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Quality of western Canadian lentils

2009

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Quality Innovation Service

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Introduction

This report presents the quality data for the 2009 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 cool spring to start the 2009 growing season. Southern prairies experienced poor soil moisture in early spring, brought on by dry conditions since 2006 and below normal winter precipitation. Cool temperatures in spring delayed snowmelt and overall planting and germination. Moderate rainfall in early June helped improve crop germination.

Frost was reported in many regions into early June. Cool temperatures and dry conditions continued through to July in many of the prairie regions, except in north and central Alberta, which were hot and dry. The cool temperatures delayed crop development, but reduced the stress on the crops and helped maintain the crop conditions until the rains in mid July. The hot and dry conditions experienced in north and central Alberta led to some crop deterioration. Warmer temperatures were seen in the southern prairies in late August and September that helped boost crop development.

Mild temperatures in late August and September and later than normal fall frost helped late maturing crops to mature without significant damage, and the dry conditions helped preserve the crop quality. The warmer temperatures also enabled most crops to be harvested by mid October. Although warm dry conditions in late August and most of September advanced crop maturity, the prevailing cooler than normal growing period and dry conditions led to a later than normal harvest.

Production review

Lentil production in 2009 was 64% higher than production in 2008 and almost double the 10-year average (Table 1). Both the harvested area and yield increased for 2009. Saskatchewan continues to dominate lentil production in Western Canada, accounting for about 98% of production, while Alberta accounts for 2% of production.

Table 1 – Production statistics for western Canadian lentils[1]

	Harvested area		Production		Yield		Mean production[2]
Province	2009	2008	2009	2008	2009	2008	1999-2008
	thousand hectares		thousand tonnes		kg/ha		thousand tonnes
Lentils							
Manitoba	-	-	-	-	-	-	5
Saskatchewan	945	631	1480	920	1570	1460	753
Alberta[3]	18	-	30	-	1650	-	9
Western Canada	**963**	**631**	**1510**	**920**	**1570**	**1460**	**762**

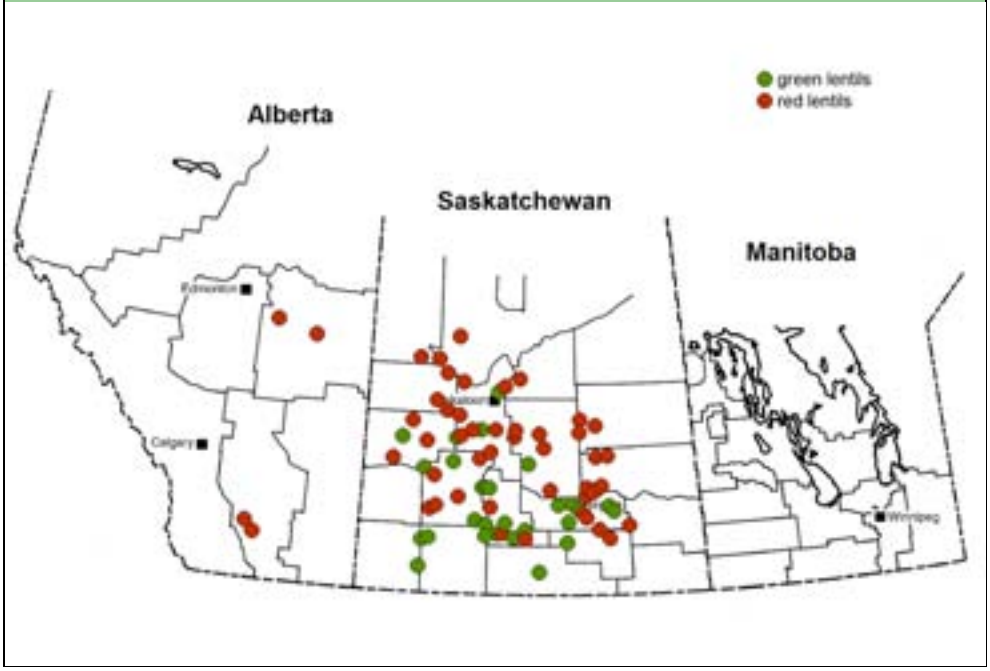
[1] Statistics Canada, *Field Crop Reporting Series, Vol. 88, No. 8.*
[2] Statistics Canada, *Field Crop Reporting Series*, 1999-2008.
[3] Includes the Peace River area of British Columbia.

Western Canadian lentils 2009

Harvest survey samples

Samples for the CGC's 2009 harvest survey were collected from producers across western Canada (Fig. 1). A total of 392 lentil samples including 231 green lentils and 161 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). 21 composites for large lentils, 5 for medium lentils and 10 for small lentils were obtained. The composites were tested for starch content, 100-seed weight and water absorption. Lentils, No. 1 Canada, green and Lentils, No. 2 Canada, green results are combined. A total of 21 composites for red lentils were made based on variety (entils, No. 1 and No. 2 Canada red combined) and crop region. 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 2009 harvest survey lentil samples



Quality of 2009 western Canadian lentils

Protein content ranged from 23.7% to 31.9% for 2009 western Canada lentils, including green and red lentils (Table 2). The average protein content for 2009 was 27.1%, which was similar to the 2008 average of 27.9% and the five-year average of 27.2% (Fig. 2). Grade level and province did not show much variation of protein content.

Small green lentils (CDC Milestone, CDC Viceroy and Eston), medium green lentils (CDC Impress, CDC Meteor and CDC Richlea) and large green lentils (CDC Glamis, CDC Grandora, CDC Greenland, CDC Improve, CDC Plato, CDC Sedley, CDC Sovereign and Laird) had average protein contents of 27.1%, 25.5% and 26.3%, respectively, which were slightly lower than their respective type of lentil in 2008 (Table 3). The mean starch contents for all sizes in 2009 (44.9%, 46.9% and 46.3%, respectively) were higher than those for 2008 (43.2%, 43.8% and 44.6%, respectively).

Small green lentils in 2009 had a mean 100-seed weight of 3.1 g, which was higher than that in 2008 (2.8 g), but their mean water absorption for 2009 was lower than for 2008 (0.79 and 0.88 g H_2O/g seeds, respectively). Medium and large green lentils in 2009 had mean 100-seed weights of 5.1 g and 6.6 g, respectively, which were similar to the 2008 survey (4.8 g and 6.7g, respectively). Mean water absorption values of 0.99 g H_2O/g seeds for medium lentils and 0.98 g H_2O/g seeds for large lentils were similar to those for 2008 (0.93 g H_2O/g seeds and 0.97 g H_2O/g seeds, respectively).

The seed size distribution for green lentils (Table4) 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 green lentils in 2009, 75% of the seeds fell within 4.0 to 5.0 mm, which was similar to 2008. Medium green lentils in 2009 had the most in the 5.0-6.0 mm range, while in 2008, the largest group fell in the 5.5-6.5 mm range. In 2008, approximately 70% of large green lentils fell within 6.0-7.0 mm, while in 2009, only approximately 63% fell within this range. This indicates that the medium and large lentils from 2009 were smaller in diameter than in 2008.

Red lentils, including the varieties CDC Blaze, CDC Impact, CDC Impala, CDC Imperial, CDC Maxim, CDC Redberry, CDC Red Rider, CDC Robin, CDC Rosetown and CDC Rouleau, had a mean protein content of 27.6% in 2009 (Table 5), which was similar to 2008 (27.9%). Red lentils in 2009 had higher starch content than in 2008 (45.0% and 44.1%, respectively). The mean 100-seed weight and mean water absorption for 2009 (3.2 g and 0.88 g H_2O/ g seeds, respectively) was similar to that in 2008 (3.3 g and 0.88 g H_2O/g seeds, respectively).

In 2009, 72% of the red lentils fell within the 4.0-5.0 mm range, which was similar to the 71% of the red lentils in 2008 (Table 6). This indicates that the 2009 seeds have a similar diameter to the 2008 seeds.

Table 7 shows the dehulling quality for 2009 western Canadian red lentils. The mean dehulling efficiency for 2009 red lentils was 78.3%, as compared to 79.3% in 2008. The dehulling efficiency was slightly lower in 2009 than in 2008 because of higher undehulled whole seeds (8.5% and 6.8%, respectively), while the powder (2.2% and 2.4%, respectively) and broken seeds (0.8% and 1.3%, respectively) were similar. Colour of dehulled lentils was measured using a Hunterlab LabScan XE spectrocolorimeter 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 10). There were no differences in brightness (L*), redness (a*) and yellowness (b*) values between the 2009 and 2008 respective fractions.

Table 2 – Protein content for 2009 western Canadian lentils by grade[1]

	Protein content, %			
Grade	2009			2008
	mean	min.	max.	mean
Manitoba				
Lentils, No. 1 Canada	-	-	-	-
Lentils, No. 2 Canada	-	-	-	-
Lentils, No. 3 Canada	-	-	-	30.3
All grades	**-**	**-**	**-**	**30.3**
Saskatchewan				
Lentils, No. 1 Canada	27.2	23.7	31.9	28.0
Lentils, No. 2 Canada	26.8	24.0	30.1	27.6
Lentils, No. 3 Canada	27.4	24.5	30.6	28.2
All grades	**27.1**	**23.7**	**31.9**	**27.9**
Alberta				
Lentils, No. 1 Canada	28.4	28.2	28.6	28.7
Lentils, No. 2 Canada	27.7	25.8	29.8	27.7
Lentils, No. 3 Canada	29.2	29.2	29.2	27.9
All grades	**28.0**	**25.8**	**29.8**	**28.3**
Western Canada				
Lentils, No. 1 Canada	27.2	23.7	31.9	28.0
Lentils, No. 2 Canada	26.9	24.0	30.1	27.6
Lentils, No. 3 Canada	27.5	24.5	30.6	28.5
All grades	**27.1**	**23.7**	**31.9**	**27.9**

[1] 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

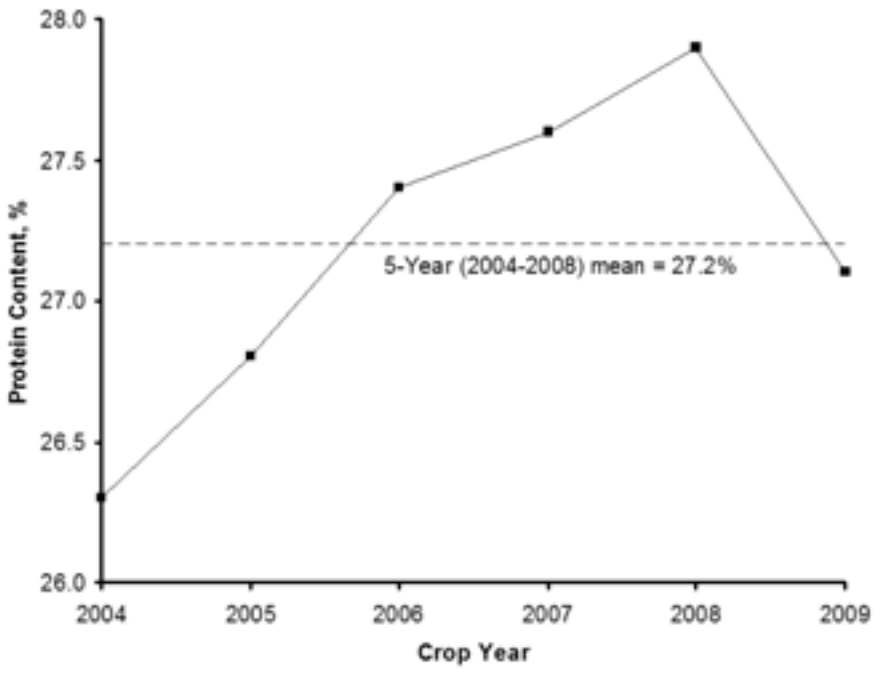


Table 3 – Quality data for 2009 western Canadian green lentils by size[1]

Quality parameter	2009 SL[2]	2009 ML[3]	2009 LL[4]	2008 SL[2]	2008 ML[3]	2008 LL[4]
Protein, % dry basis						
Number of samples	9	5	21	11	4	23
Mean	27.1	25.5	26.3	28.7	26.2	26.8
Standard deviation	0.7	1.5	0.6	0.8	1.3	0.6
Minimum	26.3	23.7	25.0	27.5	24.7	26.0
Maximum	28.5	27.2	27.9	30.1	27.5	28.0
Starch, % dry basis						
Number of samples	9	5	21	11	4	23
Mean	44.9	46.9	46.3	43.2	43.8	44.6
Standard deviation	1.4	1.7	0.6	0.9	0.7	0.8
Minimum	41.5	44.5	44.7	41.9	42.8	42.4
Maximum	46.3	49.0	47.3	44.6	44.4	45.7
100-seed weight, g/100 seeds						
Number of samples	9	5	21	11	4	23
Mean	3.1	5.1	6.6	2.8	4.8	6.7
Standard deviation	0.3	0.5	0.4	0.2	0.7	0.5
Minimum	2.6	4.6	5.9	2.4	4.2	5.5
Maximum	3.5	5.6	7.3	3.2	5.7	7.9
Water absorption, g H_2O/g seeds						
Number of samples	9	5	21	11	4	23
Mean	0.79	0.99	0.98	0.88	0.93	0.97
Standard deviation	0.20	0.06	0.05	0.11	0.06	0.04
Minimum	0.34	0.93	0.87	0.68	0.86	0.89
Maximum	0.96	1.06	1.06	1.01	0.99	1.05

[1] Lentils, No. 1 Canada and Lentils, No. 2 Canada combined.
[2] SL=small lentils including Eston, Milestone and CDC Viceroy.
[3] ML=medium lentils including CDC Meteor, Richlea and Vantage.
[4] 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 2009 western Canadian green lentils[1]

	2009			2008		
	SL[2]	ML[3]	LL[4]	SL[2]	ML[3]	LL[4]
	Number of samples			Number of samples		
Seed size distribution	32	12	187	34	8	189
<3.5 mm, %	4.1	0.2	0.1	3.3	0.2	0.1
3.5–4.0 mm, %	19.0	0.6	0.2	18.2	0.3	0.1
4.0–4.5 mm, %	46.5	2.9	0.6	45.5	0.6	0.3
4.5–5.0 mm, %	27.9	16.5	2.9	29.8	2.7	1.5
5.0–5.5 mm, %	2.4	37.9	8.8	3.2	15.7	5.4
5.5–6.0 mm, %	-	35.0	22.3	0.1	29.9	18.3
6.0–6.5 mm, %	-	6.2	40.7	-	34.4	43.2
6.5–7.0 mm, %	-	0.7	22.4	-	15.4	27.6
7.0–7.5 mm, %	-	-	2.1	-	1.0	3.5
>7.5 mm, %	-	-	-	-	-	0.1

[1] Seed size including all grades determined by the image analysis technique.
[2] SL=small lentils including Eston, Milestone and CDC Viceroy.
[3] ML=medium lentils including CDC Meteor, Richlea and Vantage.
[4] 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 2009 western Canadian red lentils[1,2]

Quality parameter	2009	2008
Protein, % dry basis		
Number of samples	26	21
Mean	27.6	27.9
Standard deviation	1.1	1.0
Minimum	25.7	26.2
Maximum	29.6	29.5
Starch, % dry basis		
Number of samples	26	21
Mean	45.0	44.1
Standard deviation	0.7	0.9
Minimum	43.1	41.5
Maximum	46.3	46.0
100-seed weight, g/100 seeds		
Number of samples	26	21
Mean	3.2	3.3
Standard deviation	0.4	0.6
Minimum	2.4	2.5
Maximum	3.9	4.8
Water absorption, g H_2O/g seeds		
Number of samples	26	21
Mean	0.88	0.89
Standard deviation	0.08	0.06
Minimum	0.70	0.76
Maximum	0.99	1.02

[1] Red lentils (CDC Blaze, CDC Impact, CDC Impala, CDC Imperial, CDC Maxim, CDC Redberry, CDC Red Rider, CDC Robin, CDC Rosetown and CDC Rouleau).
[2] Lentils, No. 1 Canada Red and Lentils, No. 2 Canada Red combined.

Table 6 – Seed size distribution for 2009 western Canadian red lentils[1]

	2009	2008
	Number of samples	
Seed size distribution[2]	161	116
<3.5 mm, %	2.6	2.1
3.5–4.0 mm, %	14.3	13.2
4.0–4.5 mm, %	34.8	34.7
4.5–5.0 mm, %	37.1	36.4
5.0–5.5 mm, %	10.7	12.7
5.5–6.0 mm, %	0.4	0.8
6.0–6.5 mm, %	-	-
6.50–7.0 mm, %	-	-
>7.0 mm, %	-	-

[1] Red lentils (CDC Blaze, CDC Impact, CDC Impala, CDC Imperial, CDC Maxim, CDC Redberry, CDC Red Rider, CDC Robin, CDC Rosetown and CDC Rouleau).
[2] Seed size including all grades determined by the image analysis technique.

Table 7 – Quality data on dehulling quality for 2009 western Canadian red lentils[1]

Quality parameter	2009	2008
Dehulling efficiency, %		
Number of samples	26	21
Mean	78.3	79.3
Standard deviation	7.4	7.6
Minimum	57.4	56.2
Maximum	85.9	88.4
Powder, %		
Number of samples	26	21
Mean	2.2	2.4
Standard deviation	0.5	0.3
Minimum	1.6	1.9
Maximum	4.1	3.4
Broken seeds, %		
Number of samples	26	21
Mean	0.8	1.3
Standard deviation	1.1	1.5
Minimum	0.1	0.3
Maximum	5.6	7.2
Undehulled whole seeds, %		
Number of samples	26	21
Mean	8.5	6.8
Standard deviation	7.1	6.4
Minimum	1.4	0.5
Maximum	30.7	28.7

Colour[2]	Whole	Splits	Whole	Splits
Brightness, L*				
Number of samples	26	26	21	21
Mean	59.7	61.9	60.0	61.6
Standard deviation	0.9	0.9	0.7	0.9
Minimum	58.1	60.3	58.7	60.2
Maximum	61.0	63.1	61.4	63.1
Redness, a*				
Number of samples	26	26	21	21
Mean	30.9	31.3	31.4	31.6
Standard deviation	1.2	1.5	1.0	1.4
Minimum	28.4	28.6	29.5	28.7
Maximum	32.9	34.2	32.8	33.6
Yellowness, b*				
Number of samples	26	26	21	21
Mean	37.6	40.0	37.6	39.5
Standard deviation	0.9	0.9	0.9	0.9
Minimum	35.8	38.5	36.2	38.4
Maximum	39.8	42.1	39.3	41.7

[1] Red lentils (CDC Blaze, CDC Impact, CDC Impala, CDC Imperial, CDC Maxim, CDC Redberry, CDC Red Rider, CDC Robin, CDC Rosetown and CDC Rouleau). Lentils, No. 1 Canada and Lentils, No. 2 Canada combined.

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