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# Quality of western Canadian lentils

## 2010

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## Introduction

This report presents the quality data for the 2010 harvest survey for western Canadian lentils. Samples submitted by western Canadian producers to the Canadian Grain Commission's (CGC) Grain Research Laboratory (GRL) were collected for data analysis.

## Growing and harvesting conditions

The Prairie Provinces experienced a good start to the 2010 growing season. However, cooler temperatures and excessive moisture present throughout the growing season delayed crop development and downgraded crop quality.

Above normal temperatures in the southern and western regions allowed an early start to planting. Late season rain and snowstorms helped replenish moisture in central and northern Alberta and in west central Saskatchewan. A series of storms in Saskatchewan and Manitoba during late May and early June delayed planting and caused flooding in previously planted fields. Overall planting progress stopped with approximately 80 per cent of the crops sown.

Cool, wet conditions persisted through July and August, especially in the southwestern Prairies. This pushed crop development three to four weeks behind normal, but reduced the stress on the crops. The Peace River region of Alberta and British Columbia experienced hot and dry conditions for most of the growing season.

Cool and wet conditions continued into September, which caused further crop development delays and quality degradation. A severe frost in Alberta and western Saskatchewan caused further damage to crops. Warm and dry conditions at the end of September and into October allowed a rapid completion of the harvest.

## Production review

Lentil production in 2010 was almost 30% higher than that in 2009 and more than double the 10-year average (Table 1). Both the harvested area and yield increased for 2010. Saskatchewan continues to dominate lentil production in Western Canada, accounting for about 95% of production, while Alberta accounts for 5% of production.

**Table 1 – Production statistics for western Canadian lentils<sup>1</sup>**

	Harvested area		Production		Yield		Mean production <sup>2</sup>
Province	2010	2009	2010	2009	2010	2009	2000-2009
	thousand hectares		thousand tonnes		kg/ha		thousand tonnes
Lentils							
Manitoba	-	-	-	-	-	-	4
Saskatchewan	1281	945	1840	1480	1400	1570	777
Alberta <sup>3</sup>	55	18	107	30	2000	1650	10
Western Canada	1336	963	1947	1510	1700	1570	786

<sup>1</sup> Statistics Canada, *Field Crop Reporting Series*, Vol. 89, No. 8.

<sup>2</sup> Statistics Canada, *Field Crop Reporting Series*, 2000-2009.

<sup>3</sup> Includes the Peace River area of British Columbia.

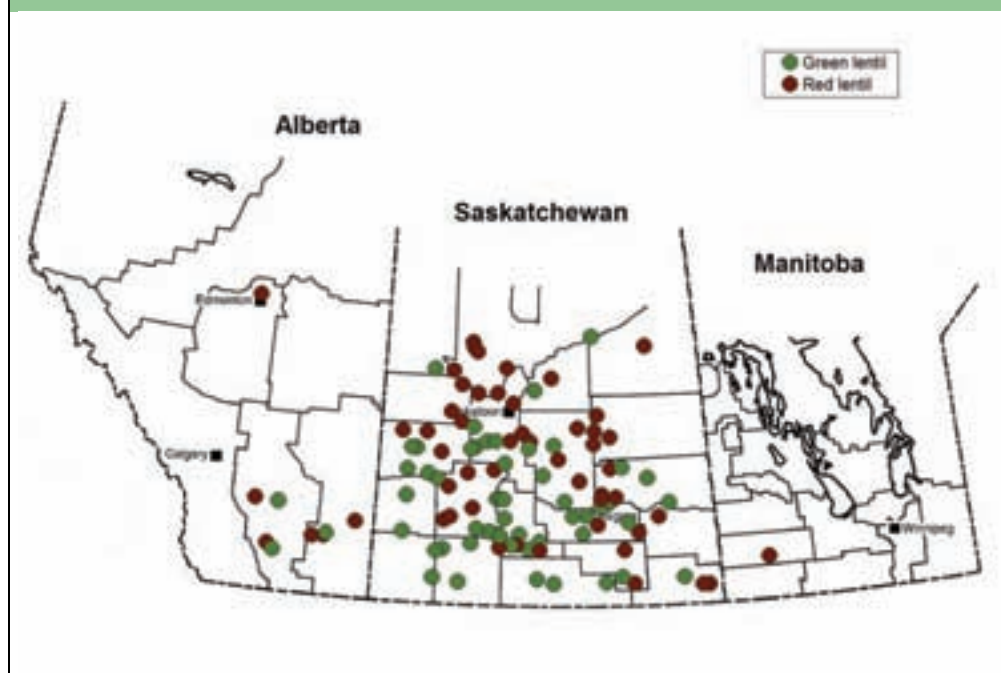
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# Western Canadian lentils \_\_\_\_\_ 2010

## Harvest survey samples

Samples for the CGC's 2010 harvest survey were collected from producers across western Canada (Fig. 1). A total of 487 lentil samples including 251 green lentils and 236 red lentils were received at the CGC for analysis. All samples were graded and tested for protein content and seed size distribution. Size distribution was determined using the Image Analysis technique developed at the CGC. Composites for green lentils were made based on size (small, medium and large), crop region and grade (No. 1 and No. 2). The composites were tested for starch content, 100-seed weight and water absorption. Composites for red lentils were made based on crop region and variety (lentils, No. 1 and No. 2 Canada red combined). In addition to the quality evaluations done on green lentils, red lentils were also evaluated for their dehulling quality. 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 2010 harvest survey lentil samples**



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## Quality of 2010 western Canadian lentils

Protein content ranged from 22.6% to 32.0% for 2010 western Canada lentils, including green and red lentils (Table 2). The average protein content for 2010 was 28.0%, which was slightly higher than the 2009 average of 27.1% and the five-year average of 27.4% (Fig. 2). Grade level and province did not show much variation of protein content.

Small size green lentils (CDC Milestone, CDC Viceroy, and Eston), medium size green lentils (CDC Impress, CDC Meteor, and CDC Richlea) and large size green lentils (CDC Glamis, CDC Grandora, CDC Greenland, CDC Improve, CDC Plato, CDC Sedley, CDC Sovereign, and Laird) had average protein contents of 26.3%, 24.5% and 26.1%, respectively, which were slightly lower than their respective type of lentil in 2009 (Table 3). Small and medium size lentils had higher mean starch contents in 2010 (45.6% and 48.2%, respectively) than 2009 (44.9% and 46.9%, respectively), while large size lentils in 2010 had slightly lower mean starch content than 2009 (45.6% and 46.3%, respectively).

Small size green lentils in 2010 had a mean 100-seed weight of 3.0 g (Table 3), which was similar to that in 2009 (3.1 g), but their mean water absorption for 2010 was higher than for 2009 (0.94 and 0.79 g H<sub>2</sub>O/g seeds, respectively). Medium and large size green lentils in 2010 had mean 100-seed weights of 5.1 g and 6.4 g, respectively, and mean water absorption values of 0.98 g H<sub>2</sub>O/g seeds and 1.01 g H<sub>2</sub>O/g seeds, respectively, which were similar to the mean 100-seed weight and water absorption values in 2009.

The seed size distribution for green lentils (Table 4) was determined by the Image Analysis technique developed at the CGC. The reported results may differ from those obtained by conventional sieving techniques. For small size green lentils in 2010, 70% of the seeds fell within 4.0 to 5.0 mm, which was lower than 2009 (74%). Most medium size green lentils in 2010 fell within 5.0-6.5 mm, which was a slightly larger size range than for 2009 (4.5-6.0 mm). In 2010, large size green lentils were similar in size to 2009, as shown by the majority of seeds for both years (63.9% and 63.1%, respectively) falling in 6.0-7.0 mm.

Red lentils, including the varieties CDC Blaze, CDC Impact, CDC Impala, CDC Imperial, CDC KR-1, CDC Maxim, CDC Redberry, CDC Red Rider, CDC Rosetown, CDC Rouleau and Crimson, exhibited a mean protein content of 27.1% in 2010 (Table 5), which was similar to 2009 (27.6%). Red lentils displayed similar mean starch contents for 2010 (45.1%) and 2009 (45.0%). The mean 100-seed weight was slightly higher for 2010 (3.6 g) than 2009 (3.2 g), but the mean water absorption was similar (0.86 g H<sub>2</sub>O/ g seeds and 0.88 g H<sub>2</sub>O/ g seeds, respectively).

In 2010, 69% of the red lentils fell within the 4.0-5.0 mm range, which was close to the 72% in 2009 (Table 6). This indicates that the 2010 seeds have a similar size to the 2009 seeds.

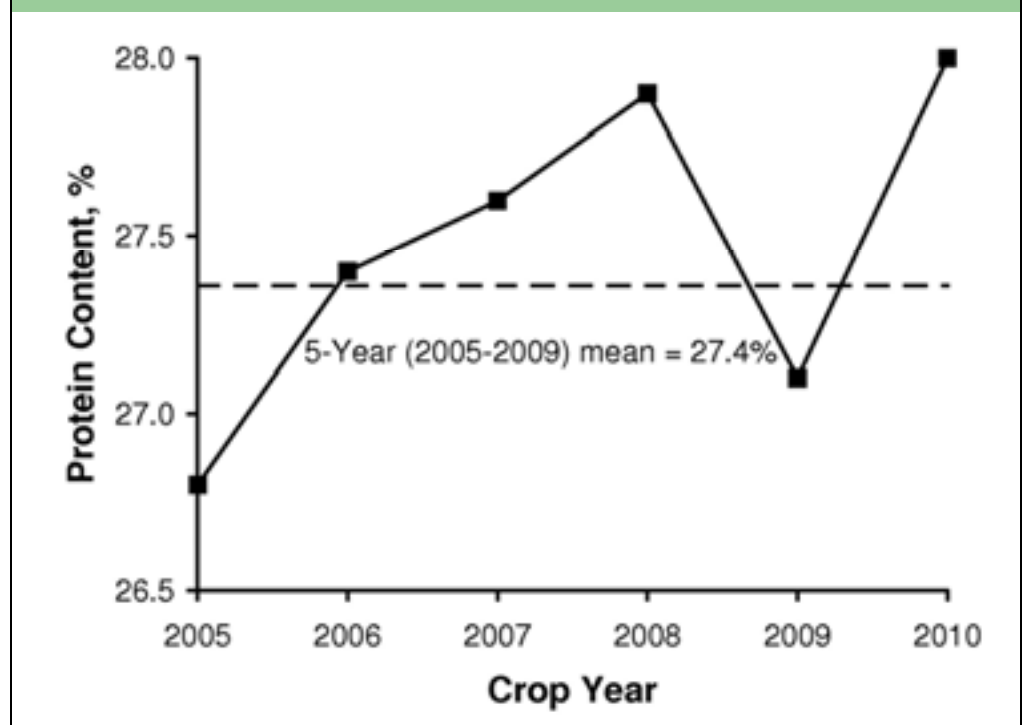
Table 7 shows the dehulling quality for 2010 western Canadian red lentils. The mean dehulling efficiency for 2010 red lentils was 76.7%, as compared to 78.3% in 2009. The dehulling efficiency was lower in 2010 than in 2009 due to higher powder content (2.6 and 2.2%, respectively) and undeulled whole seeds (9.0% and 8.5%, respectively). 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\*), similar redness (a\*) and more yellowness (b\*) as compared to dehulled whole seeds (Table 7). Red lentils from 2010 had slightly lower redness values (a\*) than from 2009 for both the whole seeds and split seeds.

**Table 2 – Protein content for 2010 western Canadian lentils by grade<sup>1</sup>**

Grade	Protein content, %			
	mean	2010 min.	max.	2009 mean
<b>Manitoba</b>				
Lentils, No. 1 Canada	-	-	-	-
Lentils, No. 2 Canada	29.2	29.2	29.2	-
Lentils, No. 3 Canada	-	-	-	-
<b>All grades</b>	<b>29.2</b>	<b>29.2</b>	<b>29.2</b>	-
<b>Saskatchewan</b>				
Lentils, No. 1 Canada	27.5	24.4	30.5	27.2
Lentils, No. 2 Canada	27.4	23.0	31.9	26.8
Lentils, No. 3 Canada	28.3	25.2	31.9	27.4
<b>All grades</b>	<b>28.0</b>	<b>22.6</b>	<b>32.0</b>	<b>27.1</b>
<b>Alberta</b>				
Lentils, No. 1 Canada	27.0	25.7	28.7	28.2
Lentils, No. 2 Canada	28.3	27.6	29.0	25.8
Lentils, No. 3 Canada	28.1	25.6	30.1	29.2
<b>All grades</b>	<b>27.9</b>	<b>25.6</b>	<b>30.1</b>	<b>28.0</b>
<b>Western Canada</b>				
Lentils, No. 1 Canada	27.4	24.4	30.5	27.2
Lentils, No. 2 Canada	27.4	23.0	31.9	26.9
Lentils, No. 3 Canada	28.3	25.2	31.9	27.5
<b>All grades</b>	<b>28.0</b>	<b>22.6</b>	<b>32.0</b>	<b>27.1</b>

<sup>1</sup> Protein content (N x 6.25) is determined by near infrared measurement calibrated against the Combustion Nitrogen Analysis reference method.

**Figure 2 – Mean protein content of western Canadian lentils**





**Table 3 – Quality data for 2010 western Canadian green lentils by size<sup>1</sup>**

Quality parameter	2010			2009		
	SL <sup>2</sup>	ML <sup>3</sup>	LL <sup>4</sup>	SL <sup>2</sup>	ML <sup>3</sup>	LL <sup>4</sup>
<b>Protein, % dry basis</b>						
Number of samples	4	3	16	9	5	21
Mean	26.3	24.5	26.1	27.1	25.5	26.3
Standard deviation	2.4	1.9	0.6	0.7	1.5	0.6
Minimum	24.0	22.5	24.7	26.3	23.7	25.0
Maximum	28.6	26.2	26.8	28.5	27.2	27.9
<b>Starch, % dry basis</b>						
Number of samples	4	3	16	9	5	21
Mean	45.6	48.2	45.6	44.9	46.9	46.3
Standard deviation	2.0	1.8	1.2	1.4	1.7	0.6
Minimum	43.4	46.4	43.8	41.5	44.5	44.7
Maximum	47.5	50.1	48.5	46.3	49.0	47.3
<b>100-seed weight, g/100 seeds</b>						
Number of samples	4	3	16	9	5	21
Mean	3.0	5.1	6.4	3.1	5.1	6.6
Standard deviation	0.3	0.3	0.3	0.3	0.5	0.4
Minimum	2.7	4.8	5.9	2.6	4.6	5.9
Maximum	3.3	5.3	6.8	3.5	5.6	7.3
<b>Water absorption, g H<sub>2</sub>O/g seeds</b>						
Number of samples	4	3	16	9	5	21
Mean	0.94	0.98	1.01	0.79	0.99	0.98
Standard deviation	0.10	0.03	0.04	0.20	0.06	0.05
Minimum	0.83	0.95	0.95	0.34	0.93	0.87
Maximum	1.07	1.00	1.10	0.96	1.06	1.06

<sup>1</sup> Lentils, No. 1 Canada and Lentils, No. 2 Canada combined.

<sup>2</sup> SL=small lentils including Eston, Milestone and CDC Viceroy.

<sup>3</sup> ML=medium lentils including CDC Impress, CDC Meteor and CDC Richlea.

<sup>4</sup> LL=large lentils including CDC Glamis, CDC Grandora, CDC Greenland, CDC Improve, CDC Plato, CDC Sedley, CDC Sovereign and Laird.

**Table 4 – Seed size distribution for 2010 western Canadian green lentils<sup>1</sup>**

Seed size distribution	2010			2009		
	SL <sup>2</sup>	ML <sup>3</sup>	LL <sup>4</sup>	SL <sup>2</sup>	ML <sup>3</sup>	LL <sup>4</sup>
	Number of samples			Number of samples		
	19	12	220	32	12	187
<3.5 mm, %	4.6	0.5	0.2	4.1	0.2	0.1
3.5–4.0 mm, %	20.6	1.1	0.4	19.0	0.6	0.2
4.0–4.5 mm, %	42.1	2.9	1.0	46.5	2.9	0.6
4.5–5.0 mm, %	27.9	12.0	3.3	27.9	16.5	2.9
5.0–5.5 mm, %	4.5	26.3	8.5	2.4	37.9	8.8
5.5–6.0 mm, %	0.3	31.2	19.5	-	35.0	22.3
6.0–6.5 mm, %	-	18.3	37.4	-	6.2	40.7
6.5–7.0 mm, %	-	6.8	26.5	-	0.7	22.4
7.0–7.5 mm, %	-	0.9	3.1	-	-	2.1
>7.5 mm, %	-	0.1	0.1	-	-	-

<sup>1</sup> Seed size including all grades determined by the image analysis technique.

<sup>2</sup> SL=small lentils including Eston, Milestone and CDC Viceroy.

<sup>3</sup> ML=medium lentils including CDC Impress, CDC Meteor and CDC Richlea.

<sup>4</sup> LL=large lentils including CDC Glamis, CDC Grandora, CDC Greenland, CDC Improve, CDC Plato, CDC Sedley, CDC Sovereign and Laird.

**Table 5 – Quality data for 2010 western Canadian red lentils<sup>1,2</sup>**

Quality parameter	2010	2009
<b>Protein, % dry basis</b>		
Number of samples	16	26
Mean	26.8	27.6
Standard deviation	1.4	1.1
Minimum	23.7	25.7
Maximum	28.7	29.6
<b>Starch, % dry basis</b>		
Number of samples	16	26
Mean	45.1	45.0
Standard deviation	1.0	0.7
Minimum	43.8	43.1
Maximum	47.6	46.3
<b>100-seed weight, g/100 seeds</b>		
Number of samples	16	26
Mean	3.6	3.2
Standard deviation	0.8	0.4
Minimum	2.7	2.4
Maximum	5.4	3.9
<b>Water absorption, g H<sub>2</sub>O/g seeds</b>		
Number of samples	16	26
Mean	0.86	0.88
Standard deviation	0.06	0.08
Minimum	0.77	0.70
Maximum	0.98	0.99

<sup>1</sup> Red lentils (CDC Blaze, CDC Impact, CDC Impala, CDC Imperial, CDC KR-1, CDC Maxim, CDC Red Rider, CDC Redberry, CDC Rouleau and Crimson).

<sup>2</sup> Lentils, No. 1 Canada Red and Lentils, No. 2 Canada Red are combined.

**Table 6 – Seed size distribution for 2010 western Canadian red lentils<sup>1</sup>**

Seed size distribution <sup>2</sup>	2010	2009
	Number of samples	
	236	161
<3.5 mm, %	2.2	2.6
3.5–4.0 mm, %	11.0	14.3
4.0–4.5 mm, %	29.8	34.8
4.5–5.0 mm, %	39.0	37.1
5.0–5.5 mm, %	15.7	10.7
5.5–6.0 mm, %	2.0	0.4
6.0–6.5 mm, %	0.2	-
6.50–7.0 mm, %	-	-
>7.0 mm, %	-	-

<sup>1</sup> Red lentils (CDC Blaze, CDC Impact, CDC Impala, CDC Imperial, CDC KR-1, CDC Maxim, CDC Red Rider, CDC Redberry, CDC Rouleau and Crimson).

<sup>2</sup> Seed size including all grades determined by the Image Analysis technique.

**Table 7 – Quality data on dehulling quality for 2010 western Canadian red lentils<sup>1</sup>**

Quality parameter	2010	2009		
Dehulling efficiency, %				
Number of samples	14	26		
Mean	76.7	78.3		
Standard deviation	4.3	7.4		
Minimum	70.7	57.4		
Maximum	84.6	85.9		
Powder, %				
Number of samples	14	26		
Mean	2.6	2.2		
Standard deviation	0.4	0.5		
Minimum	2.0	1.6		
Maximum	3.4	4.1		
Broken seeds, %				
Number of samples	14	26		
Mean	0.6	0.8		
Standard deviation	0.4	1.1		
Minimum	0.2	0.1		
Maximum	1.8	5.6		
Undehulled whole seeds, %				
Number of samples	16	26		
Mean	9.0	8.5		
Standard deviation	3.7	7.1		
Minimum	2.9	1.4		
Maximum	14.1	30.7		
Colour <sup>2</sup>	Whole	Splits	Whole	Splits
Brightness, L*				
Number of samples	14	14	26	26
Mean	60.4	62.5	59.7	61.9
Standard deviation	0.8	0.8	0.9	0.9
Minimum	58.7	60.8	58.1	60.3
Maximum	61.3	63.2	61.0	63.1
Redness, a*				
Number of samples	14	14	26	26
Mean	30.2	30.6	30.9	31.3
Standard deviation	1.2	1.5	1.2	1.5
Minimum	27.9	27.8	28.4	28.6
Maximum	31.6	33.4	32.9	34.2
Yellowness, b*				
Number of samples	14	14	26	26
Mean	37.3	39.2	37.6	40.0
Standard deviation	1.1	1.0	0.9	0.9
Minimum	35.0	38.1	35.8	38.5
Maximum	39.1	41.3	39.8	42.1

<sup>1</sup> Red lentils (CDC Blaze, CDC Impact, CDC Impala, CDC Imperial, CDC KR-1, CDC Maxim, CDC Red Rider, CDC Redberry, CDC Rouleau and Crimson). Lentils, No. 1 Canada and Lentils, No. 2 Canada are combined.

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