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# Quality of **Ontario soybeans** **2001**

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**Canada**

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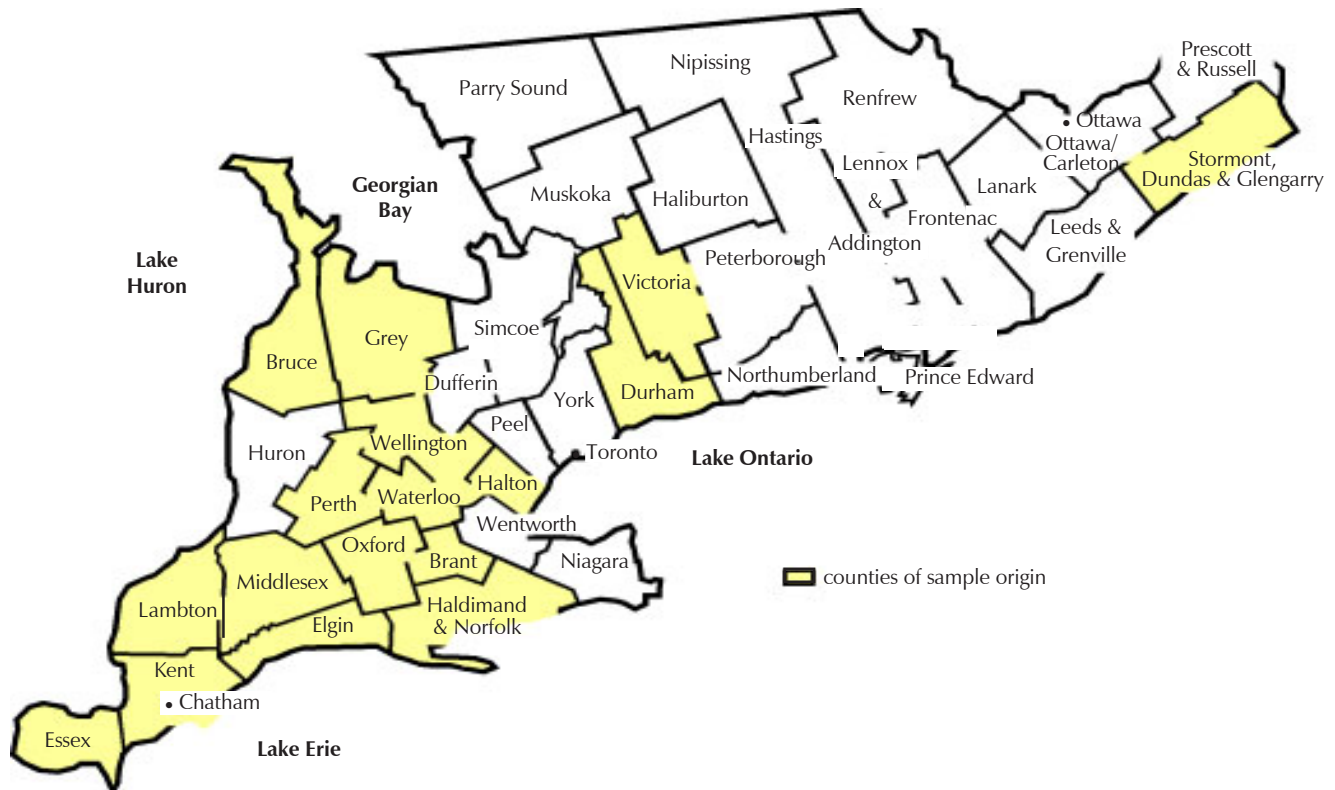
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# Quality of Ontario soybeans 2001

## Introduction

This report presents quality data and information based on the Canadian Grain Commission (CGC) 2001 harvest survey of Ontario soybeans. Oil and protein contents and fatty acid composition of harvest survey samples are reported. Quality data is based on analyses of soybean samples submitted to the CGC by the Ontario Soybean Growers' Marketing Board in Chatham. The map shows the counties of origin for the 2001 harvest survey samples.

Figure 1 • Map of southern Ontario showing counties of origin for 2001 soybean survey samples



## Summary

The 2001 harvest survey shows Ontario soybeans are near average in oil content but above average in protein content.

When compared to 2000, the oil content for 2001 is 20.5%—0.3% higher—while the protein content is higher at 42.6%.

**Table 1 • Seeded area and production for Canadian soybeans**

Year	Seeded area	Production	Yield
	hectares	Tonnes	tonnes/ha
1991	575,500	1,459,900	2.44
1992	643,600	1,455,300	2.34
1993	728,700	1,851,300	2.57
1994	820,100	2,250,700	2.74
1995	826,000	2,293,000	2.78
1996	875,300	2,170,400	2.51
1997	1,058,900	2,737,700	2.59
1998	977,800	2,730,500	2.80
1999	1,002,000	2,775,000	2.80
2000	1,066,500	2,698,300	2.50
2001	1,041,500	1,581,100	1.50

Source: Statistics Canada, *Field Crop Reporting Series, No.8, 1991-01*

**Table 2 • No. 1 and No. 2 Canada grades<sup>1</sup> of soybeans  
Quality data for 2001 harvest survey**

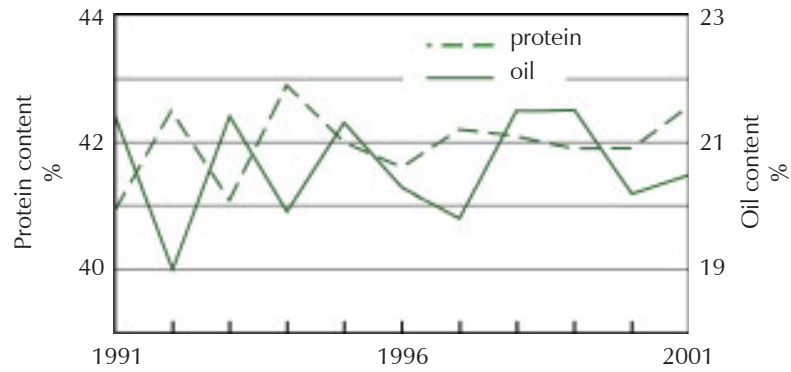
Quality parameter	All types			Crush beans		
	2001	2000	1991-2000	2001	2000	1991-2000
Oil content <sup>2</sup> ,%	20.5	20.2	20.6	20.7	20.4	20.7
Protein content <sup>3</sup> ,%	42.6	41.9	41.9	41.9	41.5	41.8

<sup>1</sup> Means for the combined grades

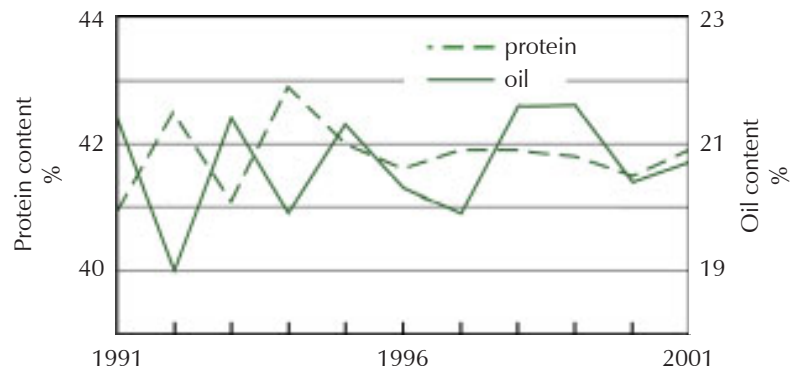
<sup>2</sup> Moisture-free basis

<sup>3</sup> N x 6.25; moisture-free basis

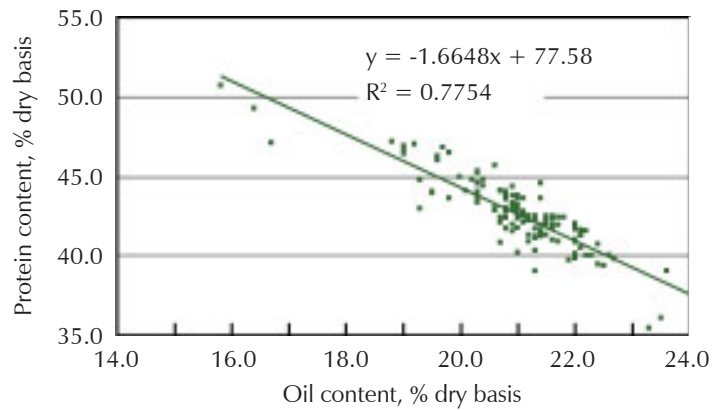
**Figure 2a • Average oil and protein contents of Ontario soybeans 1991-2001  
All types**



**Figure 2b • Average oil and protein contents of Ontario soybeans 1991-2001  
Crush beans**



**Figure 3 • Relationship between oil and protein contents  
of Ontario soybeans for 2001**



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## Weather and production review

### Weather review

The weather and crop review for 2001 Ontario soybeans is based on information published in the Ontario Ministry of Agriculture, Food and Rural Affairs 2001 Field Crop Reports (<http://www.gov.on.ca/OMAFRA/english/crops/field/reports/index.html>) and the Agriculture and Agri-Food Canada Crop Conditions Reports ([http://www.agr.ca/policy/crop/home\\_e.html](http://www.agr.ca/policy/crop/home_e.html)). Overall, crop heat units were above the long-term averages and Environment Canada reported that 2001 was the driest summer in 54 years.

### Seeding

After several mild winters the winter of 2000-2001 featured heavy snowfall and cold temperatures. Spring arrived early with warm winds that reduced soil moisture levels quickly. The warm, dry spring changed abruptly in early May to cool and wet conditions that continued into early June. As a result, some of the soybean crop was planted in the early part of May, but the rest was delayed until late May and early June.

### Growing conditions

Depending on the region the number of consecutive days with less than 3 mm rainfall often ranged from 15 to 25+ days. The dry spell ranged from June 25<sup>th</sup> to August 10<sup>th</sup> in much of Ontario. The hottest periods ran from July 19<sup>th</sup> through July 25<sup>th</sup> and August 4<sup>th</sup> through 10<sup>th</sup>. During those periods, daytime temperatures exceeded 30°C and nighttime temperatures were above 17°C.

These periods of extreme heat and lack of rainfall combined with soybean aphids resulted in flower and pod abortion particularly at the top of the plant. As a result many soybean fields began to prematurely drop leaves and dry down. Pod drop and splitting of pods were common in the 2001 crop. Rainfall the third week of August arrived too late to help most soybean stands.

### Harvest conditions

Conditions remained relatively dry until mid September, at which point a wet weather system settled in and lasted until the end of October. This produced record levels of rainfall fell in southwestern Ontario. In addition, most areas received the first hard frost by October 8<sup>th</sup>. Harvest was significantly delayed by the wet weather and 20-30% of the crop was still in the field at the end of October. Ontario soybean yields ranged from 0 to 40 bushels/acre with the average yield reported as 21.1 bushels per acre (1400 kg/ha), the lowest on record since 1960.

### Production and grade information

In 2001 Ontario's production accounted for about 77% of total Canadian soybean production compared to 96% in 2000. For Ontario, the 862,000 hectares of harvested soybean yielded an average of 1.40 tonnes per hectare for a total crop of 1.22 million tonnes. Compared to most years there were increased numbers of lower grade soybean samples. Size of beans was small, and many beans destined for Identity Preserved (IP) food markets did not meet quality standards due to weathering, insect and disease damage. These beans should be usable by the soybean crushing industry.

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## Harvest survey samples

The Ontario Soybean Growers' Marketing Board (OSGMB) in Chatham collected samples for the 2001 CGC harvest survey from producers in 18 different counties. The majority of samples originated from the counties of Lambton (19), Kent (18), Perth (12) and Bruce (10).

The OSGMB forwarded a total of 126 samples to CGC Industry Services in Chatham for cleaning and grading. According to Chatham grain inspectors, 11 of the samples graded No. 1 Canada, 59 graded No. 2 Canada, 24 graded No. 3 Canada, 17 graded No. 4 Canada, 13 graded No. 5 Canada, and two graded Sample Grade. There were 60 samples identified as "white hilum" or food bean types, which typically contain higher amounts of seed protein.

All samples were analyzed for oil and protein content using a Tecator Infratec 1241 Grain Analyzer near-infrared (NIR) spectrometer calibrated and verified against the appropriate laboratory reference method. Only grade composite samples were analyzed for fatty acid composition and free fatty acids. Grade composites were prepared from 11 No. 1 Canada, 59 No. 2 Canada, 24 No. 3 Canada, 17 No. 4 Canada, and 13 No. 5 Canada samples.

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## Quality of 2001 soybeans

There are two major types of soybeans grown in Canada, commonly referred to as oil (or “crush”) beans and food beans. A listing of Canadian soybean varieties is provided in *List of Varieties which are Registered in Canada*, Variety Registration Office, Variety Section, Plant Health and Production Division, Canadian Food Inspection Agency ([http://www.cfia-acia.agr.ca/english/plant/variety/list\\_e.html](http://www.cfia-acia.agr.ca/english/plant/variety/list_e.html)).

Oil beans make up the majority of soybeans grown for producing oil and high-protein meal. Soybean oil is used in salad oil, shortening and margarine products. Defatted soybean meal is used as a protein supplement in livestock rations. Key quality factors for oil beans are oil content, protein content, and the fatty acid composition. Oil and protein content give quantitative estimates of the beans as a source of oil, and of the defatted meal as a source of protein for animal feed. The fatty acid composition provides information about the nutritional, physical and chemical characteristics of the oil extracted from the beans.

Food beans are varieties of soybeans that have been bred for specific qualities required in the production of traditional soyfoods. The quality of these beans is measured by such attributes as a clear or white hilum, larger seed size, and a higher protein content. White-hilum soybeans that do not meet quality standards for food processing are used as oil beans.

Soyfoods are divided roughly into two classes—nonfermented and fermented. Nonfermented soyfoods include soymilk, soybean curd or tofu, toasted soy powder, and bean sprouts. Fermented products include soy sauce, miso, tempeh, and natto.

The harvest survey oil and protein results presented were obtained by near infrared (NIR) analysis using an Infratec 1241 Grain Analyzer calibrated to the reference method. Grade composites were analyzed for free fatty acid content (FFA) and fatty acid composition.

## Oil and protein content

The 2001 average oil content of 20.5% is slightly higher than the 20.2% in 2000 and similar to the ten-year mean of 20.6%. Individual producer samples varied in oil content from 15.0% to 23.9%. The 2001 average protein content of 42.6% was significantly higher than both the 2000 and the ten-year-mean values of 41.9% (Table 2). Individual producer samples varied in protein content from 35.5% to 50.7%. There were no significant differences in the oil and protein content of the top two grades of soybean, particularly for the dark-hilum, “crush beans.” (Table 3).

In 2001, the white-hilum samples contained 1.4% more protein and 0.6% less oil than the dark-hilum samples. Compared to the 2000 survey samples, the protein content of dark-hilum soybeans are 0.5% higher while the protein content of white-hilum soybeans is 1.0% higher. Compared to 2000, oil contents were 0.4% and 0.2% higher for dark and white hilum soybeans respectively. Because of the increasing amounts of white-hilum beans being produced, long-term oil and protein trends (Figures 2a and 2b) are not as clear as in earlier years when surveys contained mainly “crush” beans. White-hilum soybeans that do not meet quality standards for food processing are also used as “crush” beans and are thus submitted for the survey. If white-hilum samples are excluded from calculations then the protein means for only dark-hilum (*i.e.* true “crush beans”) are notably lower (Table 2).



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The oil and protein data are also summarized by grade and county in Tables 4 and 5. Regional quality differences are largely due to environmental conditions such as heat and drought stress although the variety or type of soybean planted is important. The GRL is involved in a collaborative study which is examining long-term North American soybean quality data and its relationship to climatic factors. Early results seemed to suggest decreases in oil content, and thus higher protein content, coincided with cooler growing climates such as Canada usually experiences. However, under true drought conditions where there is both heat and moisture stress on the plants, protein content appears to increase further as seen in the 2001 survey results. The strong inverse relationship between oil and protein content is illustrated in Figure 3.

### **Fatty acid composition**

The fatty acid composition of the soybean grade composites from the 2001 harvest survey showed little differences between the five grades (Table 6). However, compared to 2000, the grade composites have changes in the fatty acid profiles. For the No. 1 and No. 2 Canada composites there were increases in oleic acid of 2.1% and 3.0% respectively. Both these grade composites also had decreases in linoleic and linolenic acid content. The sum of the two major saturated fatty acids, palmitic plus stearic acid, were 0.8% and 0.5% higher than in the 2000 composites. Hot, dry growing conditions usually result in decreased levels of polyunsaturated fatty acids and overall higher levels of total saturated fatty acids.

### **Free fatty acid (FFA) content**

Because of the higher proportion of lower grade soybean in 2001, grade composites were also analyzed for free fatty acid (FFA) content. The majority of lower grade samples were down graded due to damage from insects such as stinkbugs and aphids boring into the seeds. The No. 1 and No. 2 grade composites from 2001 had FFA levels of 0.12% and 0.16% which are similar to the 2000 values of 0.12% and 0.14%. The 2001 composites for No. 3, No. 4 and No. 5 Canada soybean had notably higher FFA contents of 0.23%, 0.27% and 0.34% respectively. Any damage which exposes the inside of the seed to moisture and oxygen usually results in oxidation of the oil and a rise in FFA content.

**Table 3 • Ontario soybeans—2001 harvest survey**  
**Quality data by grade and hilum type**

Grade/type	No. of samples	Oil content <sup>1</sup> , %			Protein content <sup>2</sup> , %		
		Mean	Min.	Max.	Mean	Min.	Max.
<b>No. 1 Canada Yellow</b>	<b>11</b>	<b>20.4</b>	<b>15.3</b>	<b>22.2</b>	<b>42.4</b>	<b>39.7</b>	<b>47.1</b>
Dark	4	20.9	20.8	21.1	41.9	40.1	43.6
White	7	20.2	15.3	22.2	42.7	39.7	47.1
<b>No. 2 Canada Yellow</b>	<b>59</b>	<b>20.4</b>	<b>15.0</b>	<b>23.9</b>	<b>42.8</b>	<b>35.5</b>	<b>50.7</b>
Dark	33	20.7	15.0	23.9	41.9	35.5	50.7
White	26	19.9	15.3	22.0	43.8	40.2	49.3
<b>No. 3 Canada Yellow</b>	<b>24</b>	<b>20.9</b>	<b>18.6</b>	<b>22.2</b>	<b>42.0</b>	<b>39.4</b>	<b>47.2</b>
Dark	16	21.0	20.0	22.2	41.5	39.4	43.6
White	8	20.5	18.6	21.7	43.0	40.8	47.2
<b>No. 4 Canada Yellow</b>	<b>17</b>	<b>20.8</b>	<b>19.6</b>	<b>22.3</b>	<b>42.5</b>	<b>39.8</b>	<b>45.3</b>
Dark	8	20.8	20.3	21.7	42.3	41.0	44.3
White	9	20.8	19.6	22.3	42.6	39.8	45.3
<b>No. 5 Canada Yellow</b>	<b>13</b>	<b>20.2</b>	<b>18.0</b>	<b>21.4</b>	<b>42.7</b>	<b>39.5</b>	<b>46.8</b>
Dark	4	20.7	20.1	21.4	41.7	40.0	42.8
White	9	20.0	18.0	21.3	43.2	39.5	46.8
<b>Sample Canada Yellow</b>	<b>2</b>	<b>18.9</b>	<b>18.1</b>	<b>19.6</b>	<b>43.9</b>	<b>43.7</b>	<b>44.0</b>
Dark	1	18.1	18.1	18.1	44.0	44.0	44.0
White	1	19.6	19.6	19.6	43.7	43.7	43.7
<b>All</b>	<b>126</b>	<b>20.5</b>	<b>15.0</b>	<b>23.9</b>	<b>42.6</b>	<b>35.5</b>	<b>50.7</b>
Dark	66	20.8	15.0	23.9	41.9	35.5	50.7
White	60	20.2	15.3	22.3	43.3	39.5	49.3

<sup>1</sup> Moisture-free basis

<sup>2</sup> N x 6.25; moisture-free-basis

**Table 4a • Ontario soybeans—2001 harvest survey  
Oil and protein content by county and grade**

County	No. of samples	Oil content <sup>1</sup> , %			Protein content <sup>2</sup> , %		
		Mean	Min.	Max.	Mean	Min.	Max.
<b>No. 1</b>							
Brant	0						
Bruce	0						
Durham	0						
Elgin	0						
Essex	1	20.6	20.6	20.6	43.8	43.8	43.8
Glengarry	1	20.6	20.6	20.6	41.2	41.2	41.2
Grey	0						
Haldimand	2	20.9	20.9	20.9	41.0	40.1	41.9
Halton	0						
Kent	2	21.7	21.1	22.2	41.7	41.5	41.9
Lambton	3	19.3	15.3	21.7	43.9	40.9	47.1
Middlesex	1	19.4	19.4	19.4	45.0	45.0	45.0
Oxford	0						
Perth	0						
Stormont	0						
Victoria	0						
Waterloo	0						
Wellington	0						
Unknown	1	21.3	21.3	21.3	39.7	39.7	39.7
<b>All counties</b>	<b>11</b>	<b>20.4</b>	<b>15.3</b>	<b>22.2</b>	<b>42.4</b>	<b>39.7</b>	<b>47.1</b>
<b>No. 2</b>							
Brant	4	19.7	18.7	20.4	43.0	41.8	44.8
Bruce	2	21.6	20.4	22.7	39.0	35.5	42.4
Durham	0						
Elgin	0						
Essex	5	21.5	20.3	23.9	40.7	39.1	42.5
Glengarry	2	20.7	20.1	21.2	40.0	39.7	40.2
Grey	0						
Haldimand	7	20.4	18.5	22.8	42.3	36.1	46.5
Halton	1	19.6	19.6	19.6	43.4	43.4	43.4
Kent	10	20.3	18.4	22.0	44.0	40.7	46.9
Lambton	11	20.7	19.3	21.6	43.0	41.3	45.7
Middlesex	2	21.8	20.4	23.2	41.1	39.1	43.0
Oxford	2	16.9	15.0	18.7	48.9	47.0	50.7
Perth	6	20.2	18.4	21.2	42.5	40.3	46.2
Stormont	1	21.3	21.3	21.3	39.9	39.9	39.9
Victoria	0						
Waterloo	1	21.8	21.8	21.8	40.0	40.0	40.0
Wellington	2	20.1	19.5	20.6	43.3	43.0	43.6
Unknown	3	18.6	15.3	21.1	45.0	41.7	49.3
<b>All counties</b>	<b>59</b>	<b>20.4</b>	<b>15.0</b>	<b>23.9</b>	<b>42.8</b>	<b>35.5</b>	<b>50.7</b>

<sup>1</sup> Moisture-free basis

<sup>2</sup> N x 6.25; moisture-free-basis

**Table 4b • Ontario soybeans—2001 harvest survey  
Oil and protein content by county and grade**

County	No. of samples	Oil content <sup>1</sup> , %			Protein content <sup>2</sup> , %		
		Mean	Min.	Max.	Mean	Min.	Max.
<b>No. 3</b>							
Brant	3	20.3	20.2	20.6	42.4	41.9	42.9
Bruce	2	21.3	21.2	21.3	41.2	41.0	41.3
Durham	0						
Elgin	4	20.8	20.4	21.2	42.4	41.5	43.3
Essex	0						
Glengarry	0						
Grey	1	20.0	20.0	20.0	40.9	40.9	40.9
Haldimand	2	20.5	20.2	20.7	42.9	42.1	43.6
Halton	0						
Kent	3	21.4	21.0	21.7	42.0	41.3	42.5
Lambton	3	20.4	18.6	21.5	43.5	41.0	47.2
Middlesex	1	20.4	20.4	20.4	42.9	42.9	42.9
Oxford	1	20.7	20.7	20.7	42.9	42.9	42.9
Perth	2	22.1	22.0	22.2	40.0	39.9	40.0
Stormont	0						
Victoria	1	20.5	20.5	20.5	40.8	40.8	40.8
Waterloo	1	21.7	21.7	21.7	39.4	39.4	39.4
Wellington	0						
Unknown	0						
<b>All counties</b>	<b>24</b>	<b>20.9</b>	<b>18.6</b>	<b>22.2</b>	<b>42.0</b>	<b>39.4</b>	<b>47.2</b>
<b>No. 4</b>							
Brant	2	20.5	20.3	20.6	42.2	42.1	42.4
Bruce	2	20.4	19.9	20.9	43.9	42.5	45.3
Durham	2	20.4	19.6	21.2	41.8	41.7	41.9
Elgin	0						
Essex	0						
Glengarry	0						
Grey	0						
Haldimand	0						
Halton	0						
Kent	1	22.3	22.3	22.3	39.8	39.8	39.8
Lambton	2	20.7	20.5	20.8	43.3	42.2	44.3
Middlesex	2	20.9	20.8	21.0	42.8	42.5	43.1
Oxford	0						
Perth	2	21.3	21.2	21.4	42.9	41.1	44.6
Stormont	0						
Victoria	0						
Waterloo	0						
Wellington	2	20.4	20.2	20.6	42.8	41.9	43.6
Unknown	2	21.6	21.4	21.7	41.5	41.0	42.0
<b>All counties</b>	<b>17</b>	<b>20.8</b>	<b>19.6</b>	<b>22.3</b>	<b>42.5</b>	<b>39.8</b>	<b>45.3</b>

<sup>1</sup> Moisture-free basis

<sup>2</sup> N x 6.25; moisture-free-basis

**Table 4c • Ontario soybeans—2001 harvest survey  
Oil and protein content by county and grade**

County	No. of samples	Oil content <sup>1</sup> , %			Protein content <sup>2</sup> , %		
		Mean	Min.	Max.	Mean	Min.	Max.
<b>No. 5</b>							
Brant	0						
Bruce	4	20.5	20.0	20.7	42.6	41.2	44.8
Durham	0						
Elgin	0						
Essex	0						
Glengarry	0						
Grey	0						
Haldimand	0						
Halton	0						
Kent	2	21.1	20.9	21.3	41.0	39.5	42.4
Lambton	0						
Middlesex	3	19.7	19.2	20.5	44.8	43.6	46.8
Oxford	1	18.0	18.0	18.0	43.0	43.0	43.0
Perth	1	20.5	20.5	20.5	42.7	42.7	42.7
Stormont	0						
Victoria	0						
Waterloo	0						
Wellington	1	21.4	21.4	21.4	40.0	40.0	40.0
Unknown	1	20.1	20.1	20.1	42.8	42.8	42.8
<b>All counties</b>	<b>13</b>	<b>20.2</b>	<b>18.0</b>	<b>21.4</b>	<b>42.7</b>	<b>39.5</b>	<b>46.8</b>
<b>All grades</b>							
Brant	9	20.1	18.7	20.6	42.6	41.8	44.8
Bruce	10	20.8	19.9	22.7	41.8	35.5	45.3
Durham	2	20.4	19.6	21.2	41.8	41.7	41.9
Elgin	4	20.8	20.4	21.2	42.4	41.5	43.3
Essex	6	21.4	20.3	23.9	41.3	39.1	43.8
Glengarry	3	20.6	20.1	21.2	40.4	39.7	41.2
Grey	1	20.0	20.0	20.0	40.9	40.9	40.9
Haldimand	11	20.5	18.5	22.8	42.2	36.1	46.5
Halton	1	19.6	19.6	19.6	43.4	43.4	43.4
Kent	18	20.8	18.4	22.3	42.9	39.5	46.9
Lambton	19	20.4	15.3	21.7	43.3	40.9	47.2
Middlesex	9	20.5	19.2	23.2	43.3	39.1	46.8
Oxford	4	18.1	15.0	20.7	45.9	42.9	50.7
Perth	12	20.7	18.4	22.2	42.2	39.9	46.2
Stormont	1	21.3	21.3	21.3	39.9	39.9	39.9
Victoria	1	20.5	20.5	20.5	40.8	40.8	40.8
Waterloo	2	21.8	21.7	21.8	39.7	39.4	40.0
Wellington	6	20.1	18.1	21.4	42.7	40.0	44.0
Unknown	7	20.0	15.3	21.7	42.9	39.7	49.3
<b>All counties</b>	<b>126</b>	<b>20.5</b>	<b>15.0</b>	<b>23.9</b>	<b>42.6</b>	<b>35.5</b>	<b>50.7</b>

<sup>1</sup> Moisture-free basis

<sup>2</sup> N x 6.25; moisture-free-basis

**Table 5 • Ontario soybeans—2001 harvest survey  
Oil and protein content by county  
No.1 and No. 2 Canada grades combined**

County	No. of Samples	Oil content <sup>1</sup> , %			Protein content <sup>2</sup> , %		
		mean	min.	max.	mean	min.	max.
		%	%	%	%	%	%
Brant	4	19.7	18.7	20.4	43.0	41.8	44.8
Bruce	2	21.6	20.4	22.7	39.0	35.5	42.4
Essex	6	21.4	20.3	23.9	41.3	39.1	43.8
Glengarry	3	20.6	20.1	21.2	40.4	39.7	41.2
Haldimand	9	20.5	18.5	22.8	42.0	36.1	46.5
Halton	1	19.6	19.6	19.6	43.4	43.4	43.4
Kent	12	20.5	18.4	22.2	43.7	40.7	46.9
Lambton	14	20.4	15.3	21.7	43.2	40.9	47.1
Middlesex	3	21.0	19.4	23.2	42.4	39.1	45.0
Oxford	2	16.9	15.0	18.7	48.9	35.5	50.7
Perth	6	20.2	18.4	21.2	42.5	40.3	46.2
Stormont	1	21.3	21.3	21.3	39.9	39.9	39.9
Waterloo	1	21.8	21.8	21.8	40.0	40.0	40.0
Wellington	2	20.1	19.5	20.6	43.3	43.0	43.6
Unknown	4	19.3	15.3	21.3	43.7	39.7	49.3
<b>All counties</b>	<b>70</b>	<b>20.4</b>	<b>15.0</b>	<b>23.9</b>	<b>42.7</b>	<b>35.5</b>	<b>50.7</b>

<sup>1</sup> Moisture-free basis

<sup>2</sup> N x 6.25; moisture-free-basis

**Table 6 • Ontario soybean—2001 harvest survey  
Fatty acid composition and FFA content of grade composites**

Grade <sup>2</sup>	Fatty acid composition <sup>1</sup>					Iodine value <sup>3</sup>	FFA
	C16:0	C18:0	C18:1	C18:2	C18:3		
	%	%	%	%	%		%
No. 1 Canada	9.8	4.8	25.0	51.9	7.4	131	0.12
No. 2 Canada	9.7	4.7	25.3	51.8	7.2	130	0.16
No. 3 Canada	9.5	5.0	26.2	51.0	6.9	129	0.23
No. 4 Canada	9.7	4.8	24.8	52.5	6.8	130	0.27
No. 5 Canada	9.5	4.7	25.3	52.1	7.1	131	0.34

<sup>1</sup> Percentage of total fatty acids including palmitic (C16:0), stearic (C18:0), oleic (C18:1), linoleic (C18:2), and linolenic (C18:3)

<sup>2</sup> As designated on the sample envelope

<sup>3</sup> Calculated from the fatty acid composition