



Canadian Grain
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Quality of western Canadian flaxseed 2009

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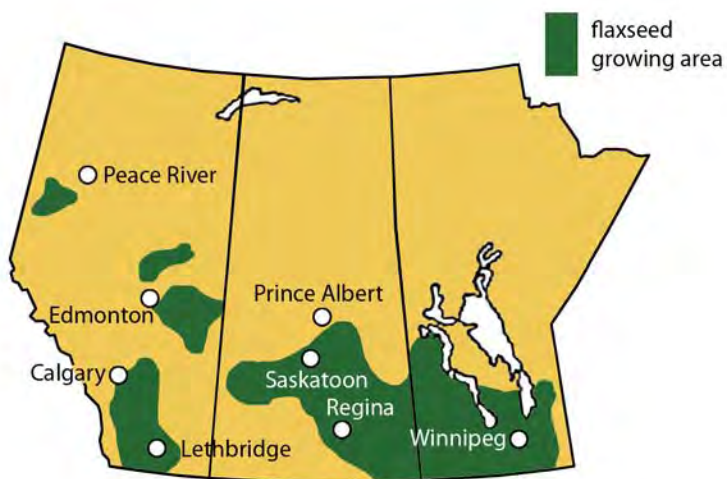
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Introduction

This report presents quality data and information based on the Canadian Grain Commission (CGC) 2009 harvest survey of western Canadian flaxseed. The quality data includes oil, protein, free fatty acids, fatty acid composition and iodine values of harvest survey samples submitted to the Grain Research Laboratory (GRL). Producers, grain companies and oilseed crushing plants submitted the samples throughout the harvest period. The map shows the traditional growing areas for flaxseed in western Canada.

Figure 1 – Map of western Canada showing traditional growing areas for flaxseed



Source: Flax Council of Canada

Summary

The Canadian Grain Commission (CGC) harvest survey of western Canadian flaxseed shows the 2009 crop to contain above average oil and iodine value but a below average protein content compared to the 2008 flax crop. The iodine value and oil content are 2.1 units and 1.1% higher than the 10-year means, respectively. The protein content is 1.2% lower than the 10-year mean.

Compared to 2008 (46.0%), the 2009 oil content, 46.1%, is similar while the protein content, 22.0%, is 0.7% lower. The α -linolenic acid content, 58.0%, is 1.8% higher than in 2008, resulting in an iodine value of 193.4, 3.9 units higher than in 2008.

The GRL's long-term harvest survey results show cool growing conditions tend to produce a flaxseed crop with higher oil contents and iodine values, but lower protein contents.

**Table 1 - Flaxseed, No. 1 Canada Western
Quality data for 2009 harvest survey**

Quality parameter	2009	2008	1999-2008 Mean
Oil content ¹ , %	46.1	46.0	45.0
Protein content ² , %	22.0	22.7	23.2
Free fatty acids, %	0.15	0.14	0.28
Iodine value	193.4	189.5	191.3

¹ Dry matter basis

² N x 6.25; 8.5% moisture basis

**Table 2 - Flaxseed, No. 1 Canada Western
Fatty acid composition for 2009 harvest survey**

Fatty acid ¹ , % in oil	2009	2008	1999-2008 Mean
Palmitic	4.8	4.9	5.1
Stearic	3.1	3.5	3.4
Oleic	16.9	18.8	18.4
Linoleic	15.7	15.1	15.3
α -Linolenic	58.0	56.2	56.9

¹ Percentage of total fatty acids in the oil including palmitic (C16:0), stearic (C18:0), oleic (C18:1), linoleic (C18:2), and linolenic (C18:3)

Weather and production review

Weather review, Seeding and Growing conditions

Temperature and precipitation patterns for the 2009 western Canadian growing season can be found on Agriculture Agri-Food Canada (AAFC) web site (http://www.agr.gc.ca/pfra/drought/article_e.htm). Weather and Crop Surveillance department of the Canadian Wheat Board and AAFC provided the majority of the detailed weather review for the 2009 crop year.

Planting was delayed due to colder than normal temperatures in the prairies. In central and northeastern Alberta and west central Saskatchewan, dry condition further delayed seeding. Cooler than normal temperatures in May, June, July and August delayed crop development. By end of August, the crop was several weeks behind maturity. The dry conditions remained in Alberta for most of the summer but cooler than normal temperatures allowed the crop to develop without excessive stress.

Most of the harvest in Manitoba and the southern part of Saskatchewan and Alberta was completed by the end of September due to significantly higher than normal September temperatures. Snow fall in October in most of the prairies temporarily stopped the harvest. Harvesting in some areas of Saskatchewan and Alberta resumed with a warmer than normal November with approximately 92% of the total harvest completed by the middle of November.

Production and grade information

Western Canadian farmers planted 692 thousand hectares of flaxseed in 2009 (Table 3), slightly higher than in 2008 (631.3 thousand hectares). The 2009 yield estimate of 1500 kg/ha was higher than the yield reported in 2008 (1377 kg/ha) and above the 10-year mean of 1241 kg/ha. Western Canada flaxseed production had an 8.0% increase, 930.1 thousand metric tonnes compared to 2008, the result of a 19.7% and 6.3% increase in Manitoba and Saskatchewan, respectively while a 13.9% decrease in production was observed in Alberta. According to the Statistics Canada estimates in *Field Crop Reporting Series No. 8*, Saskatchewan accounted for 77.4% of flaxseed production while Manitoba and Alberta had 18.8% and 3.8% respectively.

Over 95% of the samples received for the 2009 CGC Harvest Survey were graded as Flaxseed, No.1 CW, however, snow in October might result in some downgrading of the samples harvest in November in Saskatchewan and Alberta.

Table 3 - Seeded area and production for western Canadian flaxseed

	Seeded area		Production ¹		Average production ²
	2009	2008	2009	2008	1999-2008
	thousand hectares		thousand tonnes		thousand tonnes
Manitoba	121.4	107.2	193.0	161.3	182.4
Saskatchewan	550.4	505.9	708.7	666.8	576.3
Alberta	20.2	18.2	28.4	33.0	29.5
Western Canada	692.0	631.3	930.1	861.1	788.2

¹ Source—Source: *Field Crop Reporting Series*, No. 8, December 2009; Statistics Canada

² Source—Source: *Field Crop Reporting Series*, revised final estimates for 1999-2008.

Harvest survey samples

Flaxseed samples for the CGC harvest survey are collected from producers, grain handling offices and oilseed crushing plants across western Canada. The samples are cleaned to remove dockage prior to testing. The samples are analyzed for oil, protein and iodine value using a NIRSystems 6500 scanning near-infrared spectrometer, calibrated to and verified against the appropriate reference method. Composite samples are used for free fatty acids and fatty acid composition analyses. Composites are prepared by combining Flaxseed, No.1 Canada Western (CW) samples by provincial crop districts; Flaxseed, No.2, No 3. and Sample by western Canada.

This year's harvest survey report included only 333 samples compared to 344 in 2008 and 364 samples in 2007. Manitoba contributed 71 samples, Saskatchewan 237 samples and Alberta 16 samples during the harvest period from September 1 to December 1st, 2009. Weighting factors used to calculate provincial and western Canadian means are derived from the previous five-year average production for each crop district and this year's provincial production estimates in Statistics Canada's *Field Crop Reporting Series* No. 8, December 7, 2009.

Quality of western Canadian flaxseed – 2009

Tables 4 and 5 show detailed information on the quality of top grade western Canadian flaxseed harvested in 2009. A complete summary of the survey by province and lower grades can be found at: <http://grainscanada.gc.ca/flax-lin/hqfm-mqrl-eng.htm>. The number of harvest survey samples collected from each province may not represent the actual production or grade distribution. However, there were sufficient samples to provide good quality information for each province. To calculate western Canadian averages, provincial averages are weighted by the Statistics Canada production estimate and an estimate of grade distribution.

Table 6 compares the quality of recent flaxseed exports with this year's harvest survey data. The harvest survey data are from producer samples that have been cleaned to remove dockage, while recent exports of flaxseed from Thunder Bay and Vancouver contained from 0.9% to 4.32% dockage. Dockage will affect quality factors such as oil content, iodine value and free fatty acids. Flaxseed exports containing over 2.5% dockage are considered not commercially clean.

Oil and protein content give quantitative estimates of the value of the seed as a source of oil and of the resulting meal as a source of protein for animal feed. Iodine value is a measure of the overall unsaturation of the oils and is calculated from the fatty acid composition. Oils with higher iodine values, *i.e.*, with more unsaturation, polymerize more rapidly in the presence of air. For flaxseed, the high level of α -linolenic acid is an important quality factor as it is this fatty acid, which is responsible for most of flaxseed oil's drying properties. α -Linolenic acid is also the omega-3 (ω -3) fatty acid considered to contribute to good health in humans and is responsible for the increasing use of whole and ground flaxseed in cereals and baked goods, and flaxseed oil in salads.

**Table 4 - Flaxseed, No. 1 Canada Western
Quality data for 2009 harvest survey**

Province	Number of samples tested	Oil content ¹ , %			Protein content ² , %			Iodine value		
		mean	min.	max.	mean	min.	max.	mean	min.	max.
Manitoba	71	45.7	42.8	48.8	21.7	17.6	24.5	192.7	184.3	201.2
Saskatchewan	237	46.4	43.2	49.5	20.9	17.4	26.5	193.1	183.2	201.4
Alberta	16	45.6	42.0	47.6	23.4	19.5	26.8	195.1	187.6	202.2
Western Canada³	324	46.1	42.0	49.5	22.0	17.4	26.8	193.4	183.2	202.2

¹ Dry matter basis

² N x 6.25; dry matter basis

³ Mean values are weighted averages based on estimated production by province (Statistics Canada).

Table 5 – Flaxseed, No. 1 Canada Western
Fatty acid composition and free fatty acid content of 2009 harvest survey

Province	Number of samples	Free fatty acid composition, % ¹					Free fatty acids
		C16:0	C18:0	C18:1	C18:2	C18:3	
Manitoba	71	4.8	2.9	17.6	15.5	57.6	0.15
Saskatchewan	237	4.8	3.0	17.2	15.6	57.8	0.15
Alberta	16	4.7	3.2	16.2	15.0	59.3	0.17
Western Canada²	324	4.8	3.1	16.9	15.6	58.0	0.15

¹ Percentage of total fatty acids in the oil including palmitic (C16:0), stearic (C18:0), oleic (C18:1), linoleic (C18:2), and linolenic (C18:3)

² Mean values are weighted averages based on estimated production by province (Statistics Canada).

Table 6 - Flaxseed, No. 1 Canada Western
Comparison of 2009 harvest survey quality data with recent export³ shipments

Quality parameter	2009 survey	December 2009 exports	2008-2009 exports
Oil content ¹ %	46.1	45.4	45.3
Protein content ² %	22.0	21.6	22.8
Free fatty acids, %	0.15	0.32	0.40
Iodine value	193.4	190.8	188.8
Palmitic acid, % in oil	4.8	4.8	5.0
Stearic acid, % in oil	3.1	3.2	3.5
Oleic acid, % in oil	16.9	18.1	19.1
Linoleic acid, % in oil	15.6	15.6	15.5
α-Linolenic acid, % in oil	58.0	56.6	55.6
Number of samples	324	4	25

¹ Dry matter basis

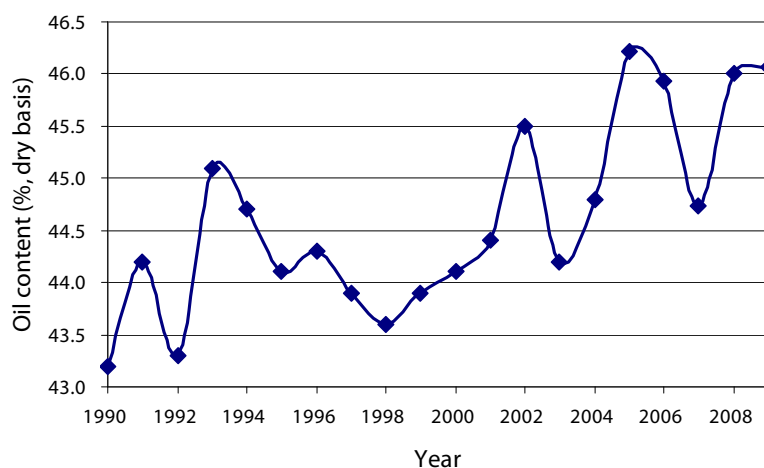
² N x 6.25; dry matter basis

³ Commercially clean exports containing less than 2.5% dockage

Oil content

The average oil content (46.1%) for Flaxseed, No.1 CW from the 2009 survey is similar to the 2008 oil content and to the record high 46.2% of 2005. The oil content for Manitoba (45.7%) is significantly lower than in Saskatchewan (46.4%) and similar to the 45.6% for Alberta samples. Compared to 2008, average oil contents in 2009 are 0.2% and 0.3% higher respectively for Manitoba and Saskatchewan samples and 0.6% lower for Alberta samples. The oil content of Flaxseed, No.1 CW samples from producers across western Canada varied from 42.0% to 59.5%. The high oil contents observed in the 2009 survey are a result of the cooler than normal growing conditions in the prairies. The decrease in oil content observed in Alberta could be a result of persisting dry conditions. While average monthly temperatures were generally one to four degrees lower than normal across the Prairies from May to end of August, the Peace River region of Alberta and British Columbia reported above than normal temperatures and persisting dry condition. The GRL's long-term harvest survey results have shown that hot, dry growing conditions tend to produce a flaxseed crop with lower oil contents and iodine values, but higher protein contents (<http://www.grainscanada.gc.ca/flax-lin/trend-tendance/qfc-qlc-eng.htm>). Also contributing to the improvement of the western Canada mean oil content in the past few years is the continuing trend of planting more of the newer high quality Canadian flaxseed cultivars. Quality information on the varieties from the 2009 survey will be available at a later date on the above noted CGC website. The oil content of December 2009 Flaxseed, No.1 CW exports averaged 45.4%, similar to the 2008–2009 export mean of 45.3%. This suggests the oil content of the 2009–2010 flaxseed exports will be similar to the previous year. Flaxseed exports that are not commercially clean will have lower oil contents than exports that are cleaned to contain less than 2.5% dockage.

**Figure 2 – Flaxseed, No. 1 Canada Western
Oil content of harvest survey samples, 1990-2009**



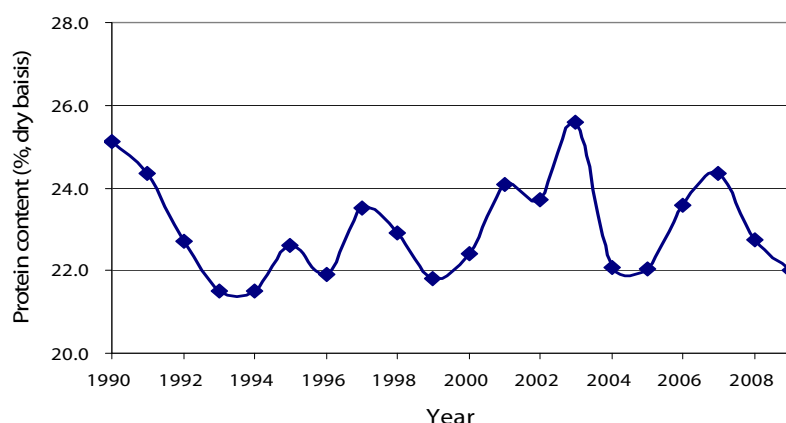
2009 average.....	46.1%
2008 average.....	46.0%
1999–2008 mean	45.0%

Protein content

The average protein content of 22.0% for Flaxseed, No.1 CW from the 2009 harvest survey is 0.7% lower than in 2008 and 1.2% lower than the 10-year mean of 23.2%. The Manitoba average protein content of 21.7% was significantly lower than the 23.4% in Alberta and higher than the 20.9% in Saskatchewan. Compared to 2008, the average protein contents was similar for Manitoba (+0.1%) and Alberta (-0.1%) but decrease significantly for Saskatchewan (-1.8%). The protein content of Flaxseed, No.1 CW samples from producers across western Canada varied from 17.4% to 26.8%.

As Table 6 shows, the protein content of 21.6% for December 2009 flaxseed exports is 1.2% lower than the 22.8% for the 2008–2009 shipping season. The protein content of flaxseed exports in 2009–2010 should be lower than the export shipments of the previous season.

**Figure 3 – Flaxseed, No. 1 Canada Western
Protein content of harvest survey samples, 1990–2009**



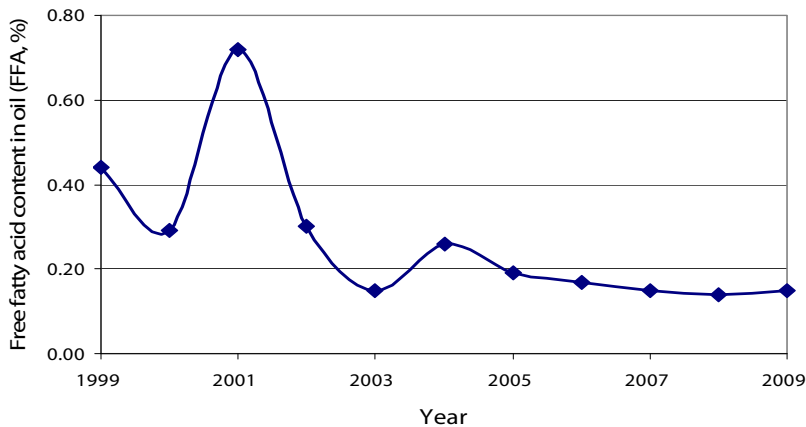
2009 average	22.0%
2008 average	22.7%
1999–2008 mean.....	23.2%

Free fatty acid content

The average free fatty acid (FFA) content of 0.15 % in top grade 2009 survey samples is similar to the 2008 average of 0.14% and below the 10-year mean of 0.28%. The average FFA content of Manitoba samples (0.15%) is similar to those from Saskatchewan (0.15%) and Alberta (0.17%). Flaxseed from regions where the crop was heat stressed or delayed due to snow harvest conditions will have FFA levels above the provincial means. The lower grade samples (No.2 CW to Canada Sample Grade) had FFA varying from 0.21 to 0.82%.

The FFA content of Flaxseed, No.1 CW exports in December 2009 averaged 0.32%; suggesting the levels in 2009-2010 might be higher than to the 2008–2009 values (Table 6).

Figure 4– Flaxseed, No. 1 Canada Western
Free fatty acid content of harvest survey samples, 1999–2009



2009 average	0.15%
2008 average	0.14%
1999–2008 mean.....	0.28%

Fatty acid composition

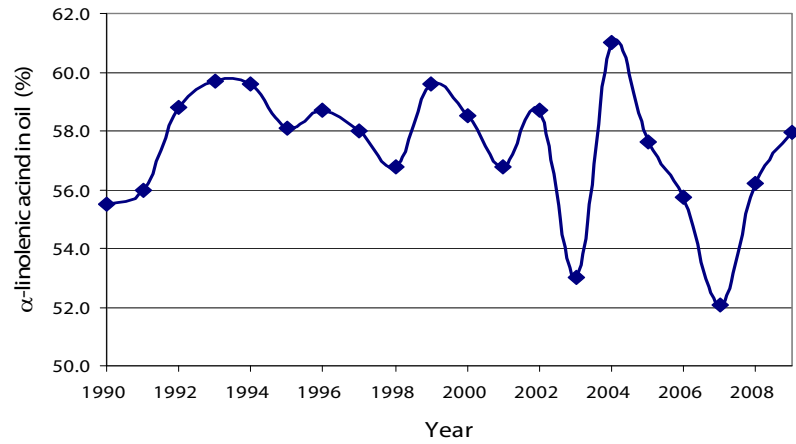
The average α -linolenic acid content of 2009 harvest survey Flaxseed, No.1 CW samples is 58.0%, significantly higher than both the 56.2% in 2008 and the 10-year mean of 56.9%. Compared to 2008, the average α -linolenic acid content increased by 0.5%, 0.1% and 2.9% respectively in Manitoba, Saskatchewan and Alberta. Flaxseed, No. 1 CW samples from producers across western Canada had a range of linolenic acid content from 52.0% to 62.7%.

The average iodine value of the oil from Flaxseed, No.1 CW samples is 193.4 units. Iodine value is a measure of the total degree of unsaturation of the oil and in flaxseed is heavily influenced by the linolenic acid content of the oil. The 2009 iodine value is 3.9 units higher than in 2008 and 2.1 units higher than the 10-year mean of 191.3 units. The average iodine value increased by 2.7, 5.1 and 6.1 units respectively for Manitoba, Saskatchewan and Alberta samples. Flaxseed, No.1 CW samples from producers across western Canada varied in iodine value from 183.2 to 202.2 units.

Oils with iodine values greater than 188 units are desired by the coatings industry for products such as paints, varnishes and inks, while oils with iodine values around 183 units are preferred by the linoleum industry. Iodine value, like oil content, is influenced by growing temperatures and length of photoperiod. Generally, cooler growing conditions and longer photoperiods will result in both higher iodine value and oil content. The cooler growing season temperatures in 2008 contributed to the increase in the mean iodine value.

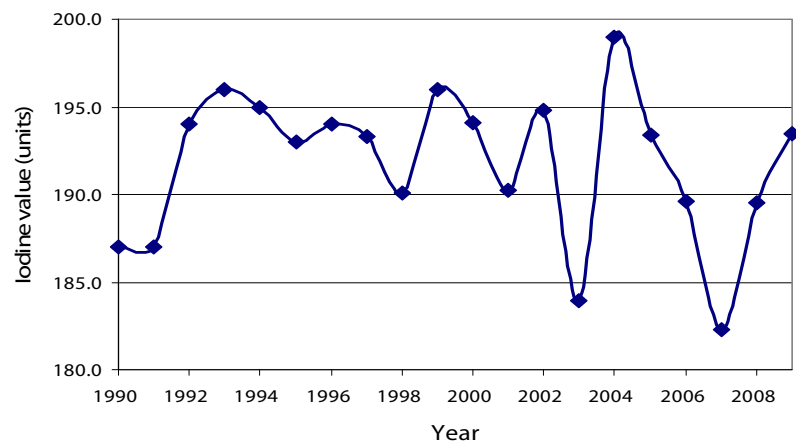
The October 2009 export data in Table 6 shows the α -linolenic acid content at 56.6% and the iodine value at 190.8 units, higher than the 2008–2009 mean export values. Flaxseed, No.1 CW exports will likely produce oils with iodine values of 190 units and higher. Flaxseed exports that are not commercially clean may have lower iodine values than those exports that are cleaned to contain less than 2.5% dockage.

**Figure 5 – Flaxseed, No. 1 Canada Western
Linolenic acid content of harvest survey samples, 1990–2009**



2009 average	58.0%
2009 average	56.2%
1999–2008 mean.....	56.9%

**Figure 6 – Flaxseed, No. 1 Canada Western
Iodine value of harvest survey samples, 1990–2009**



2009 average	193.4
2008 average	189.5
1999–2008 mean.....	191.3