No. 2 Canada Western Red Spring wheat

Data are shown in Table 10 for the Wheat, No. 2 CWRS 13.5% and 12.5% minimum protein segregates. The No. 2 CWRS 13.5 patent and straight grade flour, and the No. 2 CWRS 12.5 straight grade flour show similar wet gluten contents for both 2006 and 2005, while the No. 2 CWRS 12.5 60% patent flour is 0.5% higher this year. All flours show similar ash content and flour grade colour. Agtron colour is slightly improved for the 2006 13.5% protein segregates. Amylograph peak viscosity is higher for all No. 2 CWRS 2006 flours. Starch damage is slightly lower for the 2006 12.5% protein segregates, and the 13.5% straight grade and patent flours are comparable between years.

Farinograph absorption is comparable for the 2006 and 2005 No. 2 CWRS 13.5 straight grade and patent flours and for the No. 2 CWRS 12.5 straight grade flour. The 2006 No. 2 CWRS 12.5 60% patent flour shows a 0.7% decline in absorption from last year. The 12.5% minimum protein segregate from 2006 shows shorter dough development times for both the straight grade and 60% patent flours than 2005, but comparable stabilities. The No. 2 CWRS 13.5 straight grade flour is slightly stronger than 2005, with slightly longer dough development time and stability. The 2006 13.5% patent flour, on the other hand, is weaker than the corresponding 2005 patent flour as measured by farinograph.

Sponge and dough baking quality (Table 11) of the 2006 No. 2 CWRS 13.5 straight grade and patent flours showed similar bake absorption to 2005, but lower mixing time and energy requirements. Loaf volumes for the straight grade flour showed an improvement in 2006 over the corresponding flour from 2005. The 2006 and 2005 60% patent flours showed comparable loaf volumes. The No. 2 CWRS 12.5 straight grade and patent flours showed similar trends to the 13.5% protein segregate.

CSP baking results can be seen in Table 11. The 2006 and 2005 straight grade and 60% patent flours show comparable bake absorption at both protein levels. The 2006 No. 2 CWRS 13.5 straight grade flour and patent flour had similar mixing time requirements to the corresponding 2005 flours, but the mixing energy requirement of the 2006 straight grade flour was slightly higher than 2005 and the 2006 patent flour was lower than the 2005 flour. CSP loaf volumes for the No. 2 CWRS 13.5 for 2006 and 2005 were comparable for both straight grade and patent flours. CSP mixing times were 0.5 min shorter for the 2006 No. 2 CWRS 12.5 straight grade flour relative to 2005, but the patent flours were similar. Loaf volume for the 2006 12.5% straight grade flour was lower than for 2005, but the 2006 patent flour showed greater loaf volume than the 2005 patent flour.

Yellow alkaline noodles

Yellow alkaline noodles prepared from the 2006 No.2 CWRS 13.5 patent and straight grade flours (Table 12) displayed raw noodle color characteristics similar to those of 2005 for brightness (L*) and yellowness (b) while a significant improvement in the noodles' redness (a*) was observed. Texture characteristics of both types of cooked noodles were very similar to the 2005 crop.

White salted noodles

Raw white salted patent flour noodles, derived from the No.2 CWRS 13.5 2006 crop were equivalent in brightness and yellowness to the corresponding 2005 crop material. Improvements in redness were evident at both 2 and 24 hrs after production. Similar improvements were also noted in the noodles prepared from the 2006 straight grade flours. Cooked white salted noodle texture was slightly reduced as compared to 2005 for both flours.

Table 3 - Wheat, No. 1 Canada Western Red Spring
Quality data for 2006 harvest survey grade composite samples compared to 2005 and 1996-05 mean

	Minimum protein content			No. 1 CWRS 13.5	
Quality parameter[1]	14.5	13.5	12.5	2005	1996-05 mean
Wheat					
Test weight, kg/hL	81.0	81.5	82.1	81.4	81.7
Weight per 1000 kernels, g	31.6	31.1	32.3	30.9	31.8
Protein content, %	14.8	13.8	12.8	13.8	13.7
Protein content, % (dry matter basis)	17.1	15.9	14.7	16.0	15.9
Ash content, %	1.57	1.55	1.56	1.66	1.56
a-amylase activity, units/g	3.0	3.0	3.5	3.5	4.4
Falling number, s	410	400	390	400	390
PSI,%	53	52	51	52	52
Milling					
Flour yield					
Clean wheat basis, %	75.1	75.3	75.3	75.4	75.5
0.50% ash basis, %	75.6	76.3	76.3	75.9	76.5
Flour					
Protein content, %	14.2	13.2	12.1	13.3	13.2
Wet gluten content, %	38.9	35.8	32.9	36.1	35.8
Ash content, %	0.49	0.48	0.48	0.49	0.48
Grade colour, Satake units	-2.1	-2.4	-2.7	-2.4	-1.9
AGTRON colour, %	76	79	80	79	75
Starch damage, %	7.7	8.1	8.4	8.2	7.6[2]
a-amylase activity, units/g	1.0	1.5	1.0	1.0	1.2
Amylograph peak viscosity, BU	680	670	640	630	671
Maltose value, g/100g	2.3	2.5	2.6	2.6	2.4
Farinogram					
Absorption, %	67.5	66.9	65.9	67.7	66.0
Development time, min	8.25	8.50	6.00	7.25	5.54
Mixing tolerance index, BU	20	20	30	20	27
Stability, min	14.0	13.5	10.5	11.5	10.0
Extensogram					
Length, cm	23	20	17	22	21
Height at 5 cm, BU	325	340	405	290	320
Maximum height, BU	670	680	690	575	593
Area, cm^2	200	170	155	155	168
Alveogram					
Length, mm	137	116	117	104	112
P (height x 1.1), mm	128	131	132	127	118
W, x 10^{-4} joules	562	517	523	471	454
Baking (Canadian short process baking test)					
Absorption, %	72	70	69	70	N/A[3]
Mixing energy, W-h/kg	6.1	6.1	6.1	6.3	N/A[3]
Mixing time, min	4.0	3.8	3.9	3.8	N/A[3]
Loaf volume, cm^3/100 g flour	1125	1105	1095	1125	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] 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 4 - Wheat, No. 2 Canada Western Red Spring
Quality data for 2006 harvest survey grade composite samples compared to 2005 and 1996-05 mean

	Minimum protein level			No. 2 CWRS 13.5	
Quality parameter[1]	14.5	13.5	12.5	2005	1996-05 mean
Wheat					
Test weight, kg/hL	79.7	80.7	81.0	79.9	80.5
Weight per 1000 kernels, g	34.2	36.7	32.2	31.4	32.5
Protein content, %	14.7	13.7	12.8	13.7	13.7
Protein content, % (dry matter basis)	17.0	15.9	14.8	15.9	15.9
Ash content, %	1.64	1.60	1.61	1.64	1.63
a-amylase activity, units/g	3.5	3.5	3.0	4.0	6.7
Falling number, s	395	390	385	405	380
PSI, %	53	53	52	51	53
Milling					
Flour yield					
Clean wheat basis, %	75.1	75.1	75.0	75.5	75.4
0.50% ash basis, %	75.1	75.1	74.5	75.5	75.4
Flour					
Protein content, %	14.2	13.1	12.2	13.2	13.1
Wet gluten content, %	39.8	36.0	32.9	35.6	36.0
Ash content, %	0.50	0.50	0.51	0.50	0.50
Grade colour, Satake units	-1.7	-2.0	-2.1	-2.1	-1.6
AGTRON colour, %	73	75	77	76	72
Starch damage, %	7.7	8.4	8.7	8.0	7.4[2]
a-amylase activity, units/g	1.5	1.0	1.0	2.0	2.2
Amylograph peak viscosity, BU	555	620	630	470	544
Maltose value, g/100g	2.4	2.6	2.7	2.6	2.4
Farinogram					
Absorption, %	67.9	67.3	66.6	67.2	65.9
Development time, min	6.75	6.75	6.50	7.50	5.50
Mixing tolerance index, BU	20	15	25	25	30
Stability, min	11.0	12.0	12.0	11.0	8.6
Extensogram					
Length, cm	22	21	21	22	22
Height at 5 cm, BU	300	315	320	320	301
Maximum height, BU	580	620	590	575	544
Area, cm^2	160	165	155	165	161
Alveogram					
Length, mm	146	127	114	118	120
P (height x 1.1), mm	119	130	132	114	114
W, x 10^{-4} joules	536	530	477	445	453
Baking (Canadian short process baking test)					
Absorption, %	71	70	71	70	N/A[3]
Mixing energy, W-h/kg	5.4	5.2	5.3	5.7	N/A[3]
Mixing time, min	3.5	3.6	3.7	3.7	N/A[3]
Loaf volume, cm^3/100 g flour	1125	1120	1085	1095	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] 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 5 - Wheat, No. 3 Canada Western Red Spring
Quality data for 2006 harvest survey grade composite samples compared to 2005 and 1996-05 mean

Quality parameter[1]	2006	2005	1996-05 mean
Wheat			
Test weight, kg/hL	80.5	79.0	79.2
Weight per 1000 kernels, g	38.6	33.5	33.0
Protein content, %	13.6	12.9	13.5
Protein content, % (dry matter basis)	15.7	14.9	15.7
Ash content, %	1.61	1.59	1.60
•-amylase activity, units/g	9.0	7.0	17.1
Falling number, s	350	370	340
PSI,%	53	53	54[2]
Milling			
Flour yield			
Clean wheat basis, %	75.5	75.2	74.9
0.50% ash basis, %	75.0	76.2	74.9
Flour			
Protein content, %	13.0	12.1	12.9
Wet gluten content, %	35.4	32.4	34.7
Ash content, %	0.51	0.48	0.50
Grade colour, Satake units	-1.9	-2.1	-1.3
AGTRON colour, %	75	77	70
Starch damage, %	8.4	8.1	7.3[2]
a-amylase activity, units/g	2.0	3.5	7.4
Amylograph peak viscosity, BU	450	335	361
Maltose value, g/100g	2.7	2.7	2.6
Farinogram			
Absorption, %	67.5	67.3	65.6
Development time, min	6.25	4.75	4.98
Mixing tolerance index, BU	35	25	33
Stability, min	8.25	8.50	8.05
Extensogram			
Length, cm	22	19	21
Height at 5 cm, BU	320	300	299
Maximum height, BU	580	510	520
Area, cm^2	175	125	154
Alveogram			
Length, mm	140	97	120
P (height x 1.1), mm	124	135	113
W, x 10^{-4} joules	517	435	433
Baking (Canadian short process baking test)			
Absorption, %	71	69	N/A[3]
Mixing energy, W-h/kg	5.9	5.6	N/A[3]
Mixing time, min	3.7	3.6	N/A[3]
Loaf volume, cm^3/100 g flour	1100	1075	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] Mean of data generated starting in 1997.
[3] Not available due to change in method in 2004. See http://grainscanada.gc.ca/Quality/Methods/wheatmethods-e.htm

Table 6 - Wheat, No. 1 Canada Western Red Spring - 13.5 % and 12.5 % protein segregate
Analytical data and physical dough properties
Comparative Bühler mill flour data - 2006 and 2005 harvest survey composites[1]

	13.5 % protein segregate			
	74% Straight grade		60% Patent	
Quality parameter[2]	2006	2005	2006	2005
Flour				
Yield, %	74.0	74.0	60.0	60.0
Protein content, %	13.1	13.0	12.6	12.7
Wet gluten content, %	36.2	36.2	34.9	35.0
Ash content, %	0.42	0.43	0.37	0.38
Grade colour, Satake units	-2.9	-3.0	-3.9	-3.8
AGTRON colour, %	84	82	91	90
Amylograph peak viscosity, BU	740	720	805	775
Starch damage, %	6.6	6.8	6.6	6.8
Farinogram				
Absorption, %	63.4	63.6	63.5	63.5
Development time, min	6.00	6.00	17.75	12.25
Mixing tolerance index, BU	15	25	10	10
Stability, min	19.5	10.5	28.5	30.5

	12.5% protein segregate			
	74% Straight grade		60% Patent	
Quality parameter[2]	2006	2005	2006	2005
Flour				
Yield, %	74.0	74.0	60.0	60.0
Protein content, %	12.0	12.1	11.7	11.7
Wet gluten content, %	33.1	33.4	31.7	31.7
Ash content, %	0.43	0.44	0.38	0.38
Grade colour, Satake units	-3.3	-3.0	-4.2	-4.2
AGTRON colour, %	86	85	95	94
Amylograph peak viscosity, BU	700	665	755	710
Starch damage, %	6.9	6.9	7.0	7.0
Farinogram				
Absorption, %	62.7	63.2	62.9	63.5
Development time, min	5.75	6.50	9.00	11.00
Mixing tolerance index, BU	25	25	10	10
Stability, min	9.5	16.0	33.5	28.0

[1] The 2005 composite was stored and milled the same day as the 2006
[2] Data reported on 14.0% moisture basis

Table 7 - Wheat, No. 1 Canada Western Red Spring - 13.5 % and 12.5 % protein segregate
Baking quality data
Comparative Bühler mill data - 2006 and 2005 harvest survey composites[1]

	13.5 % protein segregate			
	74% Straight grade		60% Patent	
Quality parameter	2006	2005	2006	2005
Sponge-and-dough baking test	(40 ppm ascorbic acid)		(40 ppm ascorbic acid)	
Absorption, %	68	67	67	67
Mixing energy dough stage, W-h/kg	4.1	3.9	4.3	4.0
Mixing time dough stage, min	2.7	2.7	3.0	3.0
Loaf volume, cm^3/100 g flour	1155	1110	1125	1125
Appearance	7.4	7.4	7.7	7.5
Crumb structure	5.9	5.9	6.1	5.9
Crumb color	7.9	7.9	7.8	7.8
Canadian short process baking test	(150 ppm ascorbic acid)		(150 ppm ascorbic acid)	
Absorption, %	68	67	67	68
Mixing energy, W-h/kg	5.6	5.5	6.3	5.7
Mixing time, min	3.8	3.9	4.5	4.3
Loaf volume, cm^3/100 g flour	1135	1080	1130	1080
Appearance	7.4	6.9	7.5	7.0
Crumb structure	6.2	6.3	6.2	6.3
Crumb color	7.5	7.4	7.7	7.5
	12.5% protein segregate			
	74% Straight grade		60% Patent	
Quality parameter	2006	2005	2006	2005
Sponge-and-dough baking test	(40 ppm ascorbic acid)		(40 ppm ascorbic acid)	
Absorption, %	66	67	66	65
Mixing energy dough stage, W-h/kg	4.0	4.2	4.5	4.6
Mixing time dough stage, min	2.9	3.0	3.2	3.3
Loaf volume, cm^3/100 g flour	1055	1085	1040	1040
Appearance	7.3	7.4	7.3	7.3
Crumb structure	6.0	5.9	6.2	6.0
Crumb color	7.7	7.7	7.5	7.8
Canadian short process baking test	(150 ppm ascorbic acid)		(150 ppm ascorbic acid)	
Absorption, %	66	68	68	68
Mixing energy, W-h/kg	5.6	5.7	6.2	5.9
Mixing time, min	3.9	4.1	4.2	4.4
Loaf volume, cm^3/100 g flour	1090	1120	1080	1080
Appearance	7.4	7.7	7.3	7.5
Crumb structure	6.2	6.0	6.2	6.2
Crumb color	7.5	7.5	7.7	7.8

[1] The 2005 composite was stored and milled the same day as the 2006

Table 8 – Wheat, No. 1 Canada Western Red Spring – 13.5% protein segregate
Noodle quality data
Comparative Buhler mill data for the 2006 and 2005 harvest survey composite samples[1]

	13.5% protein segregate			
	74% Straight grade		60% Patent	
Quality parameter	2006	2005	2006	2005
Fresh alkaline noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	79.0 (72.4)	79.6 (73.5)	81.9 (76.3)	81.9 (76.2)
Redness, a*	-0.13 (0.53)	0.05 (0.59)	-0.15 (0.16)	-0.04 (0.36)
Yellowness, b*	27.8 (28.0)	28.2 (28.6)	27.2 (27.5)	27.3 (28.4)
Cooked colour				
Brightness, L*	70.3	70.0	71.3	70.9
Redness, a*	-1.56	-1.53	-1.68	-1.68
Yellowness, b*	27.3	27.5	27.6	28.0
Texture				
Thickness, mm	2.42	2.41	2.37	2.34
RTC, %	24.5	24.7	24.7	24.8
Recovery, %	33.8	34.3	34.0	34.0
MCS, g/mm^2	31.2	31.8	31.7	31.0
Fresh white salted noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	80.7 (75.0)	80.7 (75.0)	82.3 (77.4)	82.5 (77.5)
Redness, a*	2.67 (3.48)	2.77 (3.51)	2.29 (2.69)	2.38 (2.87)
Yellowness, b*	24.5 (25.7)	24.9 (25.6)	24.0 (25.4)	24.1 (25.8)
Cooked colour				
Brightness, L*	76.3	75.9	76.7	76.5
Redness, a*	0.65	0.83	0.39	0.48
Yellowness, b*	19.3	19.9	19.8	19.8
Texture				
Thickness, mm	2.48	2.49	2.53	2.53
RTC, %	19.3	20.0	18.4	19.4
Recovery, %	25.4	26.4	25.4	26.1
MCS, g/mm^2	25.5	26.6	26.2	26.7

[1] The 2005 composite was stored and milled the same day as the 2006

Table 9 - Wheat, No. 1 Canada Western Red Spring – 12.5% protein segregate
Noodle quality data
Comparative Buhler mill data for the 2006 and 2005 harvest survey composite samples[1]

	12.5% protein segregate			
	74% Straight grade		60% Patent	
Quality parameter	2006	2005	2006	2005
Fresh alkaline noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	81.1 (73.5)	80.4 (73.3)	82.5 (76.7)	83.1 (76.8)
Redness, a*	-0.28 (0.45)	-0.18 (0.46)	-0.30 (0.10)	-0.22 (0.07)
Yellowness, b*	27.7 (28.6)	28.0 (28.4)	26.4 (27.5)	27.0 (28.1)
Cooked colour				
Brightness, L*	70.8	69.7	70.5	71.5
Redness, a*	-1.65	-1.55	-1.76	-1.87
Yellowness, b*	28.4	28.3	28.5	28.9
Texture				
Thickness, mm	2.38	2.34	2.35	2.31
RTC, %	24.0	24.5	24.5	24.1
Recovery, %	32.8	33.4	33.2	32.9
MCS, g/mm^2	31.3	31.0	31.9	31.1
Fresh white salted noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	82.0 (75.8)	81.7 (74.8)	83.4 (78.1)	83.3 (77.4)
Redness, a*	2.39 (3.13)	2.54 (3.29)	2.00 (2.56)	2.15 (2.58)
Yellowness, b*	23.8 (24.8)	24.1 (25.1)	22.8 (25.3)	24.1 (25.4)
Cooked colour				
Brightness, L*	75.6	75.7	76.2	76.3
Redness, a*	0.67	0.79	0.51	0.45
Yellowness, b*	19.9	20.3	20.6	20.6
Texture				
Thickness, mm	2.47	2.48	2.45	2.50
RTC, %	18.6	19.4	18.3	18.9
Recovery, %	25.0	25.6	24.5	25.3
MCS, g/mm^2	25.6	26.1	25.4	26.0

[1] The 2005 composite was stored and milled the same day as the 2006

Table 10 - Wheat, No. 2 Canada Western Red Spring - 13.5 % and 12.5 % protein segregates
Analytical data and physical dough properties
Comparative Bühler mill flour data - 2006 and 2005 harvest survey composites[1]

	13.5% protein segregate			
	74% Straight grade		60% Patent	
Quality parameter[2]	2006	2005	2006	2005
Flour				
Yield, %	74.0	74.0	60.0	60.0
Protein content, %	13.0	13.0	12.7	12.7
Wet gluten content, %	36.3	36.0	35.0	35.1
Ash content, %	0.43	0.44	0.38	0.39
Grade colour, Satake units	-2.8	-2.7	-3.8	-3.7
AGTRON colour, %	82	80	90	89
Amylograph peak viscosity, BU	670	580	740	630
Starch damage, %	6.5	6.5	6.7	6.7
Farinogram				
Absorption, %	63.8	63.6	63.8	63.5
Development time, min	7.00	6.75	7.50	10.00
Mixing tolerance index, BU	25	20	20	10
Stability, min	14.0	12.0	25.0	29.0

	12.5% protein segregate			
	74% Straight grade		60% Patent	
Quality parameter[2]	2006	2005	2006	2005
Flour				
Yield, %	74.0	74.0	60.0	60.0
Protein content, %	12.1	12.1	11.6	11.7
Wet gluten content, %	32.9	32.7	32.4	31.9
Ash content, %	0.42	0.41	0.37	0.37
Grade colour, Satake units	-3.1	-3.2	-4.2	-4.2
AGTRON colour, %	84	84	92	94
Amylograph peak viscosity, BU	670	615	735	670
Starch damage, %	6.8	7.0	7.0	7.2
Farinogram				
Absorption, %	62.8	62.9	62.6	63.3
Development time, min	6.00	7.00	6.25	8.00
Mixing tolerance index, BU	30	30	15	20
Stability, min	9.0	10.0	32.5	31.5

[1] The 2005 composite was stored and milled the same day as the 2006
[2] Data reported on 14.0% moisture basis

Table 11 - Wheat, No. 2 Canada Western Red Spring - 13.5 % and 12.5 % protein segregates
Baking quality data
Comparative Bühler mill data - 2006 and 2005 harvest survey composites[1]

	13.5% protein segregate			
	74% Straight grade		60% Patent	
Quality parameter	2006	2005	2006	2005
Sponge-and-dough baking test	(40 ppm ascorbic acid)		(40 ppm ascorbic acid)	
Absorption, %	66	66	66	65
Mixing energy dough stage, W-h/kg	4.1	4.5	4.1	5.1
Mixing time dough stage, min	2.6	2.7	2.8	3.2
Loaf volume, cm^3/100 g flour	1150	1080	1100	1085
Appearance	7.4	7.5	7.1	7.3
Crumb structure	5.9	6.0	6.0	5.9
Crumb color	7.7	7.7	7.8	7.8
Canadian short process baking test	(150 ppm ascorbic acid)		(150 ppm ascorbic acid)	
Absorption, %	67	67	67	67
Mixing energy, W-h/kg	5.7	5.4	5.4	6.0
Mixing time, min	3.6	3.6	3.7	3.9
Loaf volume, cm^3/100 g flour	1120	1115	1090	1100
Appearance	7.5	7.4	7.2	7.4
Crumb structure	6.0	6.2	6.3	6.3
Crumb color	7.5	7.7	7.5	7.7

	12.5% protein segregate			
	74% Straight grade		60% Patent	
Quality parameter	2006	2005	2006	2005
Sponge-and-dough baking test	(40 ppm ascorbic acid)		(40 ppm ascorbic acid)	
Absorption, %	67	66	66	66
Mixing energy dough stage, W-h/kg	3.8	4.0	4.1	4.2
Mixing time dough stage, min	2.5	2.6	2.8	2.9
Loaf volume, cm^3/100 g flour	1085	1035	1065	1040
Appearance	7.5	7.5	7.4	7.3
Crumb structure	5.8	6.0	6.0	5.7
Crumb color	7.5	7.5	7.7	7.7
Canadian short process baking test	(150 ppm ascorbic acid)		(150 ppm ascorbic acid)	
Absorption, %	67	67	67	67
Mixing energy, W-h/kg	5.4	6.3	5.9	6.0
Mixing time, min	3.7	4.2	4.1	4.2
Loaf volume, cm^3/100 g flour	1060	1135	1110	1070
Appearance	7.5	7.5	7.4	7.5
Crumb structure	6.3	6.2	6.0	6.3
Crumb color	7.5	7.7	7.7	7.5

[1] The 2005 composite was stored and milled the same day as the 2006

Table 12 - Wheat, No. 2 Canada Western Red Spring
Noodle quality data
Comparative Buhler mill data for the 2006 and 2005 harvest survey composite samples[1]

	13.5% protein segregate			
	74% Straight grade		60% Patent	
Quality parameter	2006	2005	2006	2005
Fresh alkaline noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	79.4 (73.1)	79.0 (72.5)	81.6 (76.1)	81.4 (75.9)
Redness, a*	-0.11 (0.58)	0.10 (0.81)	-0.15 (0.23)	0.06 (0.44)
Yellowness, b*	26.9 (27.5)	27.4 (28.3)	25.7 (27.1)	25.7 (27.4)
Cooked colour				
Brightness, L*	70.0	69.5	71.4	70.8
Redness, a*	-1.52	-1.56	-1.71	-1.67
Yellowness, b*	26.6	26.6	27.0	27.1
Texture				
Thickness, mm	2.44	2.39	2.40	2.40
RTC, %	24.1	23.9	24.0	23.8
Recovery, %	32.9	33.4	33.2	33.5
MCS, g/mm^2	32.2	32.0	31.9	31.6
Fresh white salted noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	81.0 (75.2)	80.3 (74.5)	82.5 (76.8)	82.3 (76.4)
Redness, a*	2.56 (3.37)	2.71 (3.60)	2.31 (2.69)	2.48 (3.03)
Yellowness, b*	23.3 (24.8)	23.7 (24.7)	23.6 (25.2)	24.0 (25.5)
Cooked colour				
Brightness, L*	75.6	75.6	76.6	76.2
Redness, a*	0.76	0.81	0.53	0.58
Yellowness, b*	18.9	19.2	19.3	19.8
Texture				
Thickness, mm	2.47	2.54	2.46	2.54
RTC, %	18.6	19.8	18.2	19.7
Recovery, %	25.0	26.3	24.3	25.9
MCS, g/mm^2	25.6	27.8	25.0	28.9

[1] The 2005 composite was stored and milled the same day as the 2006

Canada Western Amber Durum wheat

Protein and variety survey

Table 13 lists the mean protein content values for Canada Western Amber Durum (CWAD) wheat by grade. Comparative values are shown for 2006 and for the previous 10 years (1996-2005). Figure 3 shows the variation in annual mean protein content since 1963.

The average protein content of the 2006 durum crop is 12.8%, which is 0.5% higher than 2005 and comparable to the 10-year mean. Protein content for the top three milling grades increased slightly from last year and for the top two grades returned to levels comparable 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.

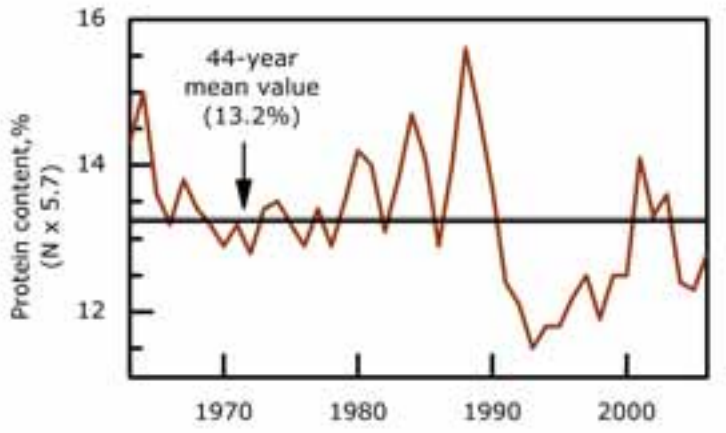
Canadian Wheat Board 2006 variety survey information indicates that AC Avonlea remains the most popular variety with western Canadian producers but showed a slight decrease in seeded acreage to 40.0% from 45.3% in 2005. Kyle further declined in acreage, decreasing to 22.6% while AC Navigator increased to 11.0% from 9.2% in 2005. AC Morse and Napoleon combined account for just over 5% of the acreage. The major change in variety distribution for 2006 was the emergence of Strongfield as a major variety with 18.5% of the acreage seeded. Strongfield is the most recently registered low cadmium variety released for commercial production in western Canada. It also has strong gluten characteristics similar to AC Navigator along with good protein potential and color similar to AC Avonlea.

Table 13 – Mean protein content of 2006 Canada Western Amber Durum wheat, by grade and year

	Protein content, %[1]		
Grade	2006	2005	1996-2005
Wheat, No. 1 CWAD	13.0	12.9	13.2
Wheat, No. 2 CWAD	12.7	12.4	12.6
Wheat, No. 3 CWAD	12.3	12.1	12.7
All milling grades	12.8	12.3	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 – 1963-2006



Wheat and pasta processing quality

Data describing the quality characteristics for composite samples of Wheat, No. 1 and No. 2 CWAD for the 2006 crop are shown in Table 14. Corresponding data for 2005 composites and mean values for the previous ten years (1996-2005) are provided for comparison. Test weight values are slightly higher than the previous year for both grades and are similar to the long term mean. Weight per 1000 kernels for No. 1 and No. 2 CWAD, however, were somewhat lower in 2006 as compared to the 2005 crop and the 10-year mean data. Hard vitreous kernel content is similar to last year and comparable to the ten-year mean for both top grades. High falling numbers for the top two grades are indicative of a high degree of soundness for both wheat and semolina. Degrading factors in the 2006 crop include lower hard vitreous kernel content, midge damage and the presence of immature and mildew damaged kernels.

Wet and dry gluten content for No. 1 and No. 2 CWAD are slightly higher than observed in 2005 but remain below the ten-year average values. Gluten characteristics are stronger than both the 2005 crop and the 10 year mean as shown by higher SDS sedimentation volumes, gluten index and alveograph W values. The increased gluten strength of No.1 and No. 2 CWAD is the result of environmental conditions along with the introduction of stronger gluten varieties over the past few years. These stronger gluten varieties include AC Navigator, AC Morse and most recently, Strongfield.

Total milling yield is equivalent to last year and the ten-year average for both No. 1 and 2 CWAD but semolina yields are about 0.5% lower than 2005. Although wheat ash is higher than seen in 2005, by 0.02% and 0.04%, for No. 1 and No. 2 CWAD, respectively, semolina ash is lower than the 2005 crop for both grade composites. Both grades are well below the ten-year average values for wheat ash and slightly lower for semolina ash. Agtron colour values are similar to last year's results and the ten-year average for both No. 1 and No. 2 CWAD. Overall milling quality of the 2006 crop is comparable to the ten-year average.

Wheat yellow pigment values for both No. 1 and No. 2 CWAD are comparable to last year, while semolina yellow pigment values are higher than 2005 values. Both wheat and semolina yellow pigment levels continue to improve over long term average values, the result of the breeding emphasis placed on increasing yellow pigment levels in new varieties. Correspondingly higher b* values were observed in both semolina and dried spaghetti. As indicated by increased L* values, the brightness of semolina and pasta is higher for the 2006 as compared to the previous crop but is comparable to the 10-year average.

Spaghetti cooking quality, as indicated by firmness (peak force) values, for No. 1 and 2 CWAD, increased over last year and the10 year average.

Data describing the quality of Wheat, No. 3 CWAD can be found in Table 15. Wheat protein and hard vitreous kernel are both higher than last year. Falling number value is indicative of sound wheat. Yellow pigment content is higher than last year and is higher than the long term average. While total milling yield is slightly higher than last year, semolina yield is 0.5% lower.

Semolina gluten index is considerably higher than last year and the long term average, as is yellow pigment content. Alveograph shows greater extensibility (L) and overall strength (W) than last year and over the long term. Spaghetti cooked firmness is improved over last year.

Table 14 - Wheat, No. 1 and No. 2 Canada Western Amber Durum
Quality data for 2006 harvest survey grade composite samples compared to 2005 and 1996-05 mean

	No. 1 CWAD			No. 2 CWAD		
Quality parameter[1]	2006	2005	1996-05 mean	2006	2005	1996-05 mean
Wheat						
Test weight, kg/hL	82.7	82.2	82.4	81.9	81.5	82.1
Weight per 1000 kernels, g	39.8	41.6	42.2	41.9	42.1	42.5
Vitreous kernels, %	91	91	90	81	80	80
Protein content, %	13.0	12.9	13.1	12.6	12.5	12.7
Protein content, % (dry matter basis)	15.0	14.9	15.2	14.6	14.5	14.8
SDS sedimentation, mL	45	40	39	41	37	35
Ash content, %	1.49	1.47	1.55	1.55	1.51	1.60
Yellow pigment content, ppm	9.1	9.1	8.5	8.9	8.7	8.4
Falling number, s	425	425	406	400	395	380
Milling yield, %	74.7	75.1	74.6	75.0	74.8	74.8
Semolina yield, %	65.8	66.3	66.2	65.2	65.7	66.1
PSI, %	38	37	37	38	37	38
Semolina						
Protein content, %	12.0	11.9	12.1	11.6	11.6	11.6
Wet gluten content, %	30.3	29.4	32.3	28.9	28.6	31.0
Dry gluten content, %	10.3	9.9	11.4	9.8	9.7	11.0
Gluten index, %	58	40	29[2]	60	40	29[2]
Ash content, %	0.63	0.66	0.65	0.65	0.67	0.66
Yellow pigment content, ppm	8.8	8.6	8.0	8.5	8.3	7.8
AGTRON colour, %	82	83	81	81	81	80
CIELAB colour:						
Brightness, L*	87.7	87.1	87.8[2]	87.8	87.2	87.7[2]
Redness, a*	-2.9	-3.2	-3.1[2]	-3.0	-3.2	-3.1[2]
Yellowness, b*	34.3	33.8	33.2[2]	33.6	32.5	32.5[2]
Speck count per 50 cm^2	22	27	24	37	26	28
Falling number, s	500	525	482	480	500	453
Alveogram						
Length, mm	99	91	88[2]	104	86	88[2]
P (height x 1.1), mm	58	59	52[2]	55	58	49[2]
P/L	0.6	0.6	0.6[2]	0.5	0.7	0.6[2]
W, x 10^{-4} joules	156	143	121[2]	146	132	111[2]
Spaghetti						
Dried at 70°C						
CIELAB colour:						
Brightness, L*	77.9	76.6	77.9[2]	77.7	76.8	77.7[2]
Redness, a*	2.2	2.2	2.0[2]	2.0	1.9	2.2[2]
Yellowness, b*	67.4	67.2	66.7[2]	65.6	66.4	66.9[2]
Firmness, g-cm	1011	950	951[3]	958	910	888[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 1997
[3] Mean of data generated starting in 1998

Table 15 - Wheat, No. 3 Canada Western Amber Durum
Quality data for 2006 harvest survey grade composite samples compared to 2005 and 1996-05 mean

Quality parameter[1]	No. 3 CWAD 2006	2005	1996-05 mean[2]
Wheat			
Test weight, kg/hL	81.2	81.0	81.3
Weight per 1000 kernels, g	39.9	43.8	42.4
Vitreous kernels, %	75	60	68
Protein content, %	12.5	12.0	12.5
Protein content, % (dry matter basis)	14.4	13.9	14.5
SDS sedimentation, mL	35	29	31
Ash content, %	1.59	1.53	1.61
Yellow pigment content, ppm	8.9	8.0	8.1
Falling number, s	395	385	344
Milling yield, %	74.9	74.2	75.0
Semolina yield, %	64.9	65.4	65.5
PSI, %	39	37	38
Semolina			
Protein content, %	11.4	11.1	11.5
Wet gluten content, %	28.8	27.6	30.4
Dry gluten content, %	9.7	9.4	10.8
Gluten index, %	52	38	25[3]
Ash content, %	0.65	0.64	0.68
Yellow pigment content, ppm	8.3	7.8	7.6
AGTRON colour, %	80	86	78
CIELAB colour:			
Brightness, L*	87.9	88.1	87.6[4]
Redness, a*	-3.0	-3.1	-3.0[4]
Yellowness, b*	33.0	32.1	31.4[4]
Speck count per 50 cm^2	43	36	38
Falling number, s	460	485	400
Alveogram			
Length, mm	108	87	86.7[4]
P (height x 1.1), mm	50	53	48[4]
P/L	0.5	0.6	0.6[4]
W, x 10^{-4} joules	129	115	105[4]
Spaghetti			
Dried at 70°C			
CIELAB colour:			
Brightness, L*	77.6	77.5	76.7[3]
Redness, a*	2.1	1.9	2.7[3]
Yellowness, b*	64.9	65.5	63.2[3]
Firmness, g-cm	906	837	861[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] No 3CWAD results for 1998 or 2003
[3] Mean of data generated starting in 1999
[4] Mean of data generated starting in 1997

Canada Western Hard White Spring wheat

Protein and variety survey

The mean protein content for CWHWS for 2006 and the previous year is shown in Table 16, below. A long term average protein is not available as this is a relatively new class of wheat. The mean protein content of the milling grades of the 2006 crop is estimated at 13.3%, 0.4% higher than for 2005. Snowbird remains the dominant variety in this class.

Table 16 – Mean protein content of 2006 Canada Western Hard White Spring wheat, by grade and year

	Protein content, %[1]		
Grade	2006	2005	1996-2005
Wheat, No. 1 CWHWS	13.1	12.7	N/A
Wheat, No. 2 CWHWS	13.7	13.1	N/A
Wheat, No. 3 CWHWS	14.0	13.2	N/A
All milling grades	13.3	12.9	N/A

Milling and baking quality - Allis-Chalmers laboratory mill

Wheat, No. 1 Canada Western Hard White

Table 17 summarizes the quality data for No. 1 CWHWS new crop composites at 14.5%, 13.5% and 12.5% protein segregation levels, with the 2005 13.5% data included for comparison. Test weight is slightly higher than 2005, while kernel weight is similar. High wheat falling number and flour amylograph peak viscosity values indicate a high degree of soundness in this year's crop. Wet gluten content is higher this year. Kernel hardness (PSI) is similar to last year, but starch damage is higher. Allis Chalmers flour milling yield is comparable to last year, and although flour ash content is slightly improved over last year, flour colour is not as bright.

Farinograph absorption is slightly lower this year. Dough development times and stabilities are slightly longer than last year. Extensograph and alveograph tests show strong yet extensible dough properties, and are showing stronger than last year. Canadian short process baking results show slightly lower dough water absorption than last year, but comparable loaf volume.

Wheat, No. 2 Canada Western Hard White

Table 18 summarizes the quality data for the Wheat, No. 2 CWHWS composite 14.5%, 13.5% and 12.5% protein segregates, with the 2005 13.5% protein segregate for comparison.

Test weight and PSI are comparable to 2005, however starch damage is higher this year. The 1000 kernel weight values are slightly higher than last year. Falling number values and amylograph peak viscosities are higher than last year, and indicative of sound wheat. Milling yield, on a constant 0.50% ash basis, is considerably improved over last year, with good flour colour.

Farinograph properties of the Wheat, No. 2 CWHWS are showing lower absorption than last year, but longer stability. Both alveograph and extensograph are exhibiting greater dough strength than seen in 2005. CSP baking absorption is slightly higher than last year, and loaf volumes are marginally higher.

Comparative Bühler laboratory mill flour data

Milling and baking quality

Samples of 2006 and stored 2005 harvest survey Wheat, No. 1 CWHWS 13.5 and 12.5 and Wheat, No. 2 CWHWS 13.5 composites were milled consecutively on the same day on the tandem Bühler laboratory mill into 74% extraction straight grade and 60% long patent flour. Flour analytical and physical dough properties of the composites are shown in Table 19 for the Wheat, No. 1 CWHWS 13.5% and 12.5% minimum protein segregates. Baking data using the Wheat, No. 1 CWHWS 13.5% and 12.5% straight grade and 60% patent flours are shown in Table 20, while noodle data using the straight grade and 60% patent flours are shown in Tables 21 and 22. Flour analytical and physical dough properties for Wheat, No. 2 CWHWS 13.5% protein segregate are shown in Table 23, and the corresponding baking quality is reported in Table 24. Noodle data can be seen in Table 25.

Wet gluten content of the 2006 Wheat, No. 1 CWHWS 13.5 straight grade flour was slightly lower than the corresponding 2005 flour, while the 12.5% protein segregate was slightly higher this year. Wet gluten content of the patent flour for the 2006 Wheat, No. 1 CWHWS 13.5 was slightly higher than 2005 while the 12.5 flours were comparable. The Wheat, No. 2 CWHWS 13.5 showed slightly higher wet gluten for both straight grade and 60% patent flour. Flour grade colour and AGTRON values were improved in all cases this year. Amylograph peak viscosities were higher for all of the 2006 flour samples.

Farinograph data show lower absorption in the 2006 Wheat, No. 1 CWHWS 13.5 and 12.5 straight grade and patent flours compared to 2005. The 2006 Wheat, No. 2 CWHWS 13.5 farinograph absorption values were comparable to last year. All flour samples from the 2006 Buhler milled composites showed comparable to stronger farinograph characteristics relative to 2005.

The 2006 sponge-and-dough baking absorption for the Wheat, No. 1 CWHWS 13.5 straight grade and patent flour is comparable to 2005, while the 12.5% protein segregate and the No. 2 CWHWS 13.5 are 1% lower than last year. All show mixing time requirements at the dough stage that are comparable to 2005. Loaf volumes for sponge-and-dough bread are similar to last year.

No. 1 CWHWS at both protein levels showed slightly longer mixing time requirements and mixing energy requirements for both straight grade and patent flour using the CSP baking formulation. The straight grade and patent flours exhibited a 1% lower baking absorption at both levels of protein. Loaf volumes are similar to last year. Straight grade and patent flour produced using Wheat, No. 2 CWHWS 13.5 showed similar CSP baking absorption, mixing requirements and loaf volumes for 2006 and 2005.

Yellow alkaline noodles

Yellow alkaline noodles were prepared using the 13.5% protein segregate for straight grade and 60% patent flour with a 1% *kansui* reagent (9:1 sodium and potassium carbonates) at a 32% water absorption level.

Raw yellow alkaline noodles prepared from 2006 Wheat, No. 1 CWHWS 13.5 60% patent and straight grade 2006 flours displayed colour characteristics almost identical to the corresponding 2005 flour (Table 21). No differences were detected in their respective cooked noodle colour readings. Measurement of textural attributes indicated that these traits were also consistent with those observed in 2005 using either patent or straight grade flours.

No appreciable differences were observed in raw noodle color characteristics for No. 1 CWHWS 12.5 2006 and 2005 patent or straight grade flour noodles. Assessment of their cooked texture characteristics also indicated that the material was very similar although the 2006 patent flour “bite” (MCS) attribute was significantly higher than the corresponding 2005 value.

Yellow alkaline raw noodle color of No. 2 CWHWS 13.5 patent flour exhibited color characteristics similar to those observed in the previous year at 2 hrs after production (Table 25). Noodles aged for 24 hrs displayed slightly better brightness and significant improved a* values as compared to their 2005 counterpart.

Noodles prepared using No. 2 CWHWS 13.5 straight grade flour exhibited similar brightness and redness at 2 hrs but significantly better yellowness (b*) than the 2005 sample. Upon aging, the 2006 straight grade noodles exhibited a decrease in L* relative to 2005 material, but they remained equivalent in terms of both redness and yellowness.

The cooked texture characteristics of the 2006 Wheat, No. 2 CWHWS 13.5 patent and straight grade yellow alkaline noodles were very similar to 2005. A slight improvement in “bite”, as measured by MCS was observed in the 2006 noodles.

White salted noodles

White salted noodles were prepared using a 1% sodium chloride solution at a 30% water absorption level in order to maintain proper dough crumb and sheeting characteristics.

White salted noodles prepared with Wheat, No. 1 CWHWS 13.5 patent or straight grade flours exhibited colour attributes similar to those observed for the 2005 material (Table 21). Texture characteristics were consistent with 2005 values for both flour types although a modest improvement in bite, expressed as MCS was observed.

White salted noodles, derived from patent or straight grade flours were also evaluated using 2006 No.1 CWHWS 12.5% protein wheat. A slight reduction in noodle brightness for both flours was observed at 2 hrs post production. Upon aging, 24 hrs, no differences were detected with the comparable 2005 patent flour. However, the aged 2006 straight grade noodle was noticeably brighter than the 2005 noodle. Cooked noodle texture parameters of either 2006 patent or straight grade noodles were lower than those prepared with comparable 2005 flours.

White salted raw noodles prepared with Wheat, No. 2 CWHWS 13.5 patent or straight grade flours exhibited color characteristics similar to 2005 when measured at both 2 and 24 hrs post production (Table 25). Cooked noodle texture for both flours was consistent with that observed in 2005.

Table 17 - Wheat, No. 1 Canada Western Hard White Spring
Quality data for 2006 harvest survey grade composite samples compared to 2005

	Minimum protein content			2005
Quality parameter[1]	14.5	13.5	12.5	13.5
Wheat				
Test weight, kg/hL	80.5	81.5	81.8	80.7
Weight per 1000 kernels, g	28.0	29.7	29.4	29.9
Protein content, %	14.7	13.9	12.8	13.8
Protein content, % (dry matter basis)	17.0	16.0	14.8	15.9
Ash content, %	1.54	1.51	1.50	1.53
a-amylase activity, units/g	2.5	2.0	2.0	3.5
Falling number, s	415	415	415	420
PSI,%	53	52	50	52
Milling				
Flour yield				
Clean wheat basis, %	74.7	74.9	75.1	75.2
0.50% ash basis, %	75.7	75.9	75.6	75.7
Flour				
Protein content, %	14.3	13.4	12.3	13.1
Wet gluten content, %	38.4	36.0	32.3	35.4
Ash content, %	0.48	0.48	0.49	0.49
Grade colour, Satake units	-2.4	-2.8	-3.0	-3.0
AGTRON colour, %	78	80	82	84
Starch damage, %	7.8	8.2	8.8	7.7
a-amylase activity, units/g	0.5	0.5	0.5	0.5
Amylograph peak viscosity, BU	975	890	995	925
Maltose value, g/100g	2.3	2.5	2.7	2.5
Farinogram				
Absorption, %	67.0	66.9	66.3	67.5
Development time, min	8.25	6.75	5.25	6.25
Mixing tolerance index, BU	25	30	25	25
Stability, min	11.0	9.0	9.0	8.0
Extensogram				
Length, cm	20	20	19	21
Height at 5 cm, BU	330	310	360	270
Maximum height, BU	620	595	635	480
Area, cm^2	157	160	162	130
Alveogram				
Length, mm	113	103	89	103
P (height x 1.1), mm	129	133	145	132
W, x 10^{-4} joules	536	507	497	491
Baking (Canadian short process baking test)				
Absorption, %	68	68	68	70
Mixing energy, W-h/kg	6.5	6.3	6.0	6.9
Mixing time, min	4.3	4.2	4.5	4.7
Loaf volume, cm^3/100 g flour	1120	1105	1075	1090

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

Table 18 - Wheat, No. 2 Canada Western Hard White Spring
Quality data for 2006 harvest survey grade composite samples compared to 2005

	Minimum protein content			2005
Quality parameter[1]	14.5	13.5	12.5	13.5
Wheat				
Test weight, kg/hL	79.2	80.1	80.7	80.2
Weight per 1000 kernels, g	30.2	31.7	31.2	30.9
Protein content, %	14.6	13.9	12.8	13.7
Protein content, % (dry matter basis)	16.9	16.0	14.8	15.8
Ash content, %	1.61	1.52	1.54	1.64
a-amylase activity, units/g	4.0	3.0	3.0	8.0
Falling number, s	415	415	420	395
PSI,%	53	53	53	52
Milling				
Flour yield				
Clean wheat basis, %	74.7	74.8	75.1	75.2
0.50% ash basis, %	76.2	75.8	75.6	74.2
Flour				
Protein content, %	14.1	13.4	12.3	13.1
Wet gluten content, %	39.2	36.0	33.2	35.9
Ash content, %	0.47	0.48	0.49	0.52
Grade colour, Satake units	-2.3	-2.5	-2.7	-2.0
AGTRON colour, %	77	79	81	77
Starch damage, %	7.6	8.1	8.5	7.7
a-amylase activity, units/g	1.0	1.0	1.0	2.0
Amylograph peak viscosity, BU	900	985	920	715
Maltose value, g/100g	2.3	2.5	2.6	2.5
Farinogram				
Absorption, %	67.3	67.1	66.2	68.0
Development time, min	6.25	6.00	6.00	6.50
Mixing tolerance index, BU	25	25	35	40
Stability, min	8.5	8.5	8.0	6.5
Extensogram				
Length, cm	21	19	19	21
Height at 5 cm, BU	320	330	325	285
Maximum height, BU	550	560	545	445
Area, cm^2	150	135	130	126
Alveogram				
Length, mm	125	105	88	109
P (height x 1.1), mm	121	133	139	116
W, x 10^{-4} joules	510	503	435	415
Baking (Canadian short process baking test)				
Absorption, %	70	70	68	69
Mixing energy, W-h/kg	6.5	6.0	6.3	5.8
Mixing time, min	4.2	4.1	4.5	3.8
Loaf volume, cm^3/100 g flour	1130	1110	1085	1085

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

Table 19 - Wheat, No. 1 Canada Western Hard White Spring - 13.5 % and 12.5 % protein segregate
Analytical data and physical dough properties
Comparative Bühler mill flour data - 2006 and 2005 harvest survey composites[1]

	13.5% protein segregate			
	74% Straight grade		60% Patent	
Quality parameter[2]	2006	2005	2006	2005
Flour				
Yield, %	74.0	74.0	60.0	60.0
Protein content, %	13.2	13.0	12.9	12.7
Wet gluten content, %	35.6	36.0	35.1	34.6
Ash content, %	0.41	0.42	0.36	0.37
Grade colour, Satake units	-3.4	-3.3	-4.3	-4.0
AGTRON colour, %	87	86	95	93
Amylograph peak viscosity, BU	1040	990	1010	945
Starch damage, %	6.6	6.4	7.0	6.8
Farinogram				
Absorption, %	63.0	64.0	63.1	64.0
Development time, min	8.50	8.00	14.25	11.00
Mixing tolerance index, BU	15	25	15	20
Stability, min	14.0	12.5	25.0	21.0

	12.5% protein segregate			
	74% Straight grade		60% Patent	
Quality parameter[2]	2006	2005	2006	2005
Flour				
Yield, %	74.0	74.0	60.0	60.0
Protein content, %	12.2	12.0	12.0	11.8
Wet gluten content, %	32.6	31.9	31.6	31.5
Ash content, %	0.41	0.42	0.36	0.37
Grade colour, Satake units	-3.5	-3.2	-4.3	-4.0
AGTRON colour, %	89	88	98	96
Amylograph peak viscosity, BU	1080	1030	1155	1100
Starch damage, %	6.6	7.1	6.9	7.2
Farinogram				
Absorption, %	61.9	63.3	62.1	62.8
Development time, min	7.50	8.25	13.00	11.00
Mixing tolerance index, BU	20	20	20	15
Stability, min	13.0	13.0	22.0	19.0

[1] The 2005 composite was stored and milled the same day as the 2006
[2] Data reported on 14.0% moisture basis

Table 20 - Wheat, No. 1 Canada Western Hard White spring - 13.5 % and 12.5 % protein segregate
Baking quality data
Comparative Bühler mill data - 2006 and 2005 harvest survey composites[1]

	13.5% protein segregate			
	74% Straight grade		60% Patent	
Quality parameter	2006	2005	2006	2005
Sponge-and-dough baking test	(40 ppm ascorbic acid)		(40 ppm ascorbic acid)	
Absorption, %	67	67	67	67
Mixing energy dough stage, W-h/kg	4.7	4.5	5.0	4.7
Mixing time dough stage, min	3.2	3.0	3.4	3.3
Loaf volume, cm^3/100 g flour	1095	1070	1090	1045
Appearance	7.5	7.2	7.4	7.4
Crumb structure	6.0	6.0	6.0	6.0
Crumb color	7.7	7.7	7.7	7.7
Canadian short process baking test	(150 ppm ascorbic acid)		(150 ppm ascorbic acid)	
Absorption, %	66	67	66	67
Mixing energy, W-h/kg	6.8	6.2	7.5	6.6
Mixing time, min	4.7	4.4	5.3	4.6
Loaf volume, cm^3/100 g flour	1120	1085	1115	1080
Appearance	7.2	7.7	7.4	7.4
Crumb structure	6.2	6.2	6.3	6.2
Crumb color	7.7	7.7	7.8	7.7

	12.5% protein segregate			
	74% Straight grade		60% Patent	
Quality parameter	2006	2005	2006	2005
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	4.4	5.2	4.7	4.7
Mixing time dough stage, min	3.1	3.4	3.5	3.3
Loaf volume, cm^3/100 g flour	1055	1035	1040	1025
Appearance	7.3	7.2	7.2	7.0
Crumb structure	6.0	6.0	6.0	6.0
Crumb color	7.8	7.8	7.8	7.8
Canadian short process baking test	(150 ppm ascorbic acid)		(150 ppm ascorbic acid)	
Absorption, %	65	66	65	66
Mixing energy, W-h/kg	6.4	5.6	7.2	6.2
Mixing time, min	4.7	4.3	5.1	4.7
Loaf volume, cm^3/100 g flour	1070	1070	1080	1050
Appearance	7.4	7.5	7.5	7.2
Crumb structure	5.9	6.0	6.2	5.9
Crumb color	7.7	7.5	7.7	7.7

[1] The 2005 composite was stored and milled the same day as the 2006

Table 21 - Wheat, No. 1 Canada Western Hard White Spring - 13.5 % protein segregate
Noodle quality data
Comparative Buhler mill data for the 2006 and 2005 harvest survey composite samples[1]

	74% Straight grade				60% Patent			
Quality parameter	2006		2005		2006		2005	
Fresh alkaline noodles								
Raw colour at 2 hrs (24 hrs)								
Brightness, L*	79.3	(74.1)	79.2	(73.6)	81.5	(76.3)	81.0	(76.5)
Redness, a*	-0.18	(0.40)	-0.18	(0.48)	-0.15	(0.15)	-0.16	(0.21)
Yellowness, b*	28.6	(28.6)	28.0	(29.0)	27.2	(28.2)	27.6	(28.8)
Cooked colour								
Brightness, L*	70.8		71.5		72.1		71.3	
Redness, a*	-2.16		-2.31		-2.31		-2.23	
Yellowness, b*	28.3		27.9		27.9		28.0	
Texture								
Thickness, mm	2.32		2.38		2.37		2.39	
RTC, %	24.3		24.7		23.7		24.7	
Recovery, %	35.1		35.0		34.6		34.8	
MCS, g/mm^2	33.5		33.9		33.8		34.5	
Fresh white salted noodles								
Raw colour at 2 hrs (24 hrs)								
Brightness, L*	81.0	(76.4)	81.0	(76.4)	82.3	(77.9)	81.8	(77.7)
Redness, a*	2.41	(2.76)	2.25	(2.94)	2.17	(2.33)	2.01	(2.39)
Yellowness, b*	23.6	(23.3)	22.9	(23.9)	23.0	(23.7)	23.2	(24.1)
Cooked colour								
Brightness, L*	76.4		76.0		76.8		77.0	
Redness, a*	0.42		0.44		0.28		0.20	
Yellowness, b*	18.5		18.6		18.8		18.9	
Texture								
Thickness, mm	2.49		2.50		2.53		2.46	
RTC, %	18.3		18.0		17.9		18.3	
Recovery, %	27.2		26.9		26.2		27.1	
MCS, g/mm^2	28.3		26.0		28.4		27.5	

[1] The 2005 composite was stored and milled the same day as the 2006

Table 22 - Wheat, No. 1 Canada Western Hard White Spring - 12.5% protein segregate
Noodle quality data
Comparative Buhler mill data for the 2006 and 2005 harvest survey composite samples[1]

	12.5% protein segregate			
	74% Straight Grade		60% Patent	
Quality parameter	2006	2005	2006	2005
Fresh alkaline noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	80.8 (74.6)	81.1 (75.0)	82.8 (78.0)	83.0 (78.2)
Redness, a*	-0.32 (0.19)	-0.39 (0.34)	-0.36 (-0.02)	-0.45 -0.06)
Yellowness, b*	28.1 (28.6)	28.0 (29.2)	26.6 (28.5)	25.9 (28.2)
Cooked colour				
Brightness, L*	71.4	71.1	72.2	71.9
Redness, a*	-2.10	-2.15	-2.22	-2.32
Yellowness, b*	28.7	28.4	28.8	28.8
Texture				
Thickness, mm	2.34	2.32	2.34	2.32
RTC, %	23.6	24.0	23.6	23.8
Recovery, %	34.5	35.2	34.9	34.8
MCS, g/mm^2	32.9	32.2	33.7	32.2
Fresh white salted noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	81.9 (76.4)	82.5 (75.4)	83.6 (78.1)	84.1 (78.1)
Redness, a*	2.23 (2.99)	2.18 (2.94)	2.02 (2.30)	1.93 (2.28)
Yellowness, b*	22.5 (24.1)	23.0 (24.1)	22.1 (24.1)	22.3 (24.4)
Cooked colour				
Brightness, L*	75.8	76.5	77.0	76.7
Redness, a*	0.39	0.36	0.20	0.15
Yellowness, b*	19.1	19.0	19.4	19.5
Texture				
Thickness, mm	2.50	2.48	2.45	2.51
RTC, %	18.8	19.9	17.9	18.9
Recovery, %	27.6	28.7	27.3	28.1
MCS, g/mm^2	28.2	28.4	27.9	28.6

[1] The 2005 composite was stored and milled the same day as the 2006

Table 23 - Wheat, No. 2 Canada Western Hard White Spring
Analytical data
Buhler mill flour data - 2006 and 2005 harvest survey composites[1]

	13.5% protein segregate			
	Straight grade		60% Patent	
Quality parameter[2]	2006	2005	2006	2005
Flour				
Yield, %	74.0	74.0	60.0	60.0
Protein content, %	13.2	13.0	12.9	12.7
Wet gluten content, %	36.6	36.3	35.8	35.4
Ash content, %	0.42	0.44	0.37	0.38
Grade colour, Satake units	-2.7	-2.5	-3.8	-3.4
AGTRON colour, %	82	81	91	91
Amylograph peak viscosity, BU	965	890	1100	965
Starch damage, %	6.0	6.2	6.1	6.4
Farinogram				
Absorption, %	63.3	63.6	63.3	63.6
Development time, min	8.50	6.75	8.50	8.75
Mixing tolerance index, BU	30	25	15	30
Stability, min	11.0	9.0	15.0	10.5

[1] The 2005 composite was stored and milled the same day as the 2006
[2] Data reported on 14.0% moisture basis

Table 24 - Wheat, No. 2 Canada Western Hard White Spring
Baking quality data
Comparative Buhler mill data - 2006 and 2005 harvest survey composites[1]

	13.5% protein segregate			
	Straight-grade		60% Patent	
Quality parameter	2006	2005	2006	2005
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	4.0	4.2	4.7	4.4
Mixing time dough stage, min	2.6	2.7	3.2	3.1
Loaf volume, cm^3/100 g flour	1100	1135	1105	1080
Appearance	7.5	7.7	7.7	7.4
Crumb structure	6.0	5.9	6.0	5.9
Crumb color	7.9	7.9	7.9	7.9
Canadian short process baking test	(150 ppm ascorbic acid)		(150 ppm ascorbic acid)	
Absorption, %	67	67	67	67
Mixing energy, W-h/kg	6.1	6.0	5.8	6.4
Mixing time, min	4.0	4.2	4.2	4.4
Loaf volume, cm^3/100 g flour	1135	1100	1120	1090
Appearance	7.4	7.5	7.4	7.7
Crumb structure	6.2	6.2	6.2	6.2
Crumb color	7.7	7.7	7.7	7.7

[1] The 2005 composite was stored and milled the same day as the 2006

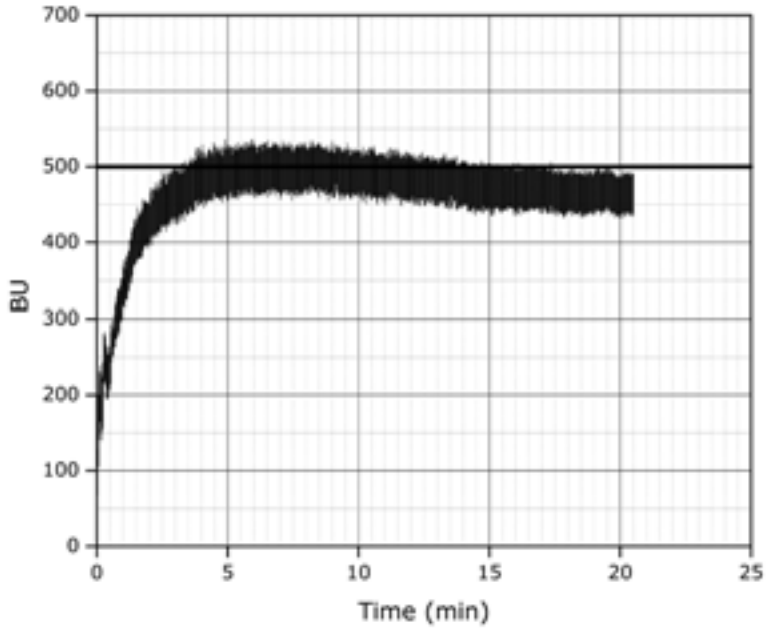
Table 25 - Wheat, No. 2 Canada Western Hard White Spring
Noodle quality data
Comparative Buhler mill data for the 2006 and 2005 harvest survey composite samples[1]

	13.5% protein segregate			
	Straight grade		60% Patent	
Quality parameter	2006	2005	2006	2005
Fresh alkaline noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	77.8 (72.0)	79.8 (73.4)	81.3 (76.4)	80.7 (75.5)
Redness, a*	-0.20 (0.65)	-0.06 (0.75)	-0.28 (0.09)	-0.06 (0.63)
Yellowness, b*	27.3 (27.7)	24.9 (27.0)	24.7 (26.8)	25.0 (27.6)
Cooked colour				
Brightness, L*	69.8	70.1	72.3	71.1
Redness, a*	-1.99	-1.91	-2.25	-2.12
Yellowness, b*	26.6	26.2	26.5	26.6
Texture				
Thickness, mm	2.40	2.40	2.41	2.37
RTC, %	25.6	24.9	24.7	24.6
Recovery, %	36.5	36.3	36.0	36.2
MCS, g/mm^2	38.1	37.6	38.8	37.4
Fresh white salted noodles				
Raw colour at 2 hrs (24 hrs)				
Brightness, L*	80.1 (74.9)	80.2 (75.0)	81.8 (77.2)	81.7 (77.2)
Redness, a*	2.33 (3.16)	2.45 (3.29)	2.07 (2.47)	2.14 (2.34)
Yellowness, b*	22.8 (23.8)	22.9 (24.2)	22.6 (23.8)	22.9 (23.5)
Cooked colour				
Brightness, L*	75.5	75.8	76.4	76.2
Redness, a*	0.50	0.57	0.29	0.23
Yellowness, b*	18.0	18.3	18.3	18.5
Texture				
Thickness, mm	2.50	2.49	2.48	2.48
RTC, %	19.5	19.2	18.6	18.7
Recovery, %	27.7	28.3	27.8	27.8
MCS, g/mm^2	29.1	29.8	30.3	29.4

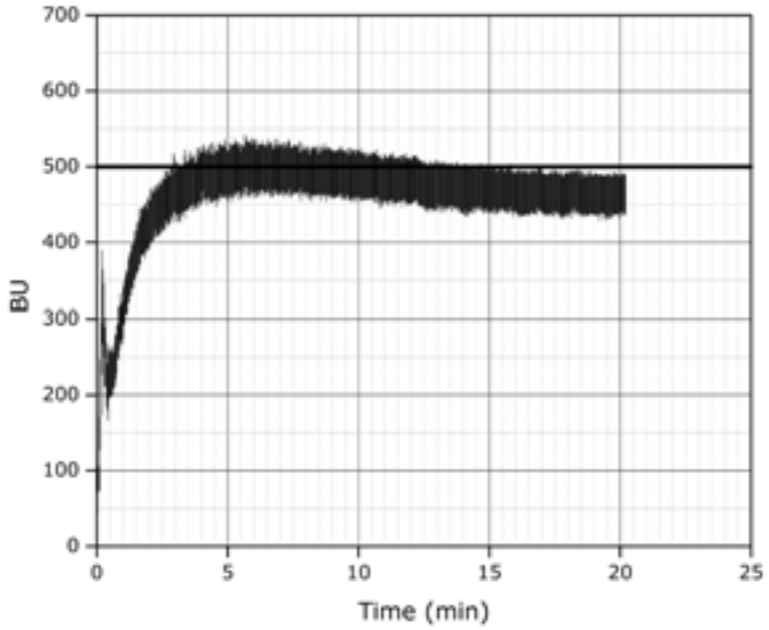
[1] The 2005 composite was stored and milled the same day as the 2006

Farinograms
2006 crop composite samples

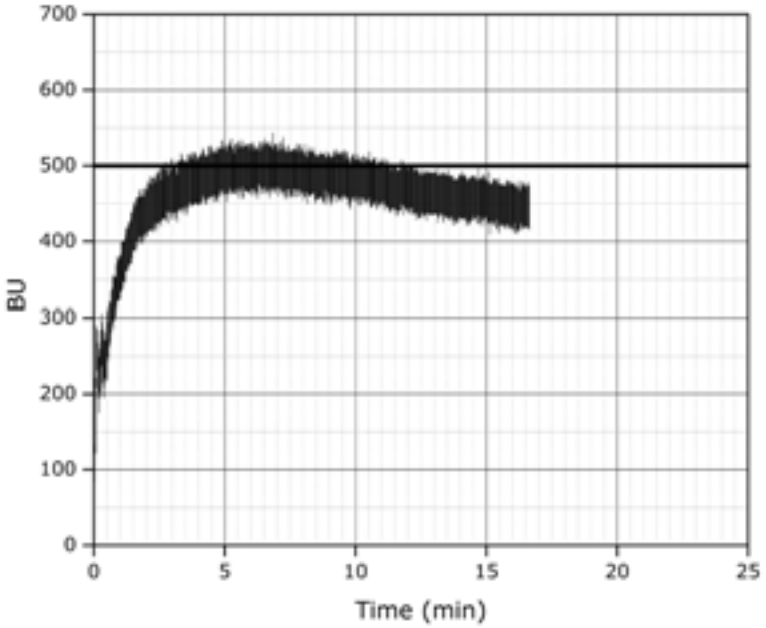
Wheat, No. 1 Canada Western Red Spring – 13.5% protein segregate



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