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Quality of western Canadian flaxseed

2018

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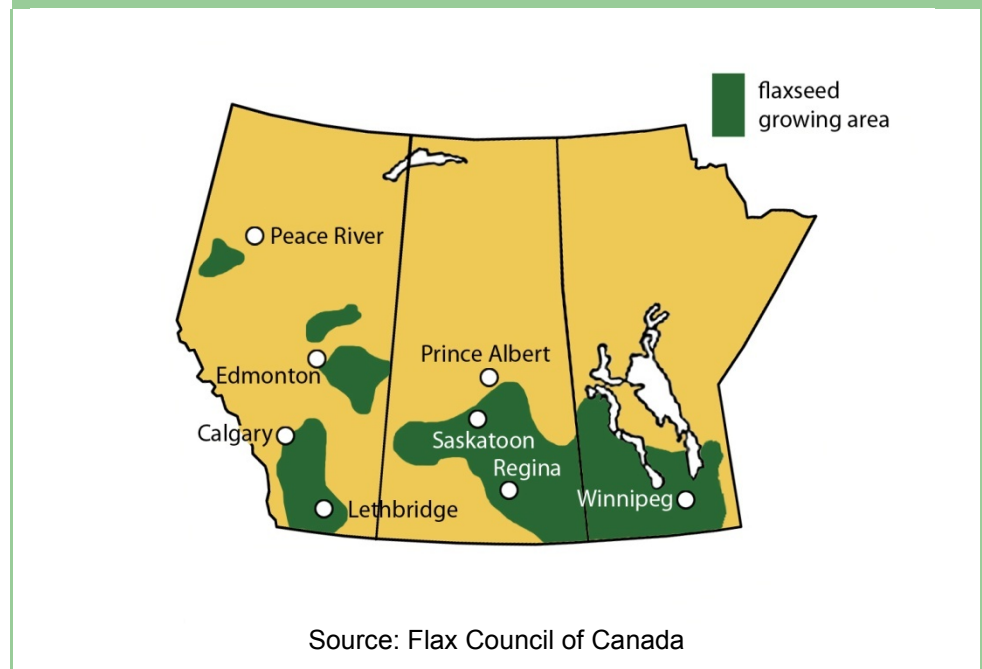
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Introduction

This report presents quality data and information based on samples of western Canadian flaxseed from the Canadian Grain Commission's 2018 Harvest Sample Program. The quality data includes oil, protein, free fatty acids, fatty acid composition and iodine values of harvest samples submitted to the Grain Research Laboratory. Producers and grain companies submitted the samples throughout the harvest period. The Prairie provinces map shows traditional growing areas for flaxseed in western Canada.

Figure 1 – Map of Prairie provinces showing traditional growing areas for flaxseed



Summary

The Canadian Grain Commission's Harvest Sample Program of western Canadian flaxseed shows that the 2018 crop contains lower oil content, similar protein content and lower iodine values when compared to the 2017 harvest.

Table 1 shows data for Flaxseed, No. 1 Canada Western. Oil content is 45.7%, which is lower than the 2017 mean (46.1%) and identical to the 10-year mean (45.7%). Protein content is 23.1%, which is similar to the 2017 mean (23.2%) and higher than the 10-year mean (22.2%). Iodine value is 189.7 units, which is lower than the 2017 value of 192.5 units. Oil and protein values are reported on a dry matter basis.

Table 1 - Flaxseed, No. 1 Canada Western Quality data for 2018 harvest

Quality parameter	2018	2017	2008-17 Mean
Oil content ¹ , %	45.7	46.1	45.7
Protein content ² , %	23.1	23.2	22.0
Free fatty acids, %	0.15	0.18	0.18
Iodine value	189.7	192.5	192.0

¹ Dry matter basis

² N x 6.25; Dry matter moisture basis

Table 2 - Flaxseed, No. 1 Canada Western Fatty acid composition for 2018 harvest

Fatty acid ¹ , % in oil	2018	2017	2008-17 Mean
Palmitic acid (C16:0)	5.1	5.0	5.0
Stearic acid (C18:0)	3.6	3.5	3.4
Oleic acid (C18:1)	18.7	17.8	18.2
Linoleic acid (C18:2)	15.8	15.0	15.3
α -Linolenic acid(C18:3)	55.9	57.7	57.4

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, seeding and growing conditions

The 2018 growing season faced many challenges throughout the prairies.

Manitoba

Although a dry start, seeding began in early May. In early June, 99.0% of the seeding was complete. Hot temperatures followed for most of July and August with minimal rainfall. Harvest commenced in mid-September along with a September frost. By the end of October, all Manitoba flax had been harvested.

Saskatchewan

A delayed spring slowed seeding in Saskatchewan. The first week of May, only 9 % of the crop was seeded, which was below the five-year seeding average of 19% for the same time (Saskatchewan Crop report 2). By early June, 99.5 % of the crop had been seeded. July and August was hampered by high temperatures, high winds and hail, which caused some crop damage. By early September harvest had commenced, but then slowed down to a halt until October and November due to heavy rain and snow. The harvesting of Flax was 98 % complete by early November.

Alberta

Alberta also experienced a late spring, which delayed seeding though out the regions. Daily average temperatures in April was 8-10 degrees below normal (Alberta Crop report May 1 2018), slowing the snowmelt. Only 1.0% of the crop had been seeded as of May 1st. By early June, most of the crop had been seeded. July and August gave way to some extreme weather. Parts of Alberta experienced strong winds, hail and some rain, while other regions were extremely dry. Harvest commenced in mid-September, but then rain and snow halted harvest. By mid-October, warmer temperatures allowed producers to move forward with their harvest. By the end of October 95.0% of the crops had been harvested.

For a more detailed look at the 2018 growing season, please refer to the following:

<https://www.gov.mb.ca/agriculture/crops/seasonal-reports/crop-report-archive/index.html>

<https://www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/agribusiness-farmers-and-ranchers/market-and-trade-statistics/crops-statistics/crop-report>

[http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/All/sdd4191](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/All/sdd4191)

Production and grade information

Western Canadian farmers seeded 346,700 hectares of flaxseed in 2018 (Table 3), which is a decrease compared to 2017 (420,900 hectares). The 2018 yield estimate of 1,500 kilograms per hectare (kg/ha) was higher than the yield reported in 2017 (1,300 kg/ha) and slightly higher than the 10-year mean of 1,478 kg/ha. Flaxseed production decreased by 44,000 metric tonnes from last year's 555,100 metric tonnes. Manitoba and Saskatchewan saw a decrease in production while it increased in Alberta. Saskatchewan accounted for 80% of flaxseed production while Manitoba and Alberta had 5% and 13.5%, respectively.

Over 98% of the samples received for the Canadian Grain Commission's 2018 Harvest Sample Program graded as Flaxseed, No. 1 Canada Western at the time of our quality analysis.

Table 3 - Seeded area and production for western Canadian flaxseed¹

	Seeded area		Production		Average production
	2018	2017	2018	2017	2008-17
	thousand hectares		thousand tonnes		thousand tonnes
Manitoba	15.2	22.3	26.3	38.4	86.2
Saskatchewan	291.9	364.2	411.2	447.6	514.6
Alberta	37.1	34.4	69.3	62.2	54.3
Western Canada	346.7	420.9	511.1	548.2	654.9

¹ **Source:** Statistics Canada. *Table 001-0010 - Estimated areas, yield and production of principal field crops in metric* (<http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0010010&paSer=&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid>)

Harvest samples

Flaxseed samples for the Canadian Grain Commission's Harvest Sample Program are collected and cleaned to remove dockage prior to testing. The samples are analyzed for oil, protein and iodine value using a Foss NIR Systems 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 brown-seeded flax samples by province for Flaxseed, No.1 Canada Western. Composites of Flaxseed, No. 2 Canada Western, Flaxseed, No. 3 Canada Western and Sample Grade combine all samples from western Canada by grade.

This year's harvest report includes 232 flax samples compared to 262 in 2017. Manitoba contributed 34 samples of Flaxseed, No. 1 Canada Western, Saskatchewan 175 samples, and Alberta 23 samples. There were two samples graded as Flaxseed, No. 2 Canada Western, two as No. 3 Canada Western.

Quality data by province and western Canada

Tables 4 and 5 show detailed information on the quality of top grade western Canadian (CW) flaxseed harvested in 2018. The number of harvest 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 and the samples received followed the provincial trends in production.

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. Alpha-linolenic acid is an omega-3 fatty acid which literature has shown can play an important role in maintaining good health in humans and animals (www.flaxcouncil.ca). It is the main factor in the increased use of whole and ground flaxseed in cereals and baked goods. Flaxseed is also used in animal feeds, for example in chicken to produce omega-3 eggs.

Iodine value is a measure of the overall unsaturation of the oil and can be calculated from the fatty acid composition. Oils with higher iodine values, i.e., with more unsaturation, polymerize more rapidly in the presence of air. In flaxseed, iodine value is directly related to the amount of alpha-linolenic acid present in the oil. Alpha-linolenic acid is one of the most important quality factors for industrial use as it is responsible for most of flaxseed oil's drying properties.

Table 4 - Quality data for 2018 western Canadian flaxseed

Province/Grade	Number of samples	Oil content ¹ , %			Protein content ² , %			Iodine value		
		Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.
No. 1 CW	232	45.7	40.5	51.7	23.1	16.3	28.9	189.7	177.2	206.5
Manitoba	34	45.4	41.2	48.7	23.8	18.7	27.6	190.4	181.8	197.4
Saskatchewan	175	45.7	40.5	51.7	22.9	16.3	28.9	189.7	177.2	206.5
Alberta	23	44.9	41.4	49.8	24.0	17.8	27.0	189.1	180.9	205.8
No. 2 CW	2	48.5	47.1	50.6	20.2	19.9	20.4	194.4	192.9	195.4
No. 3 CW	2	46.1	43.5	49.3	22.1	17.2	26.4	196.3	187.8	204.9

¹ Dry matter basis

² N x 6.25; dry matter basis.

Table 5 – Fatty acid composition and free fatty acids content of 2018 Canadian flaxseed

Province/Grade	Number of samples	Fatty acid composition, % ¹					Free fatty acids
		C16:0	C18:0	C18:1	C18:2	C18:3	
No. 1 CW	232	5.1	3.6	18.7	15.8	55.9	0.15
Manitoba	34	5.1	3.8	18.1	15.7	56.4	0.16
Saskatchewan	175	5.1	3.5	18.9	15.7	55.8	0.14
Alberta	23	5.1	3.7	18.7	16.1	55.4	0.16
No. 2 CW	2	5.2	16.0	16.0	16.0	58.4	0.45
No. 3 CW	2	5.0	15.1	15.1	16.4	59.2	0.20

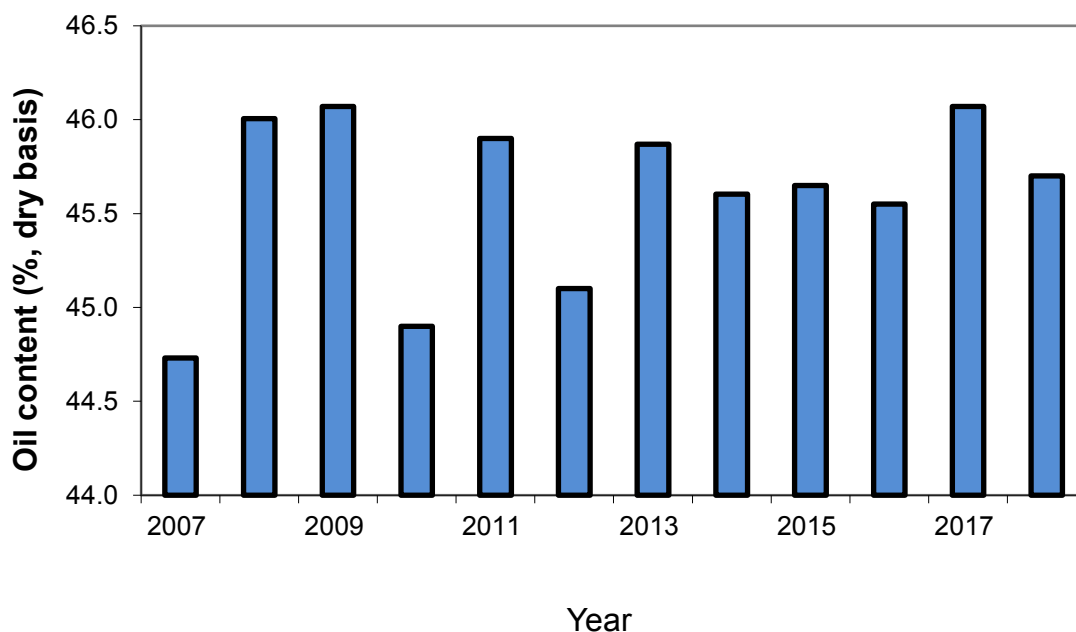
¹ Percentage of total fatty acids in the oil including palmitic (C16:0), stearic (C18:0), oleic (C18:1), linoleic (C18:2), and linolenic (C18:3)

Oil content

Average oil content (45.7%) in Flaxseed, No. 1 Canada Western is lower than the 2017 average (46.1%) and same as the 10-year mean (45.7%) (Figure 2). Average oil content for Manitoba (45.4%) and Saskatchewan (45.7%) is higher than the average in Alberta (44.9%) (Table 4). Oil content for Flaxseed, No. 1 Canada Western samples from producers across western Canada ranged from 40.5 to 51.7% (Table 4).

It has been shown that increased temperatures after flowering and during the seed-filling period can affect oil content and yield. Higher mean temperatures in July and August across the prairies may have played a role in the lower oil content for the 2018 harvest.

**Figure 2 – Flaxseed, No. 1 Canada Western
Oil content of harvest samples, 2007-18**

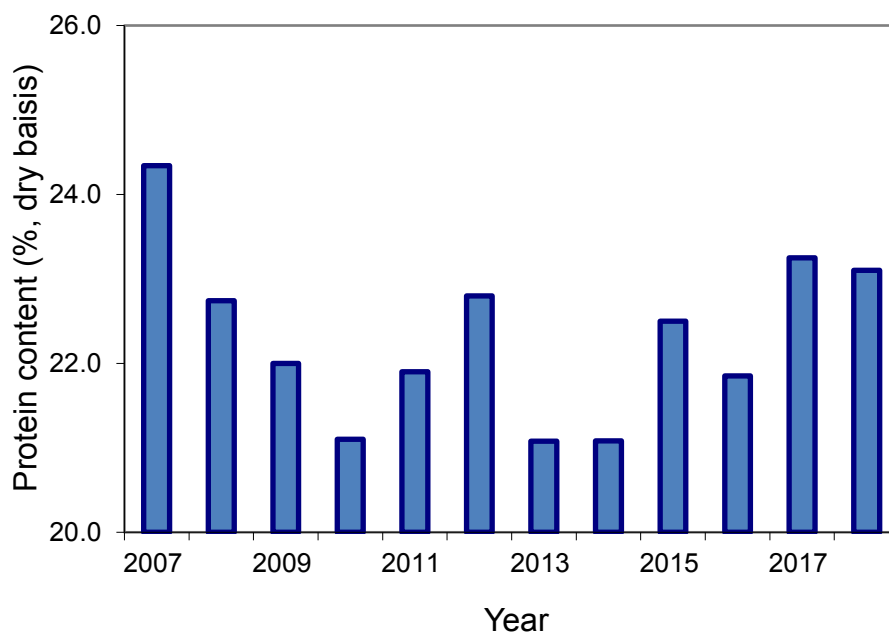


2018 average	45.7%
2017 average	46.1%
2008–17 mean	45.7%

Protein content

Average protein content (23.1%) for Flaxseed, No.1 Canada Western is similar to the 2017 harvest average (23.2%) and higher than the 10-year mean (22.0%) (Figure 3). The average in Manitoba (23.8%) is higher than the average in Saskatchewan (22.9%) and similar to the average in Alberta (24.0%). Protein content for Flaxseed, No. 1 Canada Western samples from producers across western Canada ranged from 17.2 to 26.4% (Table 4).

**Figure 3 – Flaxseed, No. 1 Canada Western
Protein content of harvest samples, 2007-18**



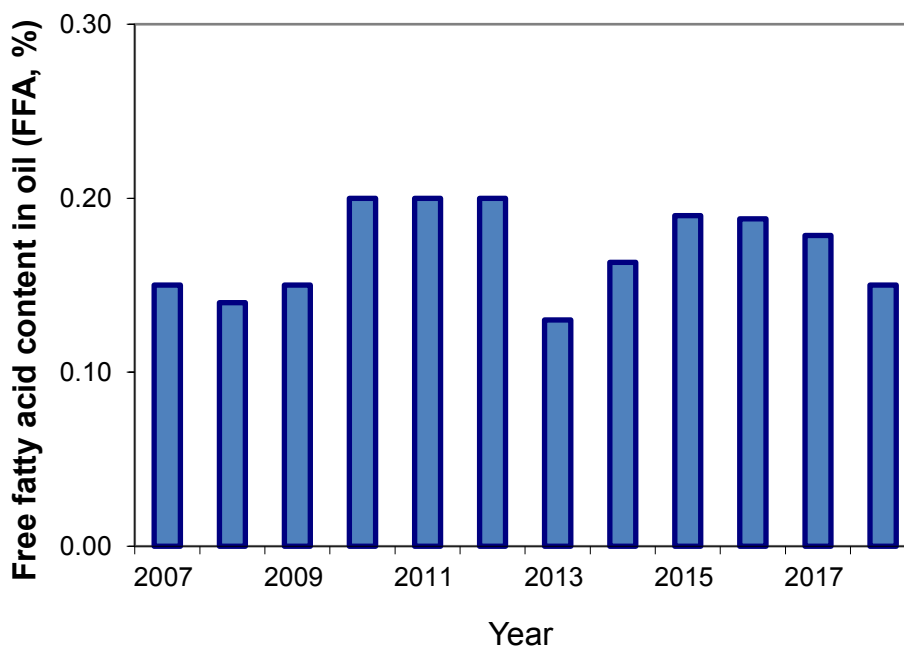
2018 average	23.1%
2017 average	23.2%
2008–17 mean	22.0%

Free fatty acids content

Average free fatty acids content (0.15%) in Flaxseed, No. 1 Canada Western is lower than the average in 2017 (0.18%) and to the 10-year mean (0.18%) (Figure 4). The average in Manitoba (0.16%) is higher than the average in Saskatchewan (0.14%) and the same as the Alberta average (0.16%) (Table 5).

Samples that graded No. 2 and No. 3 Canada Western had an average free fatty acids content of 0.33%.

**Figure 4– Flaxseed, No. 1 Canada Western
Free fatty acid content of harvest samples, 2007-18**



2018 average	0.15%
2017 average	0.18%
2008–17 mean	0.18%

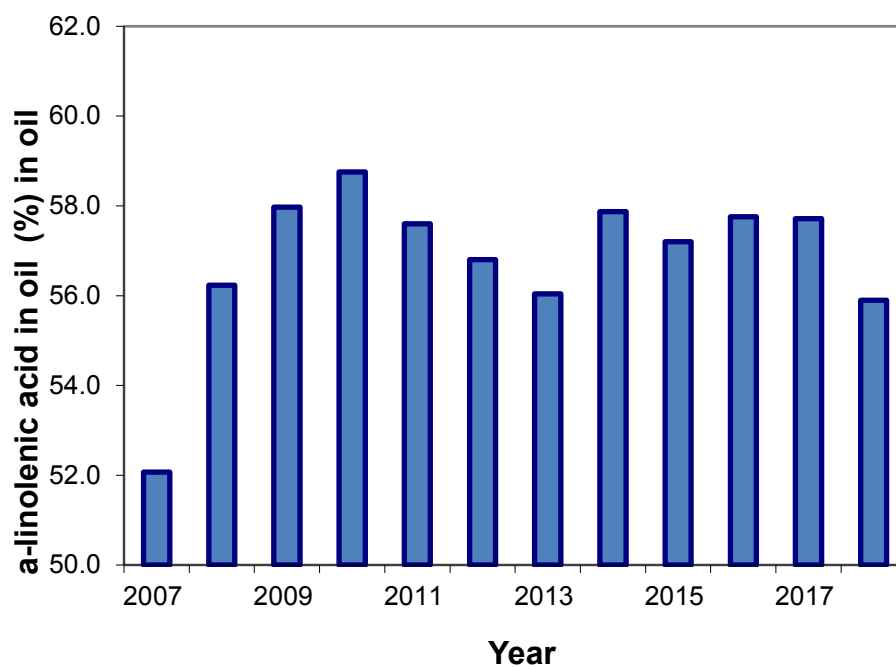
Fatty acid composition

Average α -linolenic acid (C18:3) content (55.9%) in Flaxseed, No. 1 Canada Western is lower than the 2017 average (57.7 %) and the 10-year mean (57.4%) (Figure 5).

The average iodine value of the oil from Flaxseed, No. 1 Canada Western samples is 189.7 units. Iodine value is a measure of the total degree of unsaturation of the oil and, in flaxseed, is heavily influenced by the α -linolenic acid content of the oil. The 2018 iodine value is lower than in 2017 and lower than the 10-year mean of 192.0 units (Figure 6). Iodine values for Flaxseed, No. 1 Canada Western samples from producers across western Canada varied from 177.2 to 206.5 units.

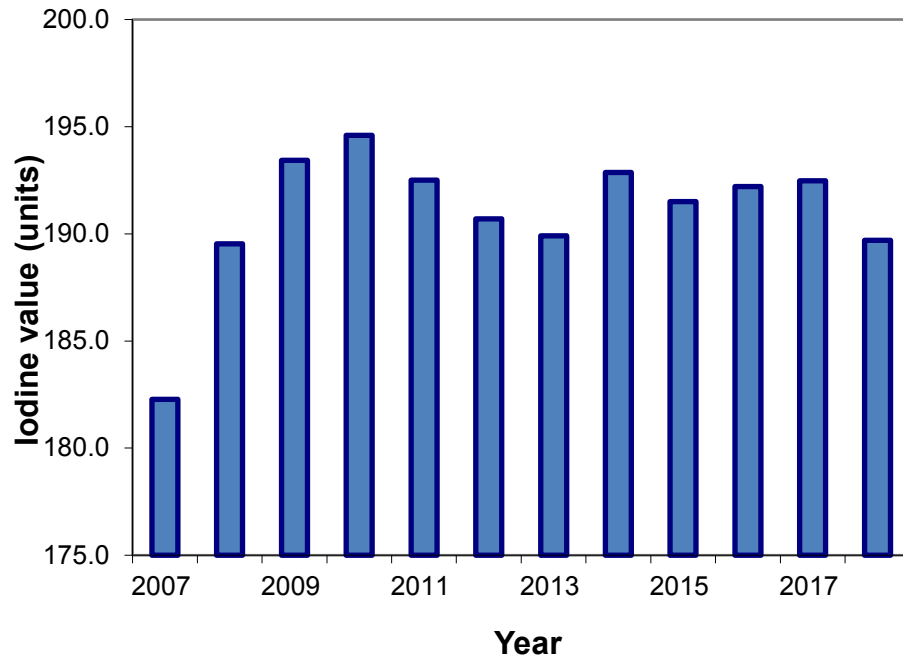
Alpha linolenic acid as it is interconnected with iodine values showed a dramatic decrease for the 2018 crop year. Similar to the relationship of oil content and environmental temperatures, α -linolenic acid tends to decrease as environmental temperatures increase, which also contributes to the decrease in iodine values. This year's drought like conditions through out the prairies illustrated this trend.

**Figure 5 – Flaxseed, No. 1 Canada Western
Percent α -Linolenic acid content of harvest samples, 2007-18**



2018 average.....	55.9%
2017 average.....	57.7%
2008–17 mean.....	57.4%

**Figure 6 – Flaxseed, No. 1 Canada Western
Iodine value of harvest samples, 2007-18**



2018 average	189.7
2017 average	192.5
2008–17 mean	192.0
