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Quality of western Canadian pulse crops 2006

Ning Wang

Program Manager, Pulse Research

Contact: Ning Wang

Program Manager, Pulse Research

Tel: 204 983-2154

Email: nwang@grainscanada.gc.ca

Fax: 204 983-0724

Grain Research Laboratory
Canadian Grain Commission
1404-303 Main Street
Winnipeg MB R3C 3G8
www.grainscanada.gc.ca

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Introduction

This report presents the quality data for the 2006 harvest survey for western Canadian pulse crops (peas, lentils, chick peas and pea beans). Samples submitted by western Canadian producers to the Canadian Grain Commission's (CGC) Grain Research Laboratory (GRL) were collected for data analysis.

Weather review

The weather review for the 2006 crop year was provided by the Weather and Crop Surveillance department of the Canadian Wheat Board (CWB).

Seeding

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.

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. Harvest was early and most regions were beginning to harvest by the 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 an early harvest across much of the Prairies. The dry, warm conditions continued into September. Cooler, wet conditions prevailed in the last half of September, which slowed the harvest and prevented completion of the harvest until October.

Production review

Pea production for 2006 was estimated to be 2.8 million tonnes, which was down about 10.5% from 2005 but was 19.8% higher than the 10-year average of 2.3 million tonnes (Table 1). The decrease in production was due to the reduction in yield. Saskatchewan accounted for 76% of Canadian pea production, while Alberta and Manitoba accounted for 21% and 3%, respectively.

Lentil production in 2006 was down 46% from 1.3 million tonnes in 2005 to 0.69 million tonnes, but was 4.8% higher than the 10-year average (Table 1). The decrease in lentil production was a result of decreased acres and yield. Saskatchewan continues to dominate lentil production in Western Canada, accounting for about 100% of production.

In 2006, Manitoba accounted for 100% of western Canadian pea bean production, which increased 36% compared to that in 2005 but was 16% lower than the 10-year average (Table 1). The increase in production was due to increased yield.

Production of chick peas for 2006 was estimated at 0.18 million tonnes, which was up 43% from 2005 and was 7.7% higher than the 5-year average (Table 1). The increased production in 2006 was a result of increased harvested area. Saskatchewan accounted for approximately 81% of western Canadian chick pea production in 2006, while Alberta accounted for 19%.

Table 1 – Production statistics for western Canadian pulses¹

Province	Harvested area		Production		Yield		Mean production ²
	2006	2005	2006	2005	2006	2005	1996-2005
	thousand hectares		thousand tonnes		kg/ha		thousand tonnes
Peas - dry							
Manitoba	32	43	91	63	2810	1470	150
Saskatchewan	1101	1060	2127	2414	1930	2280	1600
Alberta ³	245	217	588	623	2400	2871	502
Western Canada	1378	1320	2806	3100	2036	2348	2251
Lentils							
Manitoba	-	-	-	-	-	-	7
Saskatchewan	555	854	693	1264	1250	1480	645
Alberta ³	-	8	-	14	-	1760	9
Western Canada	555	862	693	1278	1250	1480	660
Pea beans							
Manitoba	28	32	53	34	1860	1050	63
Saskatchewan	-	-	-	-	-	-	-
Alberta ³	-	-	-	-	-	-	-
Western Canada	28	32	53	34	1860	1050	63
Chick peas							
Manitoba	-	-	-	-	-	-	-
Saskatchewan	130	61	160	84	1230	1390	156 ⁴
Alberta ³	14	12	23	20	1620	1620	13 ⁴
Western Canada	144	73	183	104	1270	1430	169 ⁴

¹Statistics Canada, Field Crop Reporting Series, Vol. 85, No. 8.

²Statistics Canada, Field Crop Reporting Series, 1996-2005.

³Includes the Peace River area of British Columbia.

⁴Statistics Canada, Field Crop Reporting Series, 2001-2005.

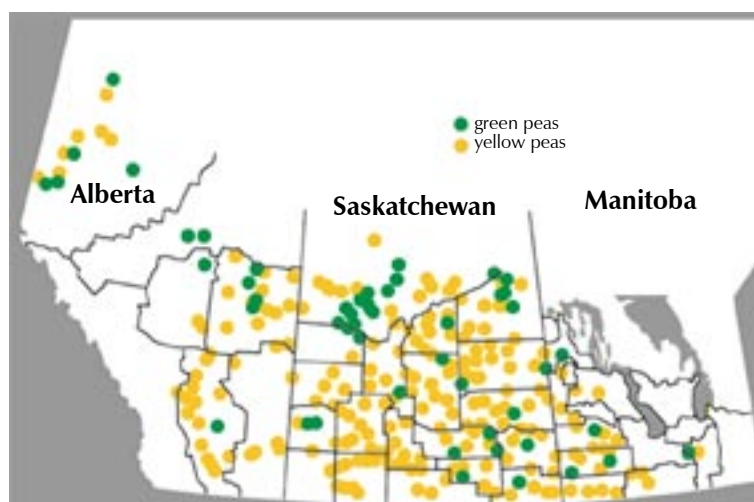
Quality of western Canadian peas

2006

Harvest survey samples

Samples for the CGC's 2006 harvest survey were collected from producers across western Canada (Fig. 1). A total of 1016 samples consisting of 737 yellow pea and 279 green pea samples were received at the CGC for analysis. All samples were graded and tested for protein content. Only those samples receiving a grade of Peas, No.1 Canada or Peas, No. 2 Canada were tested for 100-seed weight, water absorption, cooking time and firmness of cooked peas. Starch content was determined on selected samples. It is important to note that the samples reported by grade do not necessarily represent the actual distribution of grade.

Figure 1 – Map of western Canada showing origin of 2006 harvest survey pea samples



Quality of 2006 western Canadian peas

Protein content ranged from 16.9% to 30.6% for 2006 western Canadian peas, including yellow and green peas (Table 2). The average protein for 2006 western Canadian peas was 24.5% which was higher than 2005 and also higher than the five-year average of 23.7 % (Fig. 2). There was not much difference in protein content by grade level as shown in Table 2. Peas from Manitoba and Saskatchewan showed slightly higher levels of protein than peas from Alberta.

Table 3 shows the quality data for 2006 yellow peas. The average protein contents for 2006 Peas, No. 1 Canada Yellow and Peas, No. 2 Canada Yellow were 24.9% and 24.4%, respectively. These values were higher than those for 2005. Peas, No. 1 Canada Yellow in 2006 had similar mean starch content to 2005 whereas Peas, No. 2 Canada Yellow had slightly higher starch than 2005.

Peas, No. 1 Canada Yellow and peas, No. 2 Canada Yellow had average 100-seed weights of 21.4 g and 21.6 g (Table 3), respectively, which were lower than the respective grades for 2005. This indicates that seed sizes for 2006 peas are smaller than those for 2005. The mean water absorption values for 2006 Peas, No.1 Canada Yellow and Peas, No. 2 Canada Yellow were 0.98 and 0.95 (g H₂O/g seeds), respectively, which were similar to those for 2005.

The mean cooking times for Peas, No. 1 Canada Yellow and Peas, No. 2 Canada Yellow were 26.3 and 28.2 min, respectively (Table 3). 2006 yellow peas had longer cooking times than 2005. The mean firmness values of cooked yellow peas for 2006 Peas, No.1 Canada Yellow and Peas, No. 2 Canada Yellow were 11.4 and 10.1 kg/g cooked seeds, respectively. These values were slightly higher than the respective grades in 2005.

The average protein contents for Peas, No. 1 Canada Green and Peas, No. 2 Canada Green were 24.7 and 24.4% (Table 4), respectively, which were higher than those for 2005. Green peas in 2006 had similar mean starch content to those in 2005. 2006 Peas, No. 1 Canada Green and Peas, No. 2 Canada Green had smaller seed sizes than 2005, which was indicated by the lower mean 100-seed weights. The mean water absorption values for Peas, No. 1 Canada Green and Peas, No. 2 Canada Green were slightly lower than 2005. 2006 green peas had slightly longer mean cooking time and firmer cooked texture than 2005.

Table 2 – Mean protein content for 2006 western Canadian peas by grade¹

Grade	Protein content %			
	2006			2005
	mean	min.	max.	mean
Manitoba				
Peas, No. 1 Canada	24.6	22.6	29.1	23.7
Peas, No. 2 Canada	24.9	22.6	27.3	22.7
Peas, No. 3 Canada	24.1	23.1	24.8	22.8
All grades	24.9	22.6	29.1	23.1
Saskatchewan				
Peas, No. 1 Canada	25.0	19.4	30.6	23.7
Peas, No. 2 Canada	24.3	20.4	30.4	23.5
Peas, No. 3 Canada	24.1	19.6	29.5	23.5
All grades	24.6	19.4	30.6	23.6
Alberta				
Peas, No. 1 Canada	23.8	16.9	28.7	23.6
Peas, No. 2 Canada	24.2	19.8	27.6	23.6
Peas, No. 3 Canada	24.6	22.6	27.0	23.5
All grades	24.3	16.9	28.7	23.6
Western Canada				
Peas, No. 1 Canada	24.9	16.9	30.6	23.6
Peas, No. 2 Canada	24.4	19.8	30.4	23.5
Peas, No. 3 Canada	24.2	19.6	29.5	23.4
All grades	24.5	16.9	30.6	23.5

¹Protein content (Nx6.25) is determined by near infrared measurement calibrated against the Combustion Nitrogen Analysis reference method.

Figure 2 – Mean protein content of western Canadian peas

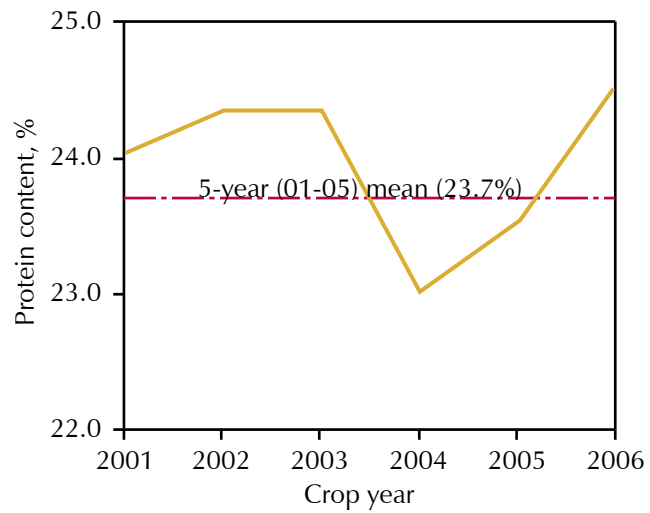


Table 3 – Quality data for 2006 western Canadian yellow peas

Quality parameter	Peas, No. 1 Canada Yellow		Peas, No. 2 Canada Yellow	
	2006	2005	2006	2005
Protein, % dry basis				
Number of samples	328	308	321	286
Mean	24.9	23.7	24.4	23.4
Standard deviation	2.0	1.3	1.6	1.4
Minimum	16.9	19.7	19.8	18.3
Maximum	30.6	28.5	30.4	28.0
Starch, % dry basis				
Number of samples	51	33	50	36
Mean	49.0	48.8	48.9	48.3
Standard deviation	1.5	1.7	1.6	2.2
Minimum	45.6	45.3	45.3	45.1
Maximum	52.8	52.5	52.8	53.0
100-seed weight, g/100 seeds				
Number of samples	294	308	281	286
Mean	21.4	23.5	21.6	22.9
Standard deviation	2.1	2.0	2.2	2.8
Minimum	12.3	16.3	11.0	9.3
Maximum	28.6	29.5	29.3	33.2
Water absorption, g H₂O/g seeds				
Number of samples	294	308	281	286
Mean	0.98	0.97	0.95	0.96
Standard deviation	0.09	0.11	0.10	0.13
Minimum	0.49	0.38	0.50	0.44
Maximum	1.14	1.28	1.17	1.22
Cooking time, min				
Number of samples	43	43	42	50
Mean	26.3	19.2	28.2	16.8
Standard deviation	8.0	8.5	6.5	7.9
Minimum	9.7	9.0	13.0	7.9
Maximum	38.8	38.5	40.0	38.1
Firmness, kg/g cooked seeds				
Number of samples	9	53	8	46
Mean	11.4	8.1	10.1	7.8
Standard deviation	3.3	2.2	3.6	3.3
Minimum	6.2	4.8	5.2	3.8
Maximum	14.8	13.1	17.3	21.3

Table 4 – Quality data for 2006 western Canadian green peas

Quality parameter	Peas, No. 1 Canada Green		Peas, No. 2 Canada Green	
	2006	2005	2006	2005
Protein, % dry basis				
Number of samples	40	52	43	45
Mean	24.7	23.3	24.4	23.7
Standard deviation	1.2	1.4	1.2	1.3
Minimum	22.1	20.0	22.1	20.3
Maximum	26.7	26.8	27.5	26.0
Starch, % dry basis				
Number of samples	23	30	27	16
Mean	48.3	48.2	48.2	47.7
Standard deviation	2.1	2.3	1.5	2.6
Minimum	41.2	44.0	44.7	43.9
Maximum	51.3	52.6	51.8	52.3
100-seed weight, g/100 seeds				
Number of samples	36	52	36	44
Mean	20.1	21.6	21.1	21.5
Standard deviation	2.1	3.2	2.8	3.1
Minimum	15.7	14.9	12.9	15.5
Maximum	24.2	30.8	26.5	30.1
Water absorption, g H₂O/g seeds				
Number of samples	36	52	36	44
Mean	0.92	0.99	0.95	1.00
Standard deviation	0.17	0.17	0.14	0.11
Minimum	0.50	0.46	0.62	0.72
Maximum	1.14	1.22	1.15	1.25
Cooking time, min				
Number of samples	14	51	16	44
Mean	29.3	23.1	29.1	26.3
Standard deviation	6.7	11.1	5.9	5.0
Minimum	18.8	8.0	20.1	8.1
Maximum	39.4	39.5	37.4	39.4
Firmness, kg/g cooked seeds				
Number of samples	9	17	8	44
Mean	11.8	7.2	10.4	8.6
Standard deviation	1.3	1.7	2.3	2.4
Minimum	10.0	4.0	6.8	3.8
Maximum	13.7	10.3	13.3	15.3

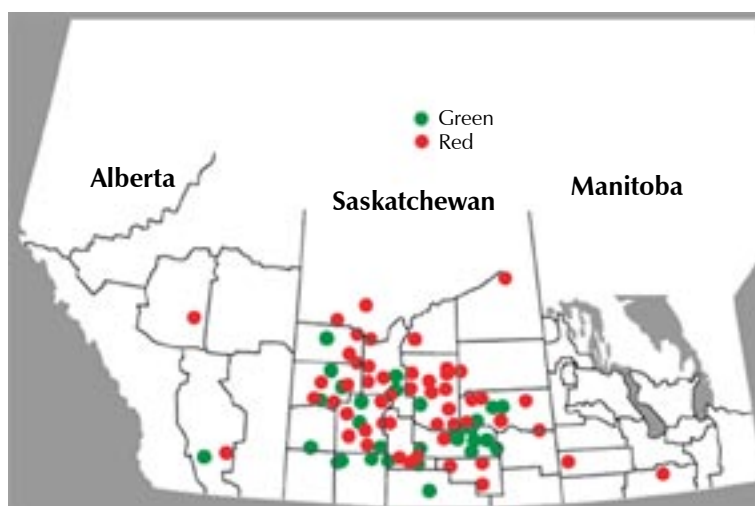
Quality of western Canadian lentils

2006

Harvest survey samples

Samples for the CGC's 2006 harvest survey were collected from producers across western Canada (Fig. 3). A total of 390 lentil samples including 251 green lentils and 139 red lentils were received at the CGC for analysis. All samples were graded and tested for protein content and seed size distribution using the Image Analysis technique. Only those samples receiving a grade of Lentils, No. 1 Canada or Lentils, No. 2 Canada were tested for 100-seed weight and water absorption. Starch content was determined on selected samples. Dehulling quality of red lentils was also evaluated. It is important to note that the samples reported by grade do not necessarily represent the actual distribution of grade.

Figure 3 – Map of western Canada showing origin of 2006 harvest survey lentil samples



Quality of 2006 western Canadian lentils

Protein content ranged from 21.6% to 31.2% for 2006 western Canadian lentils, including green and red lentils (Table 5). The average protein content for 2006 was 27.4% which was higher than the 2005 average of 26.8% and also higher than the five-year average of 26.4% (Fig. 4). The average protein content for Lentils, No. 1 Canada from Saskatchewan was higher than that for Lentils, No. 2 or No. 3 Canada.

Small green lentils (Eston, Milestone and Viceroy) and medium green lentils (Richlea and Vantage) had an average protein content of 26.6% and 26.2, respectively, which is higher than that for 2005 (Table 6), while large green lentils (Glamis, Grandora, Laird, Plato, Sedley and Sovereign) had similar mean protein content to that for 2005. The mean starch contents for small, medium and large green lentils were 45.9%, 46.7% and

46.1%, respectively, which were lower than those for the respective type of green lentils in 2005.

Small, medium and large green lentils had mean 100-seed weights of 2.9 g, 5.5 g and 6.2 g (Table 6), respectively. Small and large green lentils in the 2006 survey had slightly lower seed weight than in the 2005 survey, but medium green lentils had similar seed weights to the respective type of lentils in 2005. The mean water absorption values were 0.84 g H₂O/g seeds for small lentils, 1.00 H₂O/g seeds for medium lentils and 0.98 H₂O/g seeds for large lentils, respectively. 2006 small green lentils had lower average water absorption value than 2005.

The seed size distribution for green lentils (Table 7) was determined by the Image Analysis technique developed at the CGC. The reported results may differ from those obtained by the conventional sieving techniques. For small green lentils in 2006, 68% fell within 4.0 to 5.0 mm, while in 2005, 73% fell within 4.0 to 5.0 mm. In 2006, 71% of medium lentils fell in the range of 5.5-7.0 mm while in 2005, 59% were in this range. In 2006 survey, 65% of large lentils were within the range of 6.0 to 7.5 mm as compared to 69% in 2005.

Red lentils, including the varieties Blaze, Crimson, CDC Imperial, CDC Redberry, CDC Rouleau and Robin, had a mean protein content of 28.8% (Table 8), which was similar to that in 2005. Red lentils in 2006 had a slightly higher mean starch content than in 2005. The mean 100-seed weight for 2006 red lentils was 3.1 g, which was slightly lower than in 2005. The mean water absorption value for 2006 was similar to that for 2005.

In 2006, about 55% of the red lentils fell within 4.0 to 5.0 mm (Table 9), while in 2005, about 64% fell within 4.0 to 5.0 mm. This indicated that red lentils in 2006 had smaller mean seed sizes than in 2005.

Table 10 shows the dehulling quality for 2006 western Canadian red lentils. 2006 red lentils had a mean dehulling efficiency of 83.6% as compared to 79.7% in 2005. The powder and broken seeds produced during dehulling for 2006 were lower than those for 2005. In 2006, red lentils had less undehulled whole seeds after the dehulling process than in 2005. Colour of dehulled lentils was measured using a Hunterlab LabScan XE spectrophotometer with the CIE L*, a* and b* colour scale. Dehulled splits exhibited more brightness (L*), more redness (a*) and more yellowness (b*) as compared to dehulled whole seeds (Table 10). There were no differences in L*, a* and b* values between 2006 and 2005 dehulled whole seeds. Similar results were shown for dehulled splits.

Table 5 – Protein content for 2006 western Canadian lentils by grade¹

Grade	Protein content %			
	2006			2005
	mean	min.	max.	mean
Manitoba				
Lentils, No. 1 Canada	29.9	29.3	30.5	26.7
Lentils, No. 2 Canada	-	-	-	-
Lentils, No. 3 Canada	-	-	-	-
All grades	29.9	29.3	30.5	26.0
Saskatchewan				
Lentils, No. 1 Canada	27.6	21.6	31.2	26.9
Lentils, No. 2 Canada	26.7	22.7	31.0	26.7
Lentils, No. 3 Canada	26.8	24.0	28.2	27.3
All grades	27.4	21.6	31.2	26.8
Alberta				
Lentils, No. 1 Canada	27.7	27.5	27.9	25.8
Lentils, No. 2 Canada	27.1	26.2	28.0	27.0
Lentils, No. 3 Canada	-	-	-	-
All grades	27.4	26.2	28.0	27.1
Western Canada				
Lentils, No. 1 Canada	27.6	21.6	31.2	26.8
Lentils, No. 2 Canada	26.9	22.7	31.0	26.7
Lentils, No. 3 Canada	26.8	24.0	28.2	27.3
All grades	27.4	21.6	31.2	26.8

¹Protein content (Nx6.25) is determined by near infrared measurement calibrated against the Combustion Nitrogen Analysis reference method.

Figure 4 – Mean protein content of western Canadian lentils

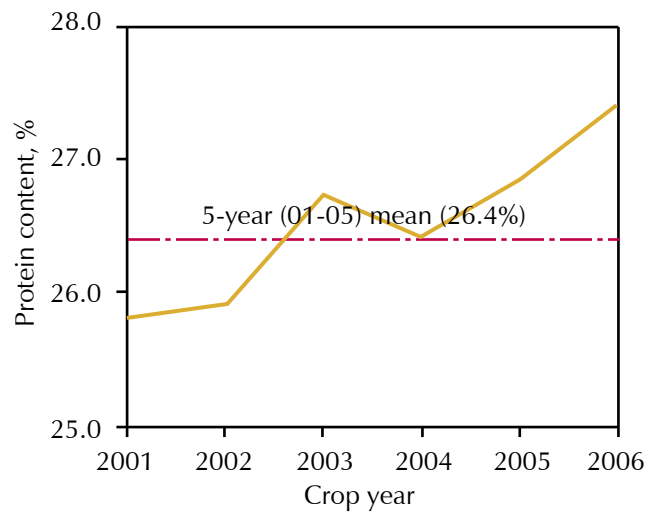


Table 6 – Quality data for 2006 western Canadian green lentils by size¹

Quality parameter	2006			2005		
	SL ²	ML ³	LL ⁴	SL ²	ML ³	LL ⁴
Protein, % dry basis						
Number of samples	41	13	158	42	25	288
Mean	26.6	26.2	26.6	25.9	25.7	26.5
Standard deviation	1.5	1.3	1.0	1.2	1.3	0.9
Minimum	21.5	24.1	22.7	23.0	21.5	22.3
Maximum	29.2	29.2	29.4	28.6	27.9	29.0
Starch, % dry basis						
Number of samples	24	13	31	17	14	60
Mean	45.9	46.7	46.1	48.2	48.7	47.9
Standard deviation	2.3	2.1	1.8	1.9	2.2	1.5
Minimum	43.6	43.0	42.5	45.2	45.0	43.7
Maximum	52.2	51.0	50.5	53.2	52.2	51.5
100-seed weight, g/100 seeds						
Number of samples	33	9	156	41	24	287
Mean	2.9	5.5	6.2	3.5	5.3	6.7
Standard deviation	0.4	0.5	0.6	0.3	0.5	0.5
Minimum	2.4	4.4	5.0	2.9	4.6	5.1
Maximum	3.8	6.2	8.0	4.1	6.6	8.4
Water absorption, g H₂O/g seeds						
Number of samples	33	9	156	41	24	287
Mean	0.84	1.00	0.98	0.94	0.97	1.02
Standard deviation	0.11	0.08	0.09	0.13	0.16	0.12
Minimum	0.58	0.86	0.67	0.71	0.69	0.50
Maximum	0.99	1.10	1.21	1.23	1.26	1.28

¹Lentils, No. 1 Canada and Lentils, No. 2 Canada Green combined.

²SL – Small lentils including the varieties Eston, Milestone and Viceroy.

³ML – Medium lentils including the varieties Richlea and Vantage.

⁴LL=large lentils including Glamis, Grandora, Laird, Plato, Sedley and Sovereign.

Table 7 – Seed size distribution for 2006 western Canadian green lentils¹

Seed size distribution	2006			2005		
	SL ²	ML ³	LL ⁴	SL ²	ML ³	LL ⁴
	Number of samples			Number of samples		
	44	13	364	45	28	364
<3.5 mm, %	4.1	0.0	0.1	1.7	0.1	0.1
3.5–4.0 mm, %	10.7	0.2	0.3	8.6	0.4	0.2
4.0–4.5 mm, %	33.0	1.0	0.8	30.5	1.6	0.4
4.5–5.0 mm, %	35.2	6.1	2.1	42.4	10.1	1.9
5.0–5.5 mm, %	7.6	21.2	6.8	15.2	29.2	6.3
5.5–6.0 mm, %	0.7	33.4	20.3	1.6	41.6	19.9
6.0–7.0 mm, %	1.8	37.5	65.3	0.0	17.0	67.8
7.0–7.5 mm, %	0.0	0.6	3.5	0.0	0.0	0.9
>7.5 mm, %	0.0	0.0	0.0	0.0	0.0	0.0

¹Seed size determined by an Image Analysis technique.

²SL – Small lentils including the varieties Eston, Milestone and Viceroy.

³ML – Medium lentils including the varieties Richlea and Vantage.

⁴LL=large lentils including the varieties Glamis, Grandora, Laird, Plato, Sedley and Sovereign.

Table 8 Quality data for 2006 western Canadian red lentils¹

Quality parameter	2006	2005
Protein, % dry basis		
Number of samples	132	57
Mean	28.8	28.7
Standard deviation	1.1	1.2
Minimum	24.1	24.9
Maximum	31.2	31.1
Starch, % dry basis		
Number of samples	110	28
Mean	47.7	46.1
Standard deviation	2.0	1.9
Minimum	42.9	43.1
Maximum	52.0	50.3
100-seed weight, g/100 seeds		
Number of samples	127	61
Mean	3.1	3.3
Standard deviation	0.4	0.5
Minimum	2.2	2.1
Maximum	4.4	4.1
Water absorption, g H₂O/g seeds		
Number of samples	127	61
Mean	0.91	0.95
Standard deviation	0.09	0.13
Minimum	0.57	0.76
Maximum	1.28	1.24

¹Red lentils (Blaze, Crimson, CDC Imperial, CDC Redberry, CDC Rouleau and Robin). Lentils, No. 1 Canada Red and Lentils, No. 2 Canada Red combined.

Table 9 Seed size distribution for 2006 western Canadian red lentils¹

Seed size distribution ²	2006	2005
	Number of samples	
	148	80
<3.5 mm, %	6.4	7.2
3.5–4.0 mm, %	24.6	25.5
4.0–4.5 mm, %	36.1	38.6
4.5–5.0 mm, %	18.9	25.1
5.0–5.5 mm, %	3.1	3.4
5.5–6.0 mm, %	0.2	0.1
6.0–7.0 mm, %	0.0	0.0
>7.0 mm, %	0.0	0.0

¹Red lentils including the varieties Blaze, Crimson, CDC Imperial, CDC Redberry, CDC Rouleau and Robin.

²Seed size including all grades determined by the Image Analysis technique.

Table 10 Quality data on dehulling quality for 2006 western Canadian red lentils¹

Quality parameter	2006	2005		
Dehulling efficiency, %				
Number of samples	91	58		
Mean	83.6	79.7		
Standard deviation	4.7	7.3		
Minimum	54.1	60.2		
Maximum	88.5	88.0		
Powder, %				
Number of samples	91	58		
Mean	2.2	2.5		
Standard deviation	0.4	0.4		
Minimum	1.5	1.7		
Maximum	4.2	3.8		
Broken seeds, %				
Number of samples	91	58		
Mean	0.4	1.4		
Standard deviation	0.8	2.1		
Minimum	0.1	0.2		
Maximum	8.0	6.6		
Undehulled whole seeds, %				
Number of samples	91	58		
Mean	4.2	6.7		
Standard deviation	4.6	6.2		
Minimum	0.1	0.1		
Maximum	36.9	27.5		
Colour ²				
	Dehulled seeds		Dehulled seeds	
Brightness, L*	Whole	Splits	Whole	Splits
Number of samples	91	91	58	58
Mean	59.7	61.3	59.7	61.9
Standard deviation	0.9	0.9	0.9	0.9
Minimum	57.8	59.2	57.8	60.1
Maximum	62.2	63.6	61.6	64.3
Redness, a*				
Number of samples	91	91	58	58
Mean	31.9	32.0	31.7	32.6
Standard deviation	115	1.3	1.5	1.7
Minimum	28.9	28.5	27.4	28.9
Maximum	33.9	34.6	33.9	35.8
Yellowness, b*				
Number of samples	91	91	58	58
Mean	39.7	41.8	39.2	41.3
Standard deviation	1.51	1.5	1.1	1.2
Minimum	35.6	38.2	36.6	38.5
Maximum	42.5	44.7	41.0	43.6

¹Red lentils (Blaze, Crimson, CDC Imperial, CDC Redberry, CDC Rouleau and Robin). Lentils, No. 1 Canada and Lentils, No. 2 Canada combined.

²L* = darkness (0) to brightness (+); a* = greenness (-) to redness (+); b* = blueness (-) to yellowness (+).

Quality of western Canadian pea beans 2006

Harvest survey samples

Samples for the CGC harvest survey were collected from producers across Manitoba, Canada (Fig. 5). For the 2006 harvest survey, 56 pea bean samples from Manitoba were received at the CGC for analysis. All samples were graded and analyzed for protein content. Only those samples receiving a grade of Pea beans, No. 1 Canada, Pea beans, No. 1 Canada Select, Pea beans, Extra Canada No. 1 or Pea beans, No. 2 Canada were tested for 100-seed weight, water absorption, cooking time and firmness of cooked beans. Starch content was determined on selected samples. It is important to note that the samples reported by grade do not necessarily represent the actual distribution of grade.

Figure 5 – Map of western Canada showing origin of 2006 harvest survey pea bean samples



Quality of 2006 western Canadian pea beans

Protein content ranged from 21.3% to 29.6% for 2006 western Canadian pea beans (Table 11). The average protein for 2006 western Canadian pea beans was 25.1% which was lower than 2005 and also lower than the five-year average of 25.5 % (Fig. 6).

Pea beans, No. 1 Canada in 2006 had lower protein content than in 2005 (Table 12), while the average starch content for 2006 was higher than for 2005. The average seed weight for 2006 Pea beans, No. 1 Canada was lower than that for 2005, which indicated that 2006 pea beans had smaller seed sizes than those in 2005. The average water absorption value in 2006 was similar to that in 2005.

Pea beans, No. 1 Canada in 2006 had a longer mean cooking time and firmer texture of cooked seeds than in 2005.

Table 11 – Mean protein content for 2006 western Canadian pea beans¹

Grade	Protein content %			
		2006		2005
	mean	min.	max.	mean
Manitoba				
Pea beans, Extra No. 1 Canada	24.6	21.3	26.9	-
Pea beans, No. 1 Canada Select	25.9	24.6	26.7	26.3
Pea beans, No. 1 Canada	25.0	22.2	29.6	25.6
Pea beans, No. 2 Canada	25.9	-	-	-
Pea beans, No. 3 Canada	-	-	-	26.9
Pea beans, No. 4 Canada	-	-	-	-
All grades	25.1	21.3	29.6	25.8

¹Protein content (Nx6.25) is determined by near infrared measurement calibrated against the Combustion Nitrogen Analysis reference method.

Figure 6 – Mean protein content of western Canadian pea beans

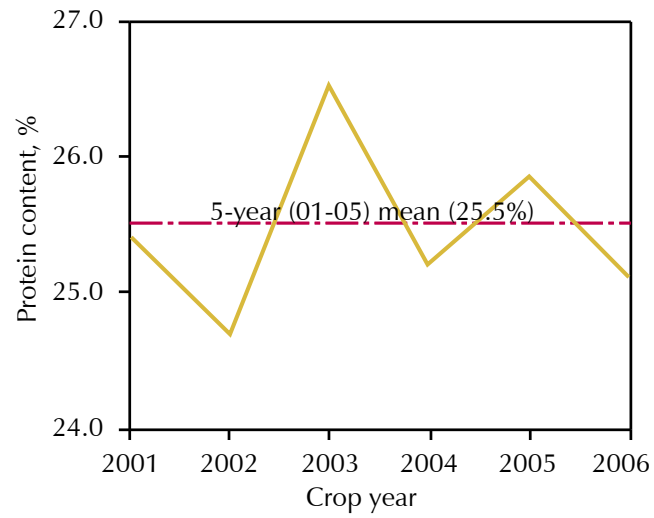


Table 12 – Quality data for 2006 western Canadian pea beans

Quality parameter	Pea beans, No. 1 Canada ¹		Pea beans, No. 2 Canada	
	2006	2005	2006	2005
Protein, % dry basis				
Number of samples	56	29	NA ²	NA
Mean	25.1	25.8	NA	NA
Standard deviation	1.4	0.8	NA	NA
Minimum	21.3	24.5	NA	NA
Maximum	29.6	27.8	NA	NA
Starch, % dry basis				
Number of samples	54	28	NA	NA
Mean	41.8	39.8	NA	NA
Standard deviation	1.4	1.4	NA	NA
Minimum	39.4	36.5	NA	NA
Maximum	45.6	42.1	NA	NA
100-seed weight, g/100 seeds				
Number of samples	55	27		
Mean	17.7	19.0	NA	NA
Standard deviation	1.6	1.0	NA	NA
Minimum	14.2	16.3	NA	NA
Maximum	21.1	21.1	NA	NA
Water absorption, g H₂O/g seeds				
Number of samples	55	27	NA	NA
Mean	0.95	0.96	NA	NA
Standard deviation	0.04	0.09	NA	NA
Minimum	0.83	0.73	NA	NA
Maximum	1.06	1.11	NA	NA
Cooking time, min				
Number of samples	49	27	NA	NA
Mean	22.8	15.9	NA	NA
Standard deviation	4.7	1.4	NA	NA
Minimum	15.5	13.8	NA	NA
Maximum	32.9	18.8	NA	NA
Firmness, kg/g cooked seeds				
Number of samples	54	27	NA	NA
Mean	15.8	9.5	NA	NA
Standard deviation	3.2	2.5	NA	NA
Minimum	9.2	4.9	NA	NA
Maximum	23.5	14.6	NA	NA

¹Including Pea beans, Extra No. 1 Canada; Pea beans, No. 1 Canada and Pea beans, No. 1 Canada Select.

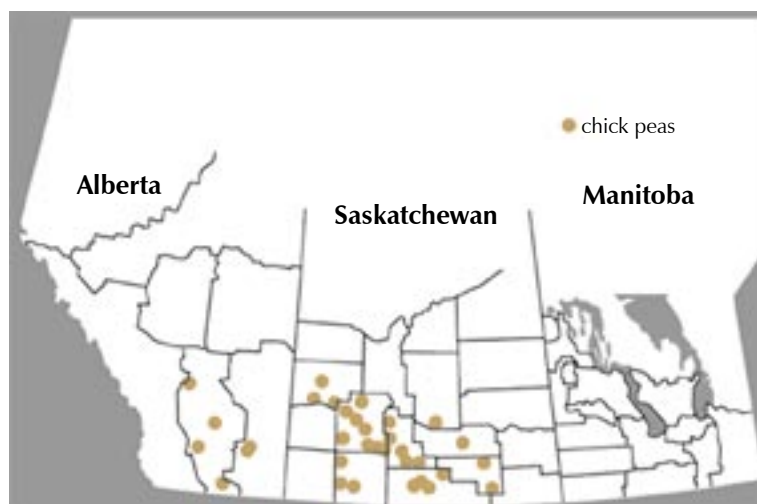
²NA=not available due to a small number of samples received.

Quality of western Canadian chick peas 2006

Harvest survey samples

Samples for the CGC harvest survey were collected from producers across western Canada (Fig. 7). For the 2006 harvest survey, 57 chick pea samples were received at the CGC for analysis. All samples were graded and analyzed for protein content. Due to the small number of desi chick pea samples received, only results for kabuli chick peas were included in the 2006 quality report. Starch content was determined on selected samples. It is important to note that the samples reported by grade do not necessarily represent the actual distribution of grade.

Figure 7 – Map of western Canada showing origin of 2006 harvest survey chick pea samples



Quality of 2006 western Canadian chick peas

Protein content ranged from 18.8% to 28.6% for 2006 western Canadian chick peas (Table 13). The average protein for 2006 was 24.2% which was higher than 2005 and also higher than the five-year average of 22.4 % (Fig. 8). Chick peas, Canada Western No. 1 had higher protein content than Canada Western No. 2.

The starch content was 42.9% for Chick peas, Kabuli, No. 1 Western Canada and 44.7% for Chick peas, Kabuli, No. 2 Western Canada, respectively (Table 14). 2006 Kabuli chick peas had lower mean 100-seed weight than 2005. Water absorption values in 2006 were similar for Chick peas, Kabuli, No.1 and No. 2 Western Canada to those in 2005.

Table 13 – Mean protein content for 2006 western Canadian Kabuli chick peas by grade¹

Grade	Protein content %			
		2006		2005
	mean	min.	max.	mean
Saskatchewan				
Chick peas, Kabuli, Canada Western No. 1	24.9	21.6	28.6	22.9
Chick peas, Kabuli, Canada Western No. 2	23.7	18.8	28.4	22.8
Chick peas, Kabuli, Canada Western No. 3	23.6	22.2	24.5	-
All grades	24.5	18.8	28.6	22.7
Alberta				
Chick peas, Kabuli, Canada Western No. 1	23.1	20.9	25.1	-
Chick peas, Kabuli, Canada Western No. 2	21.5	21.2	21.7	-
Chick peas, Kabuli, Canada Western No. 3	23.2	23.2	23.2	-
All grades	22.2	19.9	25.1	-
Western Canada				
Chick peas, Kabuli, Canada Western No. 1	24.7	20.9	28.6	22.9
Chick peas, Kabuli, Canada Western No. 2	23.4	18.8	28.4	22.8
Chick peas, Kabuli, Canada Western No. 3	23.5	22.2	28.5	-
All grades	24.2	18.8	28.6	22.7

¹Protein content (Nx6.25) is determined by near infrared measurement calibrated against the Combustion Nitrogen Analysis reference method.

Figure 8 – Mean protein content of western Canadian Kabuli chick peas

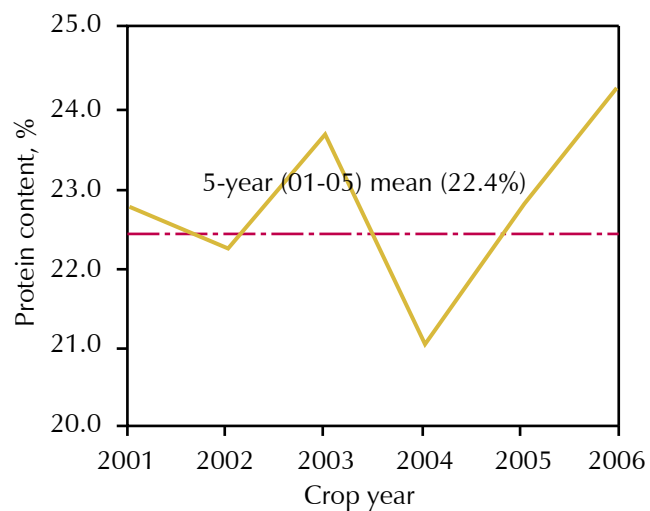


Table 14 – Quality data for 2006 western Canadian Kabuli chick peas

Quality parameter	Chick peas, Kabuli, No. 1 Canada Western		Chick peas, Kabuli, No. 2 Canada Western	
	2006	2005	2006	2005
Protein, % dry basis				
Number of samples	31	19	16	21
Mean	24.7	22.5	23.3	22.6
Standard deviation	1.9	1.1	2.7	1.0
Minimum	20.9	19.0	18.8	20.5
Maximum	28.6	24.2	28.4	24.5
Starch, % dry basis				
Number of samples	31	18	14	20
Mean	42.9	41.9	44.7	41.6
Standard deviation	2.5	1.5	2.4	1.2
Minimum	37.5	38.9	41.0	39.5
Maximum	48.4	44.4	48.6	44.4
100-seed weight, g/100 seeds				
Number of samples	34	18	16	21
Mean	35.3	37.0	36.3	38.2
Standard deviation	9.3	8.4	8.7	7.2
Minimum	22.4	23.4	25.3	23.5
Maximum	51.1	50.4	48.4	44.9
Water absorption, g H₂O/g seeds				
Number of samples	34	18	16	21
Mean	1.08	1.12	1.06	1.13
Standard deviation	0.04	0.04	0.03	0.14
Minimum	1.00	1.01	0.99	0.60
Maximum	1.16	1.19	1.10	1.29