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## The western Canadian drought of 2001 – how dry was it?

By Brent Wilson, Isabelle Trépanier and Martin Beaulieu

**Crop production across western Canada was lower in 2001 as a result of drought conditions. The grains industry has been drawing comparisons with the 1988 season, the last year a general drought reduced production. There are differences between the drought of 2001 and the drought of 1988. This article will examine some of these differences.**

In 2001, a drought already established in southern Alberta spread northward to central Alberta and eastward throughout south-central Saskatchewan. Droughts are defined as prolonged periods of dry weather. Southern Alberta is often affected with dry conditions perhaps as often as once every four or five years.

### Normalized Difference Vegetation Index

Since 1987, Statistics Canada's Spatial Analysis and Geomatics Applications (SAGA) group has kept a database of National Oceanographic and Atmospheric Administration (NOAA) satellite images covering 21 weeks of the crop growing season each year. These images are provided to Statistics Canada by the Manitoba Remote Sensing Centre.

A vegetation index, the Normalized Difference Vegetation Index (NDVI), is calculated for each of a matrix of small geographic points in the western provinces by taking the ratio of the red and near-infrared spectral bands. These bands are respectively absorbed and reflected by living vegetation. This index provides information on the vegetation condition.

Page 3 shows four maps illustrating the vegetative conditions of western Canada in 1998, 1999, 2000 and 2001 in relation to the average conditions from 1987 through 1997. The years 1987 through 1997 represent a period of time that experienced relatively good conditions as well as a few dry years in the late 1980s. This comparison clearly shows the change in vegetative conditions from 1998 to 2001. Green describes areas that were better than average, while red indicates areas that were worse, and yellow is more or less average. The spread of dry conditions from southern Alberta into central Alberta and western Saskatchewan over the period is evident.

The maps on page 4 present a comparison of 2001 to 1988. Map A shows 2001 with dry areas concentrating mainly in southern Alberta and the west-central region of Saskatchewan. Map B shows 1988 with dry areas extending throughout the growing regions of western Canada. Map C is a comparison of vegetative conditions between 2001 and 1988. This confirms that the 1988 crop year was much drier than the conditions experienced in the 2001 crop year.

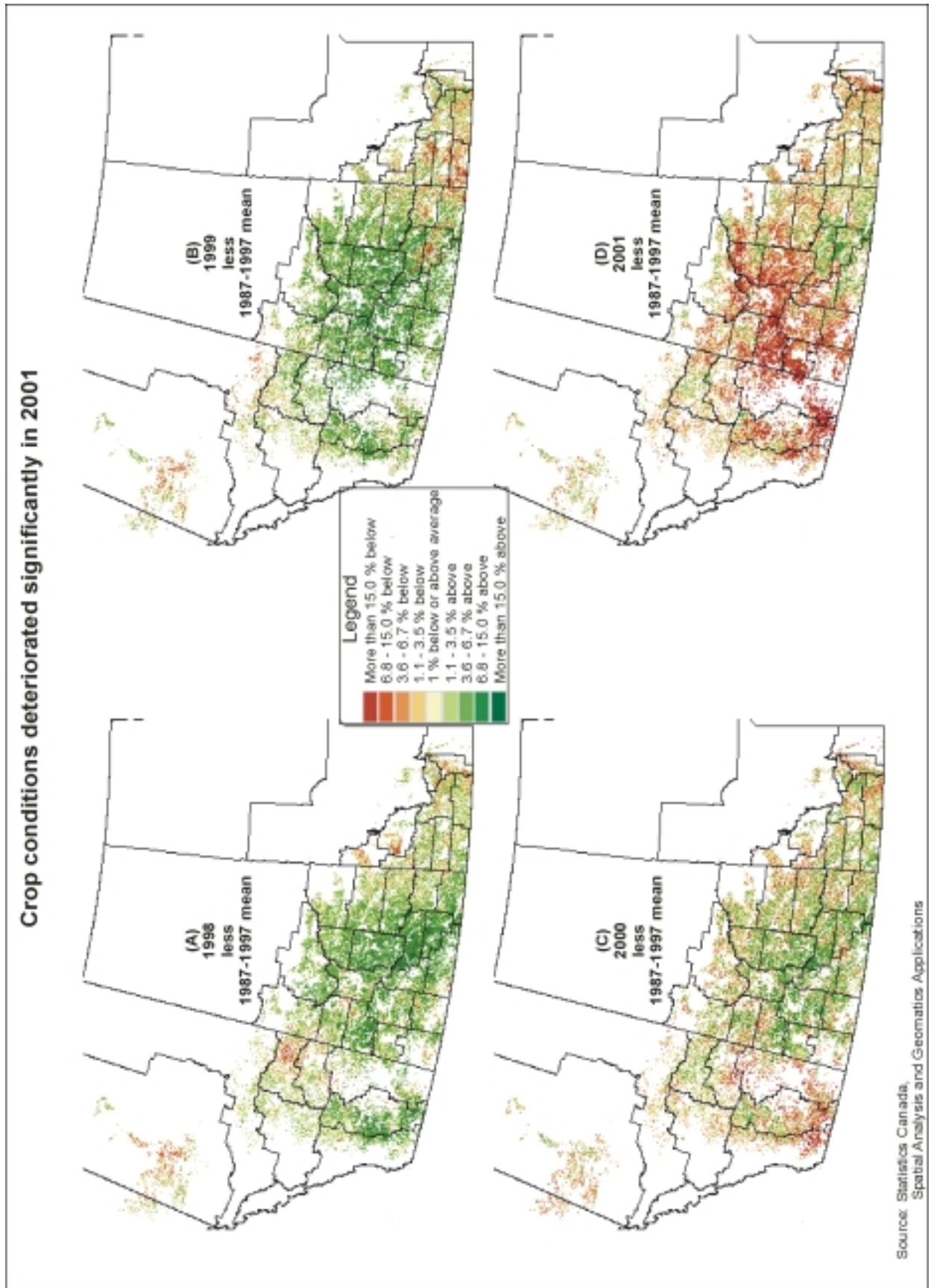
### **In terms of crop production, 1988 was much worse**

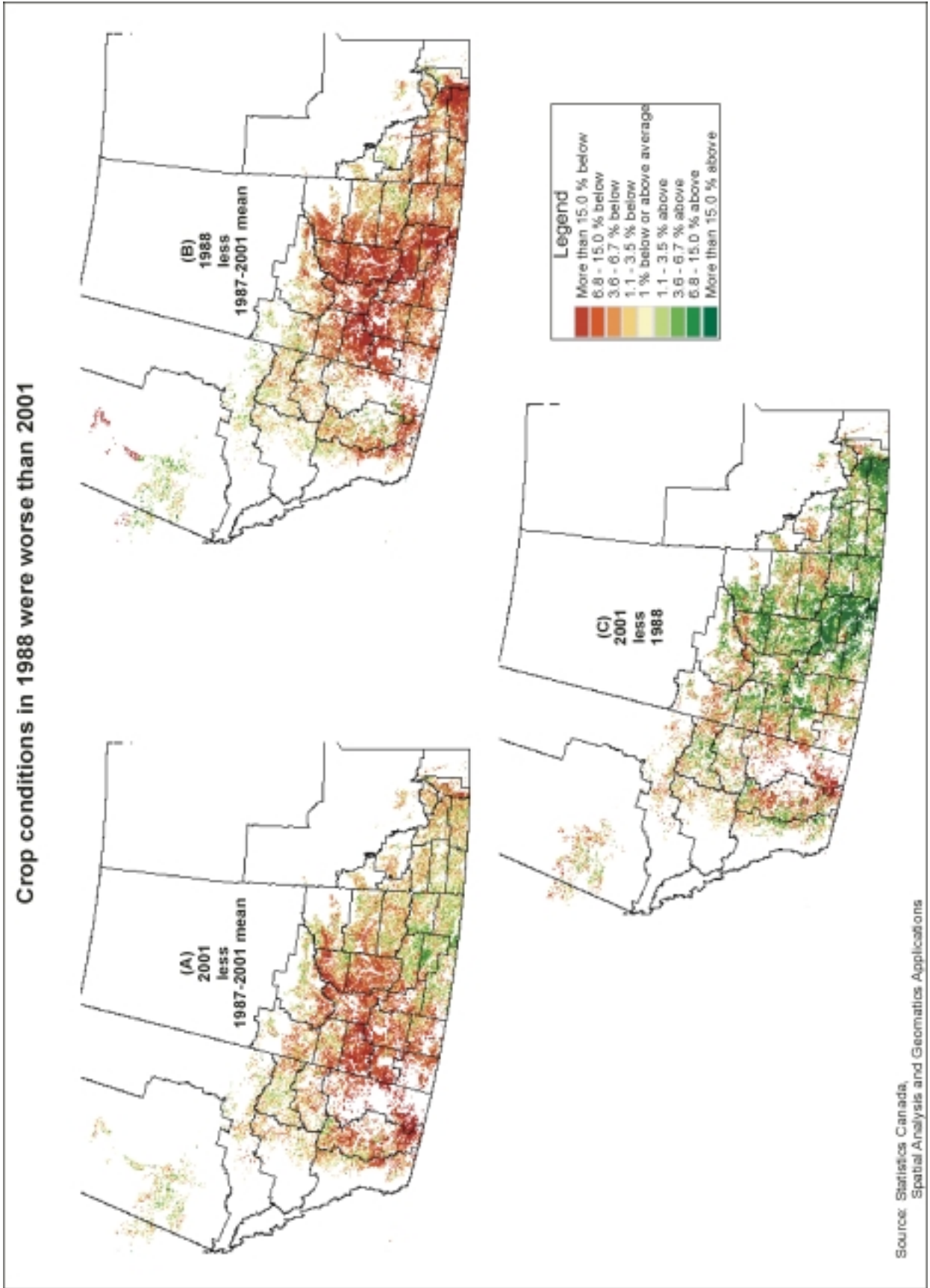
A comparison of the crop yields between 2001 and 1988 by province are set out in Table 1. Provincial averages in 1988 were far worse than the 2001 average yields. Average yields across Alberta, Saskatchewan and Manitoba were approximately 30% higher in 2001 compared to 1988. However, provincial yields alone do not fully address the impact of the 2001 dry season. The 2001 drought is unusual in its intensity and its expansion over the past few years.

Of the three Prairie provinces, Alberta yields had the smallest difference between 2001 and 1988. However in 1988, Alberta fared much better than the other provinces in terms of yields and production. Manitoba had the greatest improvement in 2001 as compared to the 1988 drought. In 2001, Manitoba had a reasonable production year despite the unusual conditions that it faced. Saskatchewan was hit hard in 1988 and, although 2001 was a better year, yields were, on average, much worse than both Manitoba and Alberta.

**Table 1 - Yields in bushels per acre by province**

	1988				2001			
	AB	SK	MB	1988 Avg.	AB	SK	MB	2001 Avg.
Winter wheat	20.6	10.0	20.0	16.9	33.3	30.2	51.6	38.4
Spring wheat	29.2	13.4	18.4	20.3	35.1	24.5	31.5	30.4
Durum wheat	21.1	10.6	16.0	15.9	20.6	21.8	31.0	24.5
All wheat	27.7	12.7	18.3	19.6	33.1	23.9	32.3	29.8
Oats for grain	73.8	38.8	36.3	49.6	64.0	47.9	60.6	57.5
Barley for grain	56.8	31.3	34.3	40.8	54.5	39.0	51.3	48.3
Fall rye	19.1	12.0	19.0	16.7	28.8	26.3	33.0	29.4
Spring rye	14.0	12.5	19.0	15.2	20.0	18.0	33.0	23.7
All rye	17.5	12.1	19.0	16.2	27.0	25.8	33.0	28.6
Mixed grain	57.1	28.6	30.0	38.6	40.0	50.0	46.7	45.6
Flaxseed	22.0	12.3	11.1	15.1	22.9	16.7	18.0	19.2
Canola	23.7	19.2	17.4	20.1	26.7	19.8	26.2	24.2





## Progression of drought 1996–2001

Provincial crop yields for spring wheat, barley and canola (the three major crops in western Canada) in Alberta, Saskatchewan and Manitoba are shown in Table 2 for the years 1996 to 2001. Both 1996 and 1999 were considered bumper crops. Yields in 1997, 1998, and 2000 were mostly above the 10-

year average. Even 2001 yields in comparison are not far below the 10-year average. The provincial yield data do not appear to support the severity of the reports on the 2001 drought.

Manitoba was included for comparative purposes. In 2001, crop loss occurred due to dry conditions in the southwestern corner and excessive moisture in the southeastern portion of the province. Unlike the other two provinces, Manitoba had a better year in 2000 than in 1999. Despite varying conditions, Manitoba appears to be better overall than the southern areas of Alberta and Saskatchewan.

**Table 2 - Yield comparison by crop and year 1996–2001**

Year	Alberta			Saskatchewan			Manitoba		
	Wheat	Barley	Canola	Wheat	Barley	Canola	Wheat	Barley	Canola
1996	40.1	62.0	22.9	33.8	56.2	25.0	37.5	62.6	30.4
1997	38.7	57.5	23.1	28.0	46.8	20.9	31.2	57.3	28.1
1998	36.5	56.5	25.1	30.8	51.4	22.9	35.9	60.4	29.1
1999	42.2	65.5	29.0	35.4	56.0	26.7	36.2	55.8	30.6
2000	39.8	56.3	26.0	32.5	51.3	25.6	39.7	62.8	28.4
2001	35.1	54.5	26.7	24.5	39.0	19.8	31.4	51.3	26.2
10-yr avg.*	35.1	58.3	24.7	30.0	50.7	22.8	34.0	58.2	27.4

\*10-year average is 1991-2000

Provincial yield averages do not indicate that 2001 was a drought year. It does not tell us that for southern Alberta, it was the second consecutive drought year. The 2001 drought was more extensive than the previous year and low moisture reserves affecting an even larger area next year has the industry concerned.

Southern Alberta is a region prone to dry growing conditions. It is an area that utilizes more irrigation than any other region in Canada. About once every four or five years, southern Alberta experiences conditions that many characterize as a drought. These years attract attention as this region is the main beef production area in Canada and, in the dry years, feedlots are forced to draw grain from central Alberta and western Saskatchewan. This creates opportunities for grain producers and merchants to provide feed for this market.

Despite a good crop in 1999, the soil moisture reserves in southern Alberta were low. The fall, winter and spring of 2000 did not provide adequate rain or snow to replenish the soil moisture. This affected planting activities throughout the region. Crop production in 2000 was mainly above average for the province but southern Alberta had a poor year.

The current drought began in southern Alberta in the fall of 1999; a record year for Alberta in yields and the region of southern Alberta had excellent results. Crop districts covering the southern part

of the province had yields at or above the provincial average. The fall finished on a dry note. In 2000, red spring wheat, barley and canola yields were well below provincial averages while crop districts in the north were better than average. In 2001, crop yields in southern districts were disastrous. Drought conditions moved northward into central Alberta and sharply reduced yields. Areas north of these regions enjoyed an above-average year.

Saskatchewan yields for red spring wheat and barley in 2000 were down 10-15% from the record year in 1999 but overall it was an above-average year. However, in southwestern regions, wheat and barley yields were down 20-25% from 1999. Canola yields were down only 5% in the southwest corner of the province, which is in line with the provincial decline. In 2000, this area represented only 10% of total Saskatchewan harvested canola acres as compared to 22% of harvested wheat area.

In 2001, southwestern Saskatchewan was in a drought situation. The dry conditions that had plagued southern Alberta for over a year had not only shifted northward to central Alberta, but eastward into Saskatchewan. Yields for the major crops in these areas were below the provincial averages.

## **Outlook**

The 1988 drought had far worse growing conditions than 2001 as revealed by the satellite data and confirmed by the crop production data. This in no way diminishes the hardships and difficulties faced by farmers throughout the region.

The 2001 drought has the industry more concerned than droughts of previous years. To date the Prairie region has not received significant precipitation to alleviate concerns for another dry season. Weather conditions so far this winter have been unseasonably warm and dry. This has many in western Canada concerned about another dry season and a drought-affected region that is spreading across the Prairies.

## **The crop districts most affected by the 2001 drought are among the most productive**

These dry conditions impact grain farmers, livestock producers, and the associated businesses that service these individuals. A drought first impacts the farmers' operating revenue. In subsequent years they may choose to use less input (fertilizer and pesticides) or spend more to irrigate their land or water their livestock. If the drought persists, they may decide to grow more drought-tolerant crops or put more land into summerfallow. Table 3 shows the historical importance of the areas affected by the 2001 drought.

During the 1990s, nearly four out of ten farms surveyed in Saskatchewan and Alberta were located in the areas affected by the 2001 drought. These farms generated 40% of the operating revenues in Saskatchewan and 50% in Alberta. Total operating expenses were in the same proportion as revenues.

Revenues from the sale of wheat alone in these affected areas represented 45% and 52% respectively of Saskatchewan and Alberta total wheat revenues. Over a third of Saskatchewan barley revenues and almost half of Alberta barley revenues came from these areas.

In both Saskatchewan and Alberta, almost 40 cents of each dollar spent by crop growers originated from drought areas. On average, farmers in these drought areas spent respectively 46 cents and 58 cents of each dollar spent to raise livestock in Saskatchewan and Alberta.

Comparison with 1988 figures can give a rough idea on the impact of a drought on farmers' income. This type of comparison is far from being perfect as many factors (affected areas, prices, cropping patterns) have changed between 1988 and 2001. In 1988, total Saskatchewan crop receipts were 15% lower than the previous five-year average (1983-1987). All wheat and barley receipts were down by 18% and 27% respectively. Crop receipts in 2001 actually rose slightly as growers drew down the inventories from previous years. The full impact of the drought on revenues will not be felt until 2002.

**Table 3 - Importance of areas affected by the 2001 drought**

<b>Percent ascribed to the 2001 drought area: ( average of 1990 through 1999)</b>	<b>Saskatchewan</b>	<b>Alberta</b>
Number of farms	40	36
Total operating revenues	42	50
Grain and oilseed revenues	41	44
All wheat revenues	45	52
Barley revenues	36	46
Total operating expenses	41	50
Total crop expenses	36	39
Fertilizer and lime expenses	33	38
Pesticide expenses	38	41
Total livestock expenses	46	58
Feed, supplements, straw and bedding	53	59
Net fuel expenses	39	37

**Source:** Statistics Canada, Whole Farm DataBase.

**Note:** Drought areas include crop districts 3BS, 3BN, 4A, 4B, 6A, 6B, 7A, 7B, 8B in Saskatchewan and 1,2,3 in Alberta

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**CURRENT CANADIAN AGRICULTURAL INDICATORS**

	2000	2001	Percent Change
<b>Crop Production December 5 Estimate (million tonnes)</b>			
Wheat	26.8	21.3	-26
Oats	3.4	2.8	-21
Barley	13.5	11.4	-18
Canola	7.1	5.1	-39
Flaxseed	0.7	0.7	0
Corn for grain	6.8	8.2	17
Soybeans	2.7	1.6	-69
Dry Peas	2.9	2.2	-32
<b>Cattle and Calves on Farms (million head)</b>			
Total Cattle and Calves - January 1, 2001, 2002 *	13.0 *	13.0 *	0
Calves Born	5.2	5.4	4
<b>Pigs on Farms (million head)</b>			
Total Pigs - Year End	12.6	13.1	4
Sows Farrowed July-December	1.4	1.5	7
Sows to Farrow January-June 2001, 2002 *	1.4 *	1.5 *	7
<b>Milk Sold Off Farms (million kilolitres)</b>			
January-December	7.5	7.6	1
<b>Chicken Meat Production (thousand tonnes)</b>			
Total	903	949	5
<b>Egg Production (million dozen)</b>			
Total	550	568	3
<b>Cultivated Area of Fruit (thousand hectares)</b>			
Apples	27.3	25.3	-8
Strawberries	5.5	5.4	-2
Blueberries	38.4	40.0	4
Grapes	8.3	8.7	5
<b>Planted Area of Vegetables (thousand hectares)</b>			
Field Vegetables	112	113	1
Potatoes	165	167	1



**CURRENT CANADIAN AGRICULTURAL INDICATORS**

	2000	2001	Percent Change
<b>International Trade in Agricultural Commodities and Food (billion dollars)</b>			
Exports	26.6	30.0	11
Imports	18.2	20.0	9
<b>Price Indexes</b>			
Consumer Price Index Food Component (1992=100) - December	114.5	118.6	3
Farm Product Price Index (1997=100) - December	96.1	98.4	2
<b>Farm Cash Receipts (billion dollars)</b>			
Total	33.0	36.2	9
<b>Bankruptcies - Agriculture and related service industries (number)</b>			
Total	262	271	3
<b>Manufacturing Shipments of Food (billion dollars)</b>			
Total Value	41.7	44.3	6
<b>Retail Trade in Food Stores (billion dollars)</b>			
Total Value	61.1	63.8	4
<b>Population (million persons)</b>			
October 1	30.9	31.2	1
<b>Employment (million persons)</b>			
December	15.0	15.0	0
<b>Raw Unemployment Rate (percent)</b>			
December	6.3	7.6	17

**March 1, 2002 through September 1, 2002****Field Crops**

- April 24 - March seeding intentions of principal field crops by province for 2002 (Catalogue no. 22-002-XPB)
- May 7 - Stocks of Canadian grain at March 31, 2002 (Catalogue no. 22-002-XPB)
- June 28 - Preliminary estimates of principal field crop area for 2002 (Catalogue no. 22-002-XPB)
- August 23 - July 31, 2002 estimate of production of principal field crops (Catalogue no. 22-002-XPB)

**Grain Markets**

- March 27 - Cereals and oilseeds market statistics, monthly (Catalogue no. 22-007-XPB)
- April 25
- May 28
- June 28
- July 29
- August 28
- May 30 - Grain Trade of Canada 2000-01 (Catalogue no. 22-201-XPB)

**Horticulture Crops**

- July 19 - Preliminary estimates of potato area by province for 2002 (Catalogue no. 23-008-UIB)
- June 6 - Area of fruit and vegetable crops by province for 2002 (Catalogue no. 22-003-XIB)
- April 26 - Greenhouse, sod and nursery industries (Catalogue no. 22-202-XIB)

**Food Consumption**

- June 13 - Supply, disposition and per capita disappearance of cereals, sugars, syrups, pulses, nuts, beverages, dairy products, poultry, eggs and meats for 2001 (Catalogue no. 32-229-XPB/XIB)

**Livestock and Animal Products**

- May 14 - Farm sales of milk for fluid and manufacturing purposes, production and stocks of creamery butter, cheddar cheese and other dairy products by province, quarterly (Catalogue no. 23-001QXPB/XIB)
- August 13
- April 25 - Inventories of pigs by province at April 1 (Catalogue no. 23-603-UPE)
- August 22 - Inventories of pigs, cattle and sheep by province at July 1 (Catalogue no. 23-603-UPE)
- April 25 - Wildlife fur production for 2001 (Catalogue no. 23-603-UPE)
- August 22 - Report on fur farms by province for 2001 (Catalogue no. 23-603-UPE)
- May 15 - Production of poultry and eggs by province, 2001 (Catalogue no. 23-202-XIB)

## Scheduled Releases of Agricultural Information

### March 1, 2002 through September 1, 2002

#### Livestock and Animal Products

- February 28 - Aquaculture economic statistics (Catalogue no. 23-603-UPE)
- September 26 - Aquaculture (Catalogue no. 23-603-UPE)
- March 28 - Stocks of frozen meat products by province, monthly (Catalogue no. 23-009-XIE)  
April 25  
May 30  
June 27  
July 25  
August 29
- March 19 - Stocks of frozen poultry meat by province, monthly (Catalogue no. 23-603-UPE)  
April 18  
May 17  
June 19  
July 18  
August 20
- March 5 - Egg production and number of laying hens by province, monthly (Catalogue no. 23-003-XPB)  
April 9  
May 8  
June 7  
July 5  
August 9

#### Farm Income and Prices

- May 28 - Farm cash receipts by province, quarterly (Catalogue no. 21-001-XIB)  
August 26
- July 16 - Estimates of agricultural economic indicators for 2001: farm income, farm cash receipts, farm operating expenses and depreciation charges, current values of farm capital, farm debt outstanding and direct program payments (Catalogue no. 21-603-UPE)

Users may obtain these releases on the date of release through the contacts listed on the next page. Much of the data is available in machine readable form in CANSIM at the same time. The publications will be available at a later date.

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