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Quality of western Canadian flaxseed 2001

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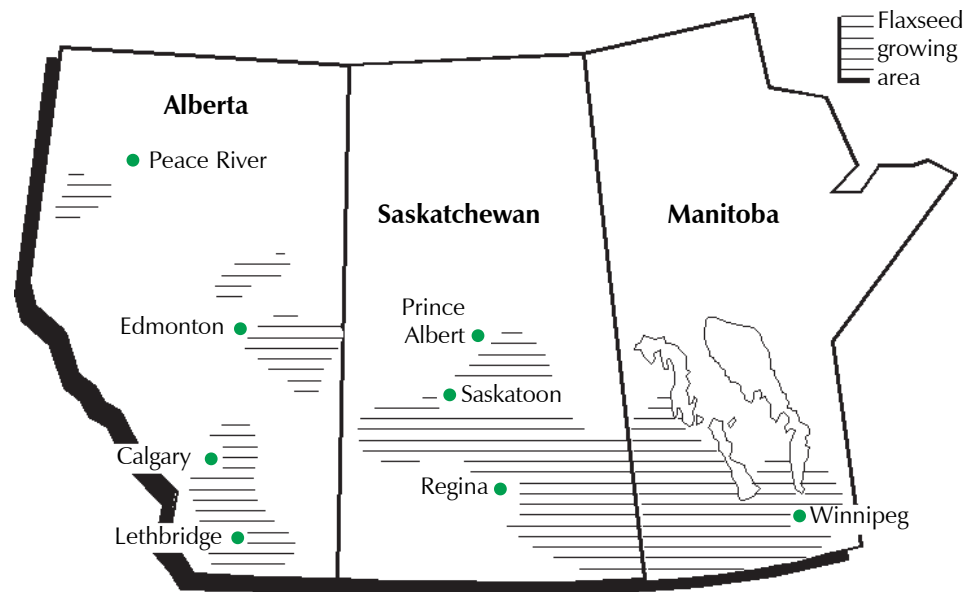
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Quality of western Canadian flaxseed 2001

Introduction

This report presents quality data and information based on the Canadian Grain Commission (CGC) 2001 harvest survey of western Canadian flaxseed. Quality data presented includes oil, protein and free fatty acid content, the fatty acid composition, and the iodine value of harvest survey samples. Quality data are based on analyses of flaxseed samples submitted to the Grain Research Laboratory (GRL) throughout the harvest period by producers, grain companies and oilseed crushing plants. The map shows the traditional growing areas for flaxseed in western Canada.

Figure 1 • Map of western Canada showing traditional growing area for flaxseed



Source: Flax Council of Canada

Summary

The Canadian Grain Commission (CGC) harvest survey of western Canadian flaxseed shows the 2001 crop to be near average in oil content with a decreased iodine value, but much above average in protein content. The iodine value is three units lower and the oil content is 0.3% higher than the 10-year means. Protein content, however, is 1.6% higher than average.

Compared to 2000, the oil content, 44.4%, is slightly higher and the protein content, 24.1%, is significantly higher. Although oil content is similar to last year, the linolenic acid content, 56.3%, is significantly lower in 2001, resulting in an iodine value of 190, which is four units lower than in 2000.

**Table 1 • No. 1 Canada western flaxseed
Quality data for 2001 harvest survey**

Quality parameter	2001	2000	1991-2000 Mean
Oil content ¹ , %	44.4	44.1	44.1
Protein content ² , %	24.1	22.4	22.5
Free fatty acids, %	0.4	0.3	0.2
Iodine value	190	194	193
Linolenic acid content, % in oil	56.3	58.9	58.4

¹ Dry matter basis

² N x 6.25; dry matter basis

**Table 2 • No. 1 Canada western flaxseed
Fatty acid composition for 2001 harvest survey**

Fatty acid, % in oil	2001	2000	1991-2000 Mean
Palmitic	5.2	5.4	5.3
Stearic	3.7	3.2	3.2
Oleic	19.5	17.9	17.8
Linoleic	15.1	14.2	14.6
Linolenic	56.3	58.9	58.4

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

The Weather and Crop Surveillance department of the Canadian Wheat Board provided the weather review for the 2001 harvest survey.

Seeding

Overall, 2001 seeding progress was ahead of normal for the prairie crop, although not as rapid as what was experienced in 2000.

Dry conditions in Alberta and a large portion of Saskatchewan during the fall and winter of 2000 resulted in very poor soil moisture levels going into the 2001 planting season. Exceptions to this were Manitoba and southeastern Saskatchewan where above normal precipitation during the fall of 2000 provided ample soil moisture reserves for spring planting. Dry, warm conditions during late April and May resulted in rapid seeding of most crops in the western Prairies.

However, planting of some smaller seeded crops such as flaxseed was delayed in many areas due to the lack of soil moisture. In the driest areas, plant populations were reduced markedly by the extreme conditions as germination was quite uneven. Planting in the western Prairies was over 50 percent complete by the middle of May and was wrapped up by the end of the month. The excess soil moisture and persistent precipitation in eastern areas slowed planting until late May and into June in parts of southeastern Saskatchewan and Manitoba.

Growing conditions

Cooler temperatures through most of the month of June kept crop stress to a minimum, despite the very dry conditions. Rains during the month of June were isolated to the eastern Prairies with only scattered rainfall reported in western areas. June precipitation ranged from significantly above normal in the eastern Prairies to well below normal in southern Alberta. Central and northern Alberta, including the Peace River region, received moderate amounts of precipitation during the last half of the month which provided much needed moisture for crops. The rainfall caused some problems as ungerminated seeds started to grow and many fields had two to three different growth stages for the remainder of the season. Other than the southeast, Saskatchewan remained extremely dry and crop conditions began to deteriorate rapidly by the end of the month.

Above normal temperatures during the first two weeks of July caused severe stress to all crops and yield potentials declined in the western areas of the Prairies. Most locations in Saskatchewan and southern Alberta received less than fifty percent of normal precipitation for the month. Northern Alberta received frequent moderate amounts of precipitation during the month, which helped improve the condition of the crop in that region. Moderate to heavy rainfall events covered parts of Manitoba and eastern Saskatchewan during July which resulted in increased disease pressure and caused some losses due to flooding.

Harvest conditions

The harvest began in many regions during the first two weeks in August, although activity was not general until the third week in August. Harvest weather was ideal with most locations in the prairie region receiving minimal amounts of precipitation (less than half of normal) and warmer than normal temperatures. The harvest was over one-third complete by the end of August and essentially finished by the third week of September. The uneven growth in central and northern Alberta slowed harvest activity in those regions, with harvesting essentially complete by the first week of October.

Production and grade information

Table 3 shows western Canadian farmers planted 663 thousand hectares of flaxseed in 2001, which was an 11 percent increase from last year's area. The 2001 yield estimate of 1100 kg/ha was lower than both the 1200 kg/ha reported in 2000 and the 10-year mean of 1293 kg/ha. Total flaxseed production in western Canada is up slightly to 702 thousand tonnes according to estimates by Statistics Canada reported in *Field Crop Reporting Series No. 8*, December 5, 2001. In 2001, Saskatchewan accounted for 69 percent of flaxseed production while Manitoba and Alberta had 28 percent and three percent respectively.

Table 3 • Seeded area and production for western Canadian flaxseed

	Seeded area ¹ thousand hectares		Production ¹ thousand tonnes		Average production ² thousand tonnes
	2001	2000	2001	2000	1991-2000
Manitoba	182	176	199	206	310
Saskatchewan	465	405	483	470	475
Alberta	15	14	20	18	34
Western Canada	663	595	702	693	819

¹ Source-*Field Crop Reporting Series, No.8*, December 5, 2001; Statistics Canada

² Source-*Field Crop Reporting Series*, revised final estimates for 1991-2000

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 No.1 Canada Western (CW) samples by province.

This year's harvest survey included 408 samples, of which 404 were graded No.1 CW flaxseed. Manitoba contributed 135 samples, Saskatchewan 262 samples and Alberta 11 samples during the harvest period from September 1 to December 15, 2001. 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 5, 2001.

Quality of 2001 western Canadian flaxseed

Tables 4 and 5 show detailed information on the quality of western Canadian flaxseed harvested in 2001. 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 the estimate of grade distribution.

Table 6 compares the quality of recent flaxseed exports with this year's harvest survey data. The harvest survey data is from producer samples that have been cleaned to remove dockage, while recent exports of flaxseed from Thunder Bay and Vancouver contained 7.3% and 2.1% dockage respectively. 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 linolenic acid is an important quality factor as it is this fatty acid which is responsible for most of flaxseed oil's drying properties. Linolenic acid is also the omega-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 • No. 1 Canada Western flaxseed
Quality data for 2001 harvest survey**

Province	No. of samples	Oil content ¹			Protein content ²			Iodine value ³		
		Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.
		%			%					
Manitoba	133	44.3	38.2	49.7	23.4	17.4	27.2	190	177	203
Saskatchewan	260	44.5	40.1	49.7	24.4	18.7	29.0	190	182	206
Alberta	11	44.2	41.6	45.9	25.0	22.1	26.7	189	183	195
Western Canada³	404	44.4	38.2	49.7	24.1	17.4	29.0	190	177	206

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 • No. 1 Canada Western flaxseed
Fatty acid composition and free fatty acid content for 2001 harvest survey**

	Number of samples	Fatty acid composition, % ¹					Free fatty acids, %
		C16:0	C18:0	C18:1	C18:2	C18:3	
Manitoba	133	5.2	3.6	19.6	15.0	56.4	0.56
Saskatchewan	260	5.3	3.7	19.4	15.1	56.3	0.30
Alberta	11	4.8	4.1	19.7	15.0	56.0	0.25
Western Canada²	404	5.2	3.7	19.5	15.1	56.3	0.37

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 • No. 1 Canada Western flaxseed
Comparison of 2001 harvest survey quality data with recent export shipments¹**

Quality parameter	2001 survey	November exports	2000-2001 exports
Oil content ² , %	44.4	44.1	44.0
Protein content ³ , %	24.1	23.0	22.3
Free fatty acids, %	0.4	0.7	0.5
Iodine value	190	193	195
Palmitic acid, % in oil	5.2	5.3	5.3
Stearic acid, % in oil	3.7	3.4	3.3
Oleic acid, % in oil	19.5	18.2	17.4
Linoleic acid, % in oil	15.1	15.0	14.8
Linolenic acid, % in oil	56.3	57.9	58.9

¹ Commercially clean exports containing less than 2.5% dockage

² Dry matter basis

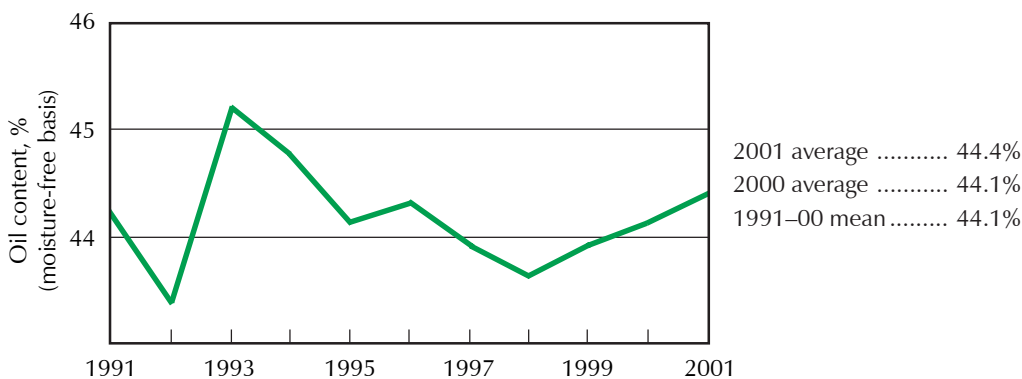
³ N x 6.25; dry matter basis

Oil content

The oil content of 44.4% for No. 1 CW flaxseed from the 2001 survey is slightly higher than the 44.1% in 2000 and similar to the 10-year mean of 44.1%. The oil content of 44.5% for Saskatchewan is slightly higher than the 44.3% in Manitoba samples and the 44.2% in Alberta samples. Compared to 2000, mean oil contents are 0.6% and 0.3% higher for Manitoba and Saskatchewan, but lower by 0.6% for Alberta. The warm, dry growing conditions in southern regions resulted in those regions having lower oil contents than the reported provincial means. The oil content of No. 1CW flaxseed samples from producers across western Canada varied from 38.2% to 49.7%.

The oil content of November 2001 No. 1 CW flaxseed exports averaged 44.1%, similar to the 2000-2001 export mean of 44.0%. However, these November oil contents are 1.0% lower than the August values, suggesting that the oil contents of 2001-2002 flaxseed exports may become lower than the previous year. Flaxseed exports that are not commercially clean will have significantly lower oil contents than those exports that are cleaned to contain less than 2.5% dockage.

**Figure 2 • No. 1 Canada western flaxseed
Oil content of harvest survey samples, 1991-2001**

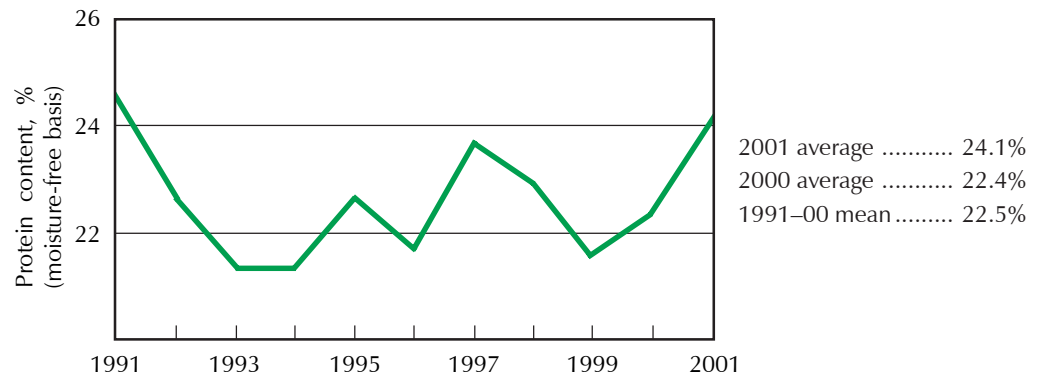


Protein content

The protein content of 24.1% for No. 1 CW flaxseed from the 2001 harvest survey is 1.7% higher than in 2000 and 1.6% higher than the 10-year mean of 22.5%. As Table 4 shows, Manitoba had lower mean protein content than Saskatchewan and Alberta in 2001. Compared to 2000, protein contents increased by 1.0%, 1.7% and 2.1% respectively for the Manitoba, Alberta and Saskatchewan samples. The protein content of No. 1 CW flaxseed samples from producers across western Canada varied from 17.4% to 29.0%.

As Table 6 shows, the protein content of 23.0% for November flaxseed exports is higher than the protein content of 22.3% for the 2000-2001 shipping season. The protein content of flaxseed exports in 2001-2002 should be higher than the export shipments of the previous season.

**Figure 3 • No. 1 Canada western flaxseed
Protein content of harvest survey samples, 1991-2001**



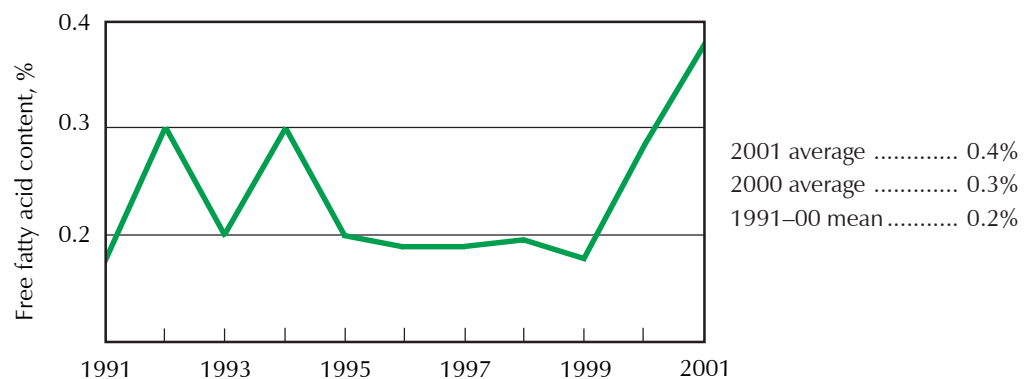
Free fatty acid content

The free fatty acid (FFA) content of 0.4 % in 2001 survey samples is higher than both the 2000 and 10-year means. The FFA content of 0.56% for Manitoba samples is notably higher than the 0.30% in Saskatchewan samples and the 0.25% in Alberta samples and accounts for the overall higher FFA in 2001. Flaxseed from regions where the harvest was delayed may have even higher FFA levels.

Because FFA data was not collected on harvest survey samples until 1993, FFA data for earlier years were obtained from inspection composite samples to produce the 1991-2000 mean of 0.2%.

As Table 6 shows, as of November 2001 the FFA content of No. 1 CW flaxseed exports averaged 0.7%, higher than the 2000-2001 value of 0.5%.

**Figure 4 • No. 1 Canada western flaxseed
Free fatty acid content of harvest samples, 1991-2001**



Fatty acid composition

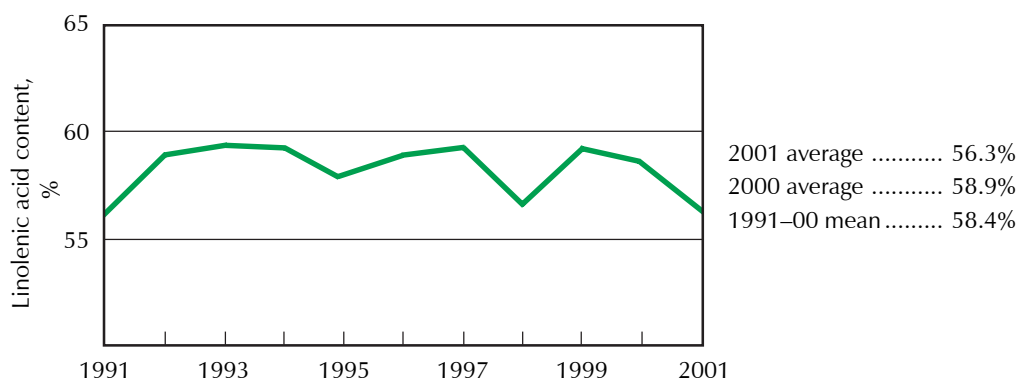
The linolenic acid content in 2001 harvest survey samples is 56.3%, significantly lower than both the 58.9% in 2000 and the 10-year mean of 58.4%. Compared to 2000, the average linolenic acid content decreased by 3.6%, 3.2% and 1.1% respectively in Alberta, Saskatchewan and Manitoba samples.

The average iodine value of the oil is 190 units. This is four units lower than in 2000 and three units below the 10-year mean of 193 units. The average iodine value decreased by seven, five and two units respectively for Alberta, Saskatchewan and Manitoba. No. 1 CW flaxseed samples from producers across western Canada varied in iodine value from 177 to 206 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 November 2001 export data in Table 6 shows the linolenic acid content at 58.0% and the iodine value at 193 units, notably lower than the 2000-2001 mean export values. The No. 1 CW flaxseed exports will likely produce oils with iodine values around 190 to 192 units. Flaxseed exports that are not commercially clean may have significantly lower iodine values than those exports that are cleaned to contain less than 2.5% dockage.

**Figure 5 • No. 1 Canada western flaxseed
Linolenic acid content of harvest survey samples, 1991-2001**



**Figure 6 • No. 1 Canada western flaxseed
iodine value of harvest survey samples, 1991-2001**

