Canadian agriculture: evolution and innovation

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Chief Statistician of Canada

November 14, 2017
Winnipeg, Manitoba
Outline of presentation

• Introduction and background
  Canadian agriculture in a global market

• Portrait of a 21st century farm operation
  Socioeconomic changes in Canadian agriculture

• Canadian agriculture
  Innovation in an evolving industry

• Moving forward
  Challenges and opportunities
Evolution of the Canadian agriculture industry
Canada is a world leader in agriculture

Ranked 5th globally for agriculture export value in 2014

Source: Agriculture and Agri-Food Canada.

Top exports in 2016:

1. Canola seed and oil: $8.8 billion
2. Wheat: $6.0 billion
3. Meat, pork: $3.2 billion
4. Soybeans: $2.5 billion
5. Lentils: $2.1 billion

Source: Trade Data Online.

Rank in global production in 2014:

1st: canola, lentils, dry peas, maple
2nd: blueberries
6th: wheat, barley
7th: soybeans

Source: Food and Agriculture Organization of the United Nations.
Canadian exports have grown from $11.5 billion in 1996 to $28.1 billion in 2016.

Source: Trade Data Online.
### Canada exports across the world

#### Largest exports by value by country of destination in 2016

**China is the main export destination for:**

<table>
<thead>
<tr>
<th>Export</th>
<th>Value (million)</th>
<th>% of value exported by Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canola seed</td>
<td>$1,928</td>
<td>34.0</td>
</tr>
<tr>
<td>Soybeans</td>
<td>$948</td>
<td>37.8</td>
</tr>
<tr>
<td>Flaxseed</td>
<td>$216</td>
<td>55.7</td>
</tr>
</tbody>
</table>

**Japan is the main export destination for:**

<table>
<thead>
<tr>
<th>Export</th>
<th>Value (million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>$579</td>
</tr>
</tbody>
</table>

**India is the main export destination for:**

<table>
<thead>
<tr>
<th>Export</th>
<th>Value (million)</th>
<th>% value exported by Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry peas</td>
<td>$595</td>
<td>41.5</td>
</tr>
<tr>
<td>Lentils</td>
<td>$523</td>
<td>24.6</td>
</tr>
</tbody>
</table>

**USA is the main export destination for:**

<table>
<thead>
<tr>
<th>Export</th>
<th>Value (million)</th>
<th>% of value exported by Canada</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat, beef</td>
<td>$1,511</td>
<td>78.7</td>
</tr>
<tr>
<td>Meat, pork</td>
<td>$1,320</td>
<td>76.7</td>
</tr>
<tr>
<td>Greenhouse veg</td>
<td>$1,089</td>
<td>99.6</td>
</tr>
<tr>
<td>Maple</td>
<td>$236</td>
<td>61.9</td>
</tr>
<tr>
<td>Blueberries</td>
<td>$165</td>
<td>55.8</td>
</tr>
</tbody>
</table>

Contribution of the agricultural sector to the economy

Percent of gross domestic product

Portrait of a 21st century farm operation:

Socioeconomic characteristics of farm businesses and farm operators
Fewer farms, but they are larger

Total number of agricultural operations and average area (in acres) per operation, 1871 to 2016 census years, Canada

Source: Census of Agriculture.
A shift in production: Evolution of farm type

Percentage of agricultural operations by selected operation types, 1981 to 2016

Gross farm receipts in 2015 constant dollars by selected operation type, 1980 to 2015

Source: Census of Agriculture.
Productivity growth in Canadian agriculture

Trend in output, input and productivity in Canadian agriculture, 1961 to 2013

Source: CANSIM 383-0032.
Farm cash receipts have increased alongside farm debt

Source: CANSIM 002-0008 and 002-0001.
Farmers invest in their business

Average annual capital investment per farm (in 2015 constant dollars)

<table>
<thead>
<tr>
<th>Year</th>
<th>Investment (in 2015 constant dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>$133,887</td>
</tr>
<tr>
<td>2013</td>
<td>$117,684</td>
</tr>
<tr>
<td>2011</td>
<td>$115,778</td>
</tr>
<tr>
<td>2009</td>
<td>$107,350</td>
</tr>
</tbody>
</table>

Source: CANSIM table 002-0074.
More farms renting land as prices rise

Land tenure, 2001 to 2016

Value per acre, 2016

Source: Census of Agriculture.
Larger farms have more year-round employees

Number of employees on agricultural operations by receipts class, Canada, 2015

Source: Census of Agriculture.
Farmers are getting older

55 years and older, 37%

Less than 35 years, 30%

35 to 54 years, 33%

Less than 35 years, 9%

35 to 54 years, 36%

Source: Census of Agriculture, Census of Population
On large farms, older farmers are as likely to use technology

Percentage of farm operators reporting the use of technology by age category of farm operator and receipts class of operation, 2016

Source: Census of Agriculture.
Canadian agriculture

Innovation in an evolving industry
Canadian farms are innovating

product  process  organization  marketing
Technology allows farmers to manage larger operations

<table>
<thead>
<tr>
<th>Receipt Class</th>
<th>Percentage Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $10,000</td>
<td>42.7</td>
</tr>
<tr>
<td>$10,000 to $24,999</td>
<td>50.7</td>
</tr>
<tr>
<td>$25,000 to $49,999</td>
<td>56.4</td>
</tr>
<tr>
<td>$50,000 to $99,999</td>
<td>63.8</td>
</tr>
<tr>
<td>$100,000 to $249,999</td>
<td>73.3</td>
</tr>
<tr>
<td>$250,000 to $499,999</td>
<td>85.4</td>
</tr>
<tr>
<td>$500,000 to $999,999</td>
<td>92.9</td>
</tr>
<tr>
<td>$1,000,000 and over</td>
<td>95.9</td>
</tr>
</tbody>
</table>

Source: Census of Agriculture.
Crop farms grow with technology

Proportion of agricultural operations reporting selected technology by cropland acreage, 2015

Source: Census of Agriculture.
New crop varieties expand growing area

Total soybean area seeded by province, 1981 to 2016

Sources: CANSIM table 004-0003 and 004-0213.
Industry consolidation drives efficiency gains

Total number of pigs and agricultural operations reporting, Canada, 1961 to 2016

Sources: CANSIM tables 004-0004 and 004-0223.
Innovation: Producing more with less

1981
Number of dairy cows: 1.8 million
Milk production: 7.3 million kilolitres

2016
Number of dairy cows: 939,071
Milk production: 8.4 million kilolitres

Source: CANSIM 002-0068.
Automation increases size of production

Proportion of greenhouse, nursery and floriculture type operations using greenhouse automation by square feet under glass, Canada, 2016

Source: Census of Agriculture.
Small farms innovate

Percentage of agricultural operations reporting direct marketing by sales class, Canada, 2015

Source: Census of Agriculture.
Renewable energy reduces costs

Proportion of operations with a renewable energy producing system on their operation by farm type, Canada, 2016

- Hog and pig: 8.2%
- Poultry and egg: 8.1%
- Greenhouse: 5.6%
- Vegetable and melon: 7.1%
- Beef: 6.6%

Source: Census of Agriculture
Innovative ways to produce data

July 31, 2017 compared to normal (1987-2016)
### Yield model results

<table>
<thead>
<tr>
<th>Crop</th>
<th>July Survey (bu/ac)</th>
<th>Yield Model¹ (bu/ac)</th>
<th>Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barley</td>
<td>63.2</td>
<td>64.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Canola</td>
<td>35.2</td>
<td>38.1</td>
<td>8.2</td>
</tr>
<tr>
<td>Corn for grain</td>
<td>153.4</td>
<td>160.9</td>
<td>4.9</td>
</tr>
<tr>
<td>Flaxseed</td>
<td>19.6</td>
<td>19.4</td>
<td>-1.0</td>
</tr>
<tr>
<td>Mixed grains</td>
<td>58.5</td>
<td>58.4</td>
<td>-0.2</td>
</tr>
<tr>
<td>Oats</td>
<td>90.0</td>
<td>93.2</td>
<td>3.6</td>
</tr>
<tr>
<td>Peas, dry</td>
<td>34.4</td>
<td>35.0</td>
<td>1.7</td>
</tr>
<tr>
<td>Rye, fall</td>
<td>50.8</td>
<td>51.9</td>
<td>2.2</td>
</tr>
<tr>
<td>Soybeans</td>
<td>39.3</td>
<td>42.2</td>
<td>7.4</td>
</tr>
<tr>
<td>Wheat, durum</td>
<td>28.1</td>
<td>31.0</td>
<td>10.3</td>
</tr>
<tr>
<td>Wheat, spring</td>
<td>44.4</td>
<td>47.2</td>
<td>6.3</td>
</tr>
<tr>
<td>Wheat, winter</td>
<td>73.9</td>
<td>73.9</td>
<td>0.0</td>
</tr>
</tbody>
</table>

1 CANSIM Table 001-0075.

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**Collecting data without contacting farmers**

**Partnership:**
Statistics Canada
Agriculture and Agri-Food Canada

**Three data sets:**
1. Satellite data
2. Agro-climatic data
3. Historical yield estimates
Innovative ways to use alternative data

- High accuracy
- 70-98% coverage, varying by crop type and province
- Shared with Statistics Canada since 2015
Looking forward:

Challenges and opportunities
Innovation will continue to shape the agriculture industry
The future of Canadian agriculture

- Transportation
- Demographics
- Research and development
- Environment
- Land values
- Labour
The future of Canadian agriculture

Background satellite image

2017

Source: The lake boundaries have been digitized from georectified Landsat-5 and Landsat-8 satellite images.
The future of Canadian agriculture

Global markets

Technology

Prices

Regulation and policies

Trade agreements
Agriculture data at Statistics Canada

- Agriculture surveys
- Census of Agriculture
- Satellite data
- Administrative data
Greenhouse identification and area estimates using satellite data

Comparison of greenhouse area between satellite and the Census of Agriculture for Leamington/Kingsville area

<table>
<thead>
<tr>
<th>Year</th>
<th>From satellite</th>
<th>CEAG¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>64.3</td>
<td>65.9</td>
</tr>
<tr>
<td>2014</td>
<td>84.6</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>96.6</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>83.7</td>
<td></td>
</tr>
</tbody>
</table>

¹ CANSIM Table 004-0217.
Future opportunities for innovation at Statistics Canada

Nano-satellites

Drones

Precision agriculture data

Crowdsourcing
Thank you!

Please visit www.statcan.gc.ca for more information

#TalkingStats