Canadian agriculture: evolution and innovation

www.statcan.gc.ca

Telling Canada's story in numbers

CANADA 150

Talking Stats: Connecting. Collaborating. Learning.

Anil Arora
Chief Statistician of Canada

November 14, 2017

Winnipeg, Manitoba

Canada

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
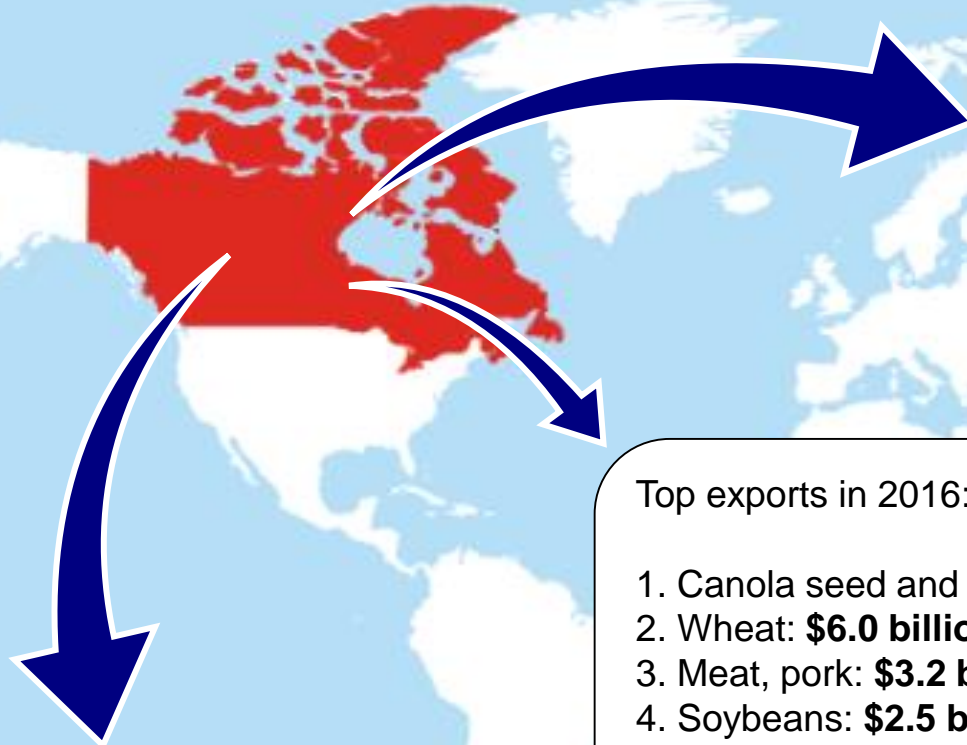 *Challenges and opportunities*

Evolution of the Canadian agriculture industry

Canada is a world leader in agriculture

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.

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.

Ranked 5th globally for agriculture export value in 2014

Source: Agriculture and Agri-Food Canada.

Canadian exports have grown

$28.1 billion

2016

$11.5 billion

1996

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:

Export	Value (million)	% of value exported by Canada
Canola seed	$1,928	34.0
Soybeans	$948	37.8
Flaxseed	$216	55.7

USA is the main export destination for:

Export	Value (million)	% of value exported by Canada
Meat, beef	$1,511	78.7
Meat, pork	$1,320	76.7
Greenhouse veg	$1,089	99.6
Maple	$236	61.9
Blueberries	$165	55.8

Japan is the main export destination for:

| Export	Value (million)	% of value exported by Canada
Wheat	$579	9.7

India is the main export destination for:

Export	Value (million)	% value exported by Canada
Dry peas	$595	41.5
Lentils	$523	24.6

Source: World Trade Atlas.

Contribution of the agricultural sector to the economy

percent of gross domestic product

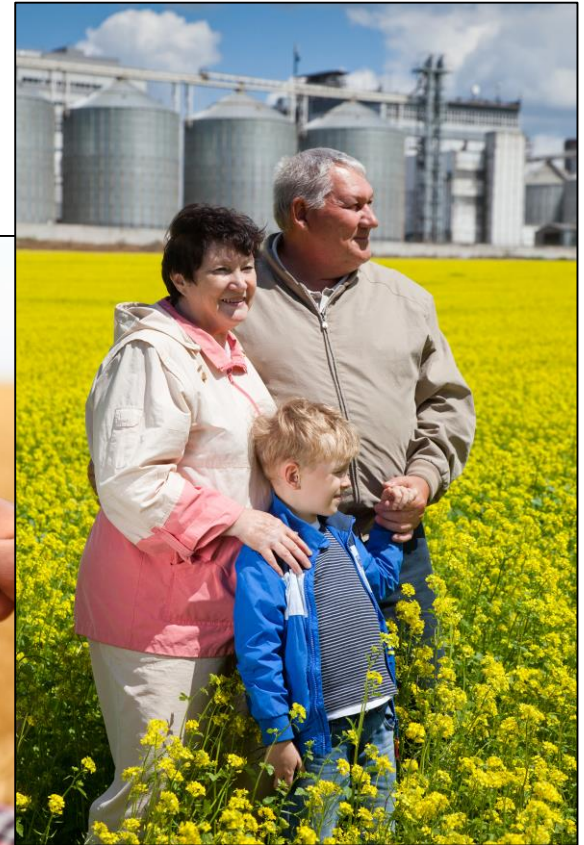|	N.L.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Canada
	2.9	10.3	4.0	4.9	4.5	3.8	10.3	13.5	4.0	3.4	4.6
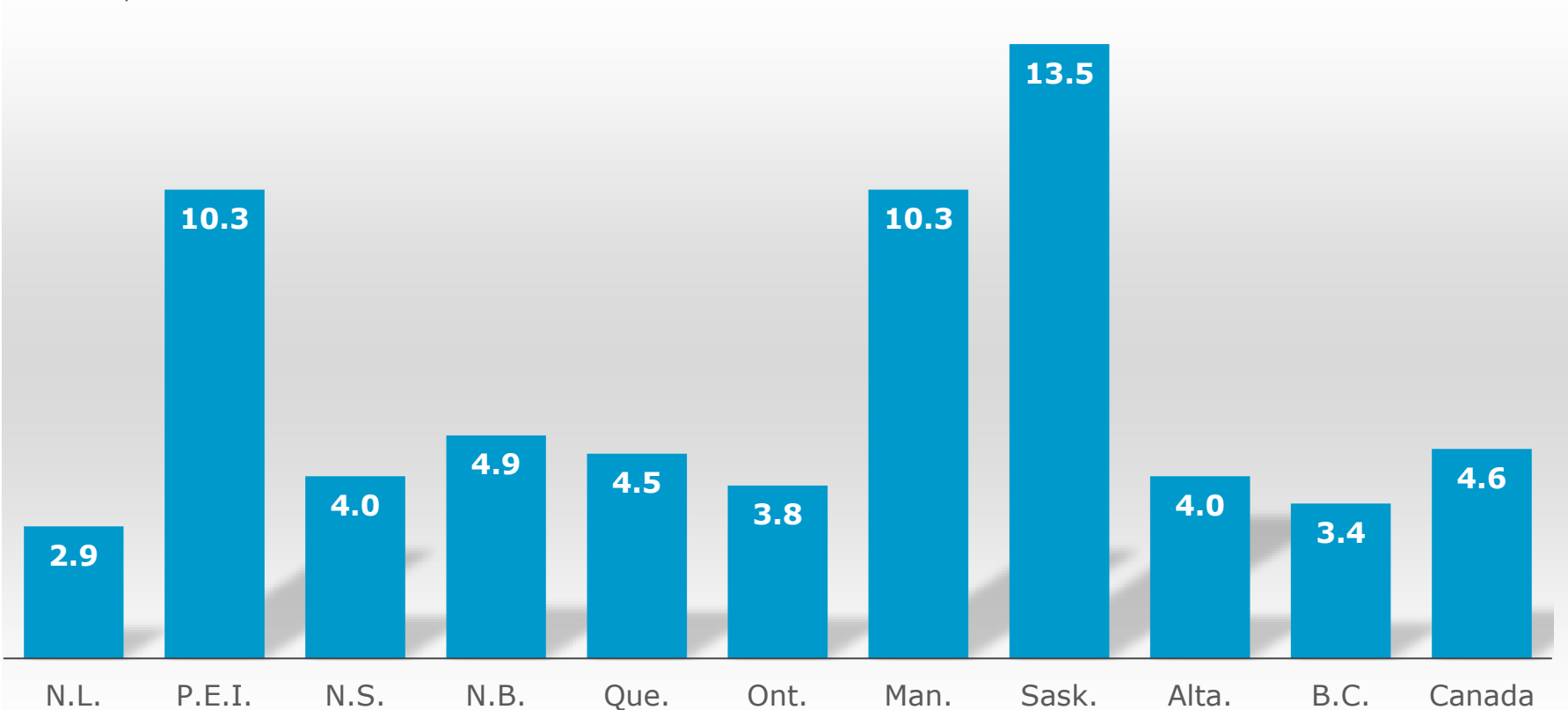
Source: Statistics Canada, 2013. Special tabulation, based on 2013 gross domestic product by industry.

Portrait of a 21st century farm operation:

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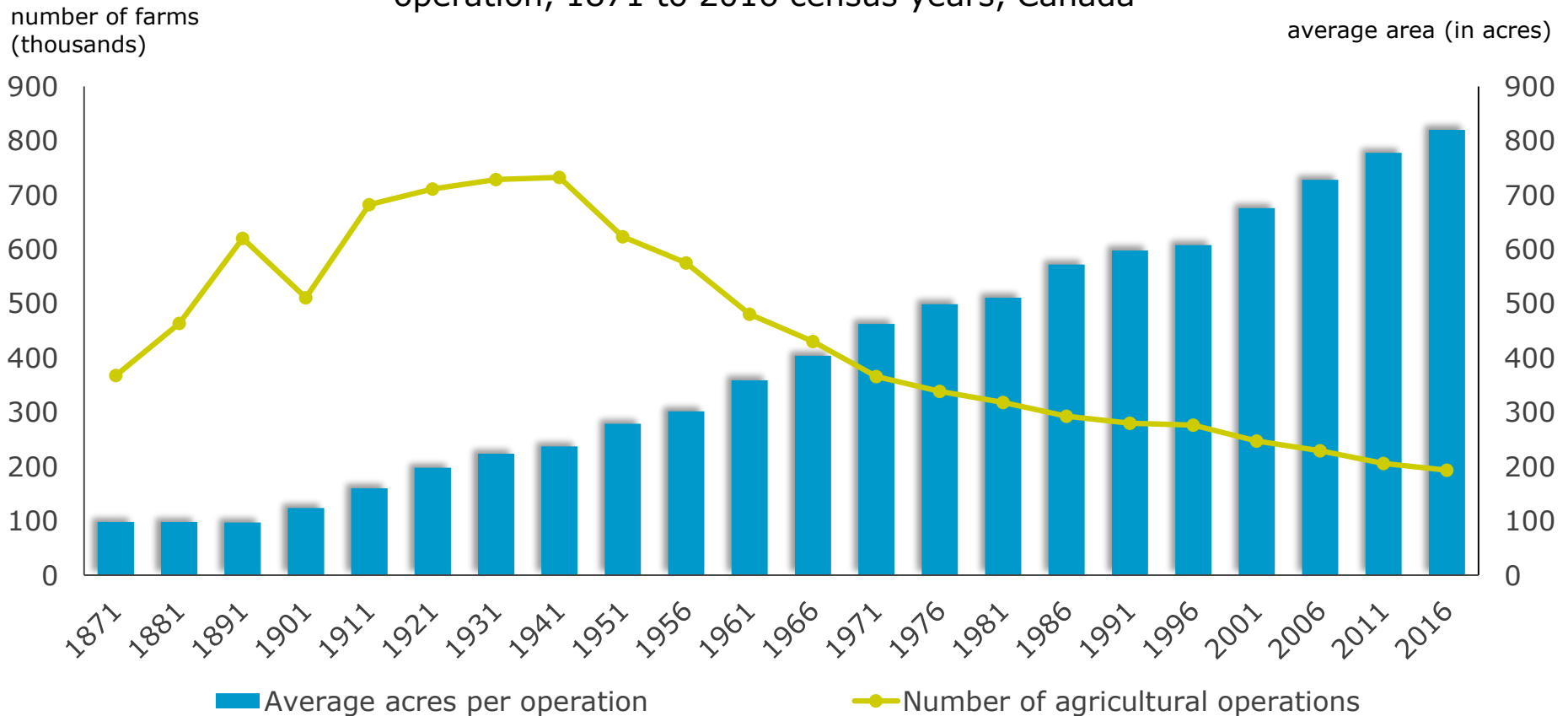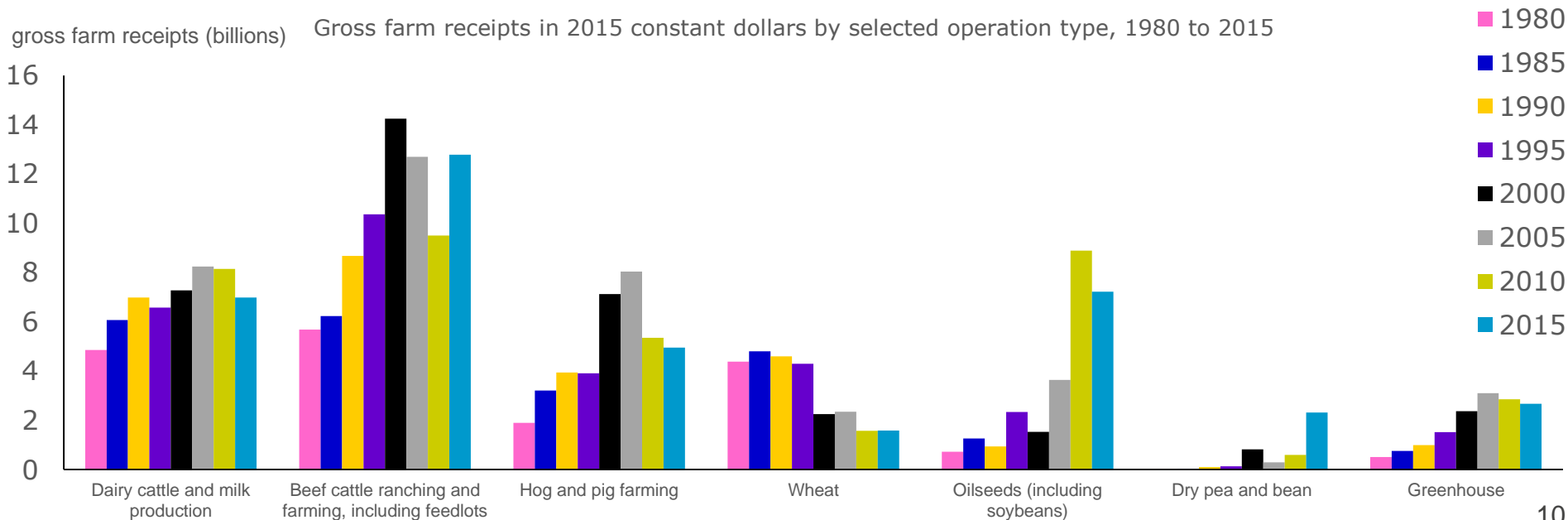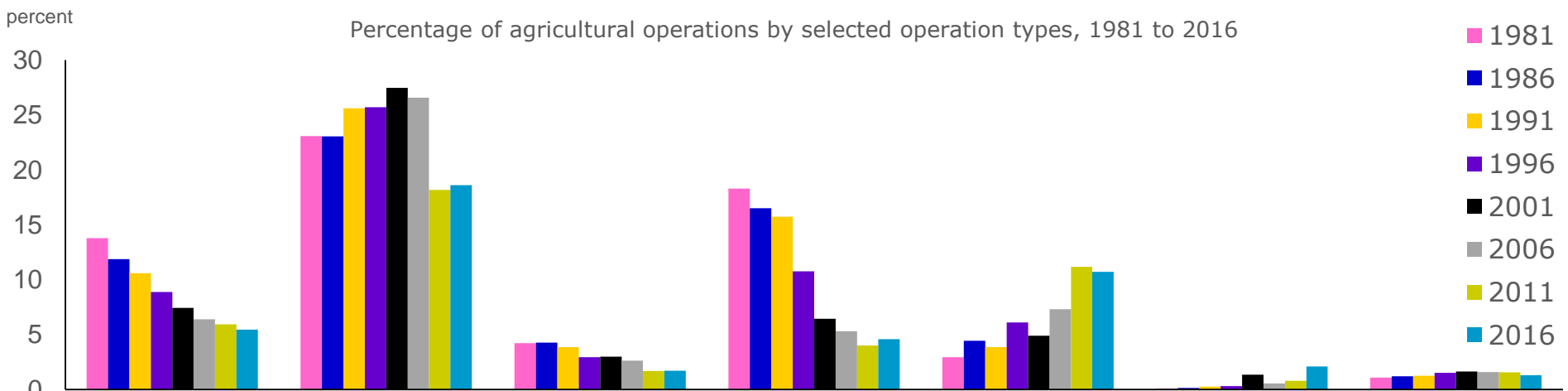
Fewer farms, but they are larger

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

Average acres per operation

Number of agricultural operations

Source: Census of Agriculture.

A shift in production: Evolution of farm type

percent

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

Legend (top chart):
- 1981
- 1986
- 1991
- 1996
- 2001
- 2006
- 2011
- 2016

gross farm receipts (billions)

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

Legend (bottom chart):
- 1980
- 1985
- 1990
- 1995
- 2000
- 2005
- 2010
- 2015

Categories: Dairy cattle and milk production | Beef cattle ranching and farming, including feedlots | Hog and pig farming | Wheat | Oilseeds (including soybeans) | Dry pea and bean | Greenhouse
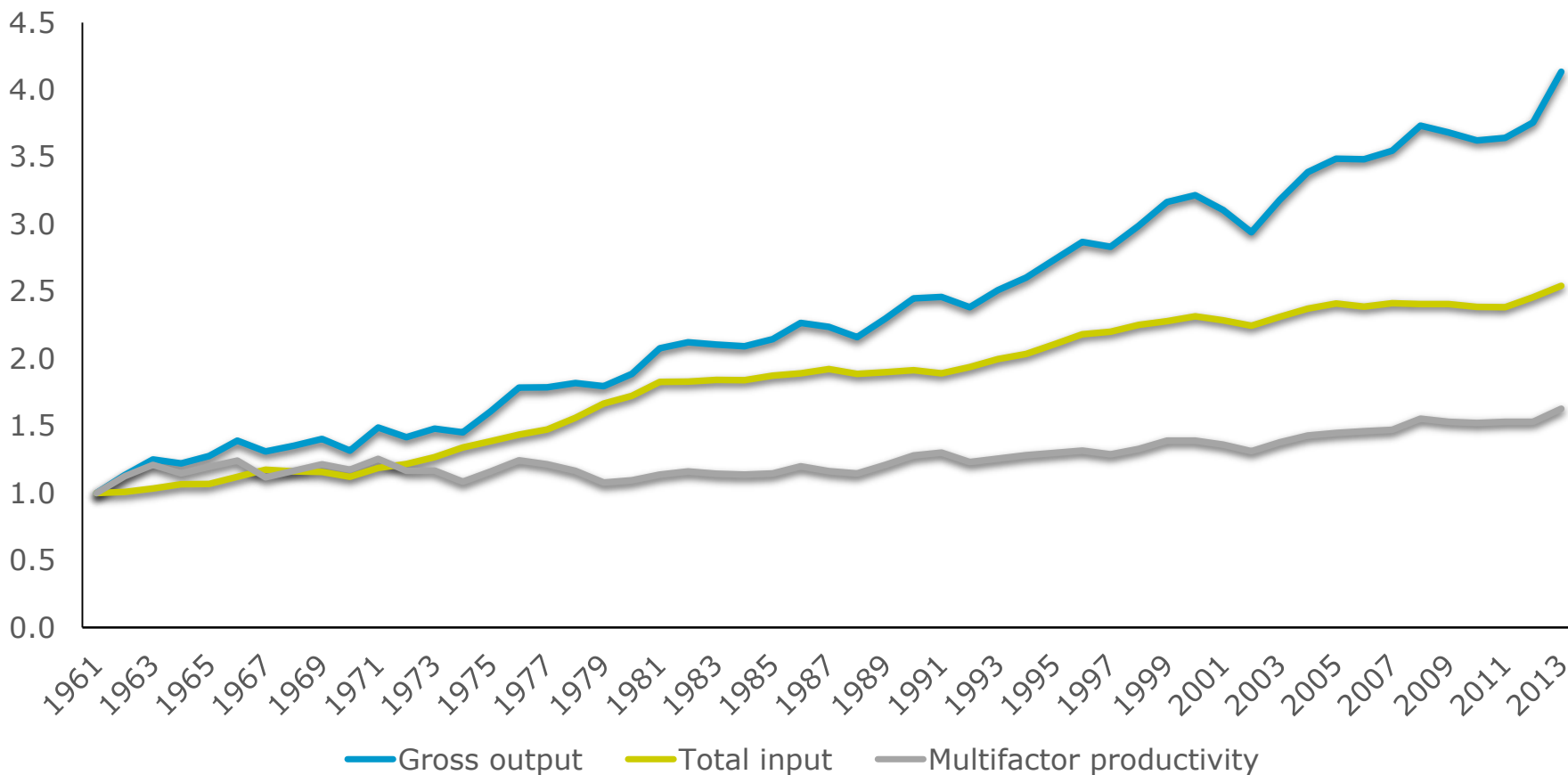
Source: Census of Agriculture.

Productivity growth in Canadian agriculture

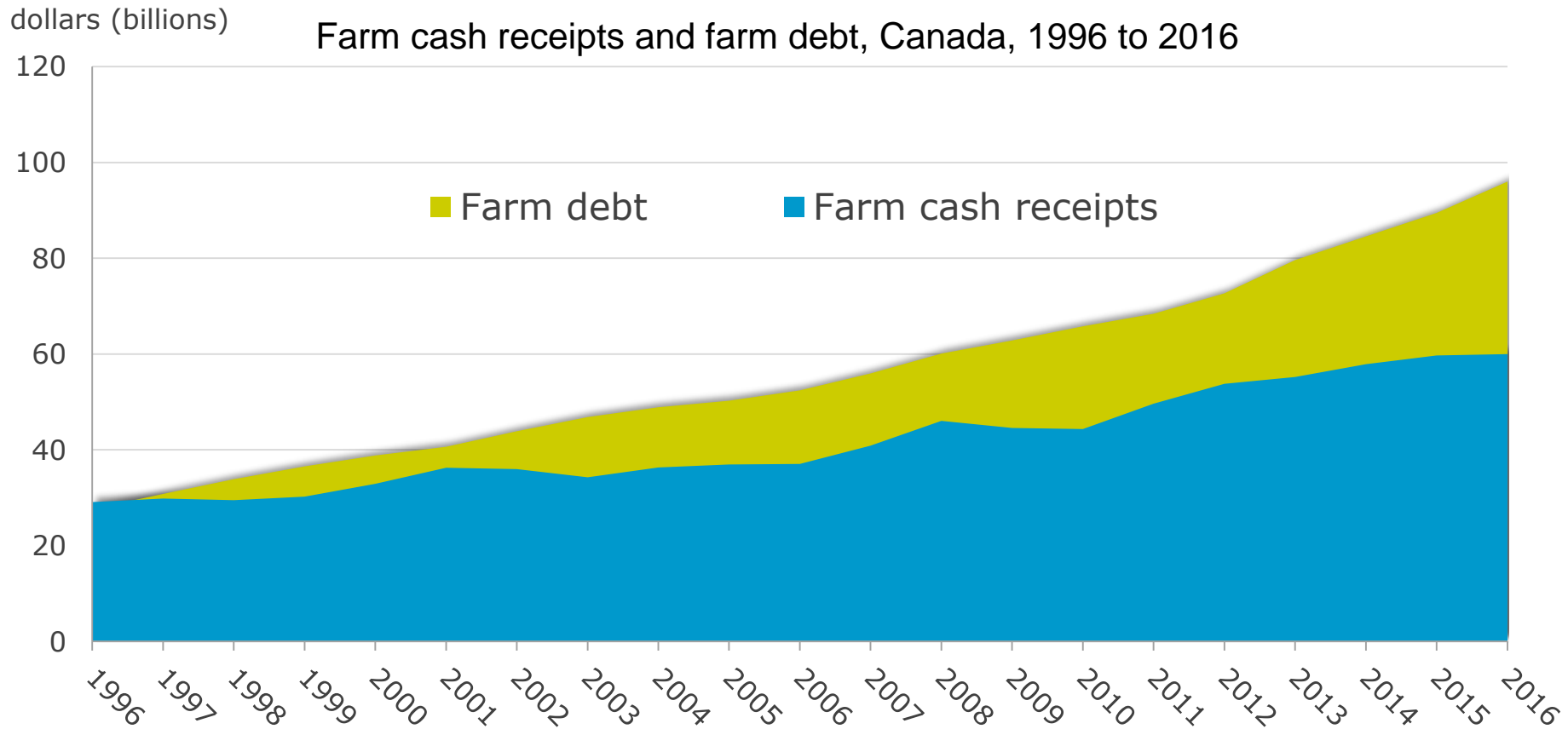Trend in output, input and productivity in Canadian agriculture, 1961 to 2013

index (1961=1)

Legend: Gross output, Total input, Multifactor productivity

Source: CANSIM 383-0032.

Farm cash receipts have increased alongside farm debt

dollars (billions)

Farm cash receipts and farm debt, Canada, 1996 to 2016

Legend: Farm debt, Farm cash receipts

Source: CANSIM 002-0008 and 002-0001.

Farmers invest in their business

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

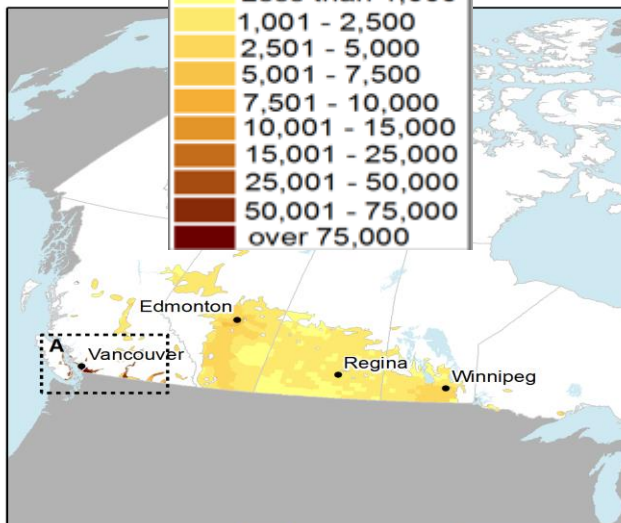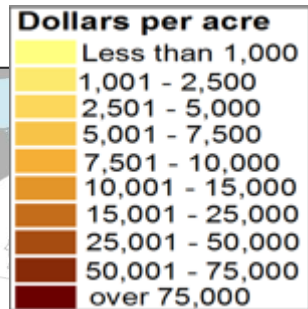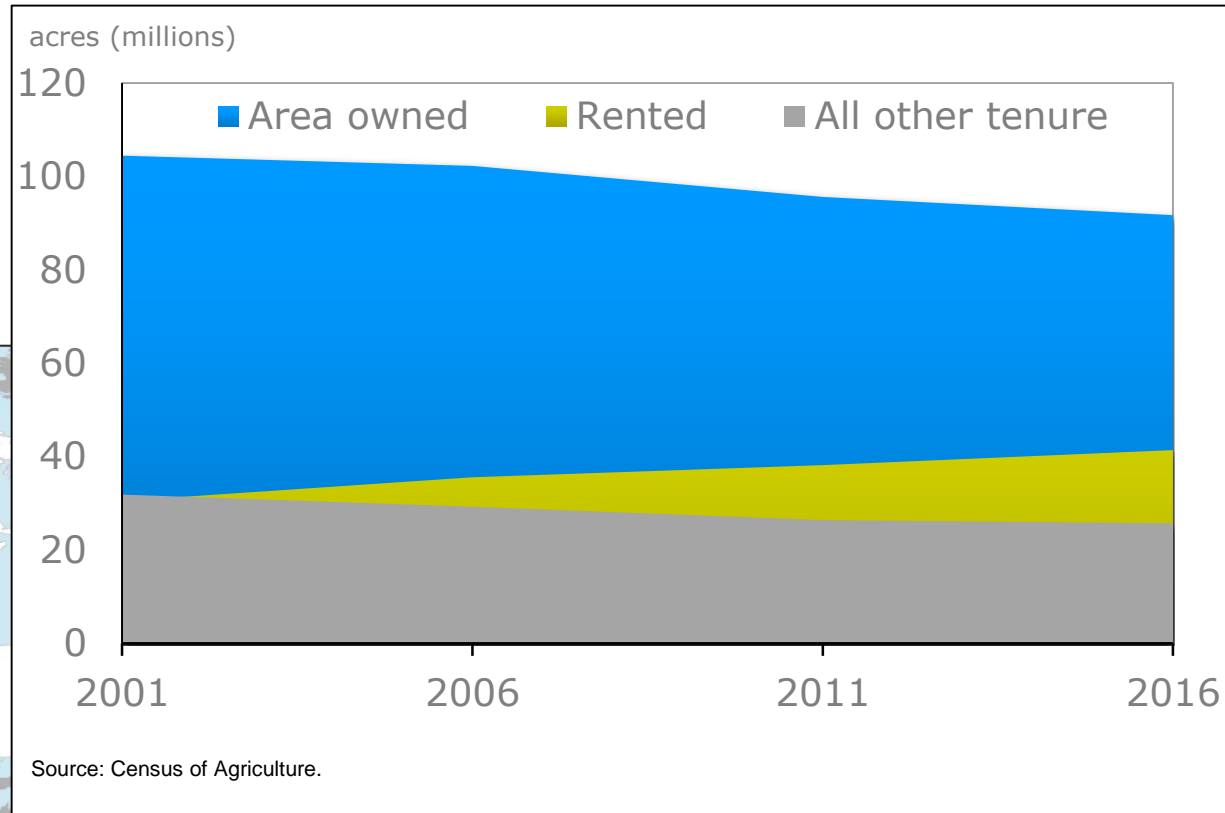| Year	Investment
2015	$133,887
2013	$117,684
2011	$115,778
2009	$107,350
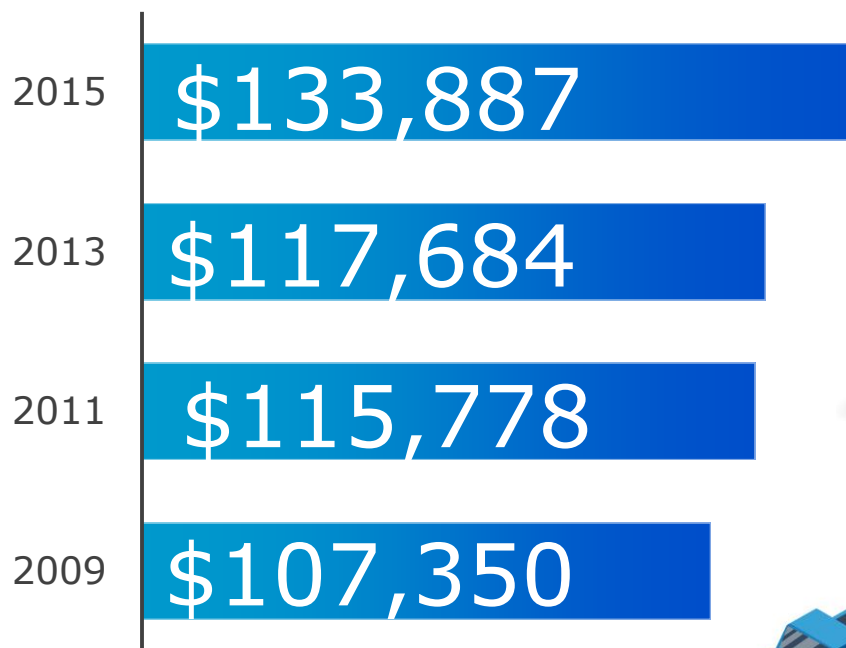
Source: CANSIM table 002-0074.

More farms renting land as prices rise

Land tenure, 2001 to 2016

Dollars per acre
- Less than 1,000
- 1,001 – 2,500
- 2,501 – 5,000
- 5,001 – 7,500
- 7,501 – 10,000
- 10,001 – 15,000
- 15,001 – 25,000
- 25,001 – 50,000
- 50,001 – 75,000
- over 75,000

acres (millions)

Area owned | Rented | All other tenure

120
100
80
60
40
20
0

2001   2006   2011   2016

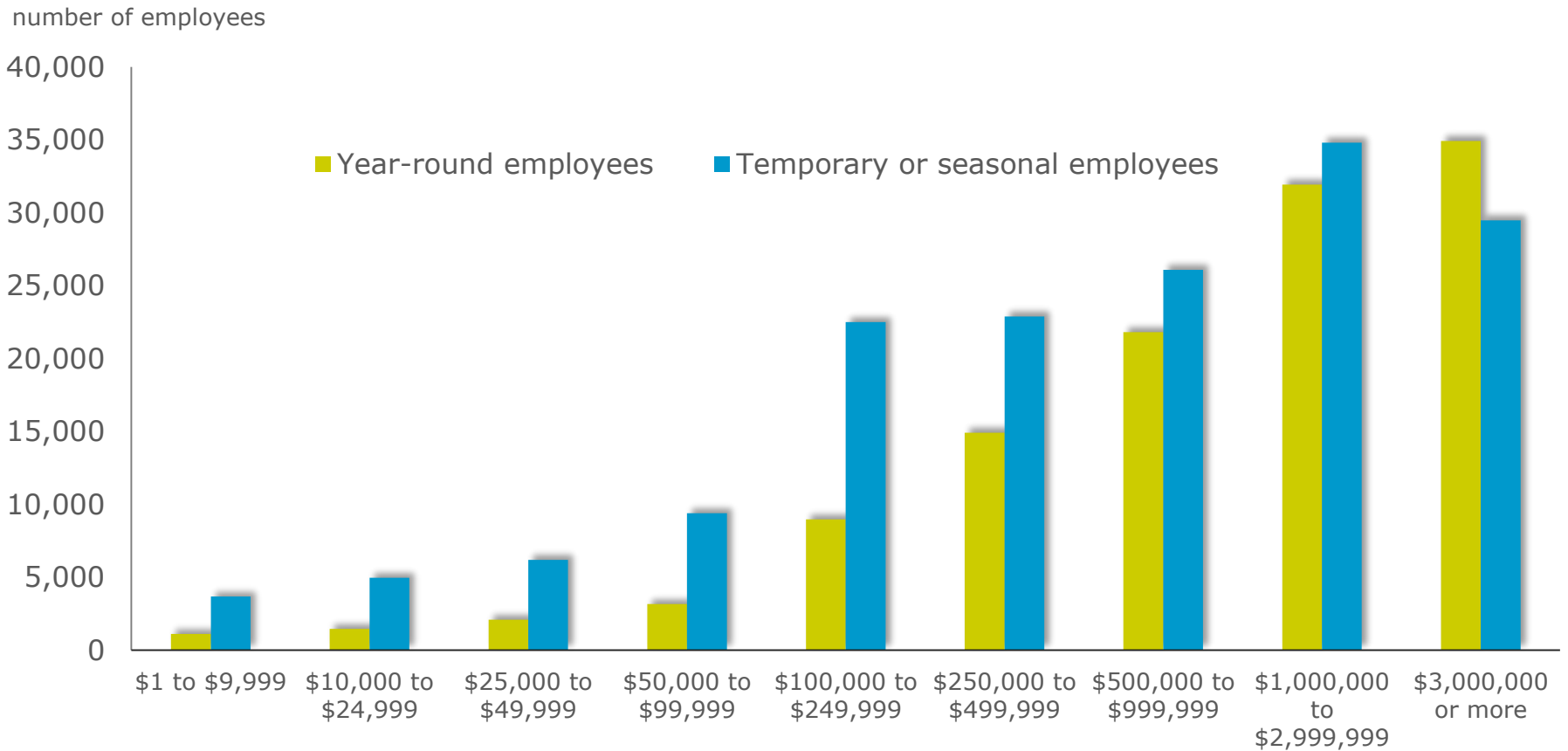Source: Census of Agriculture.

Value per acre, 2016

Source: Census of Agriculture.

14

Larger farms have more year-round employees

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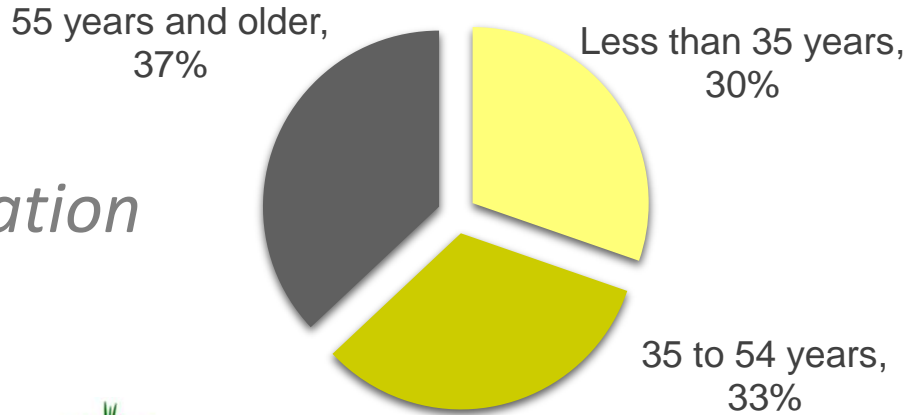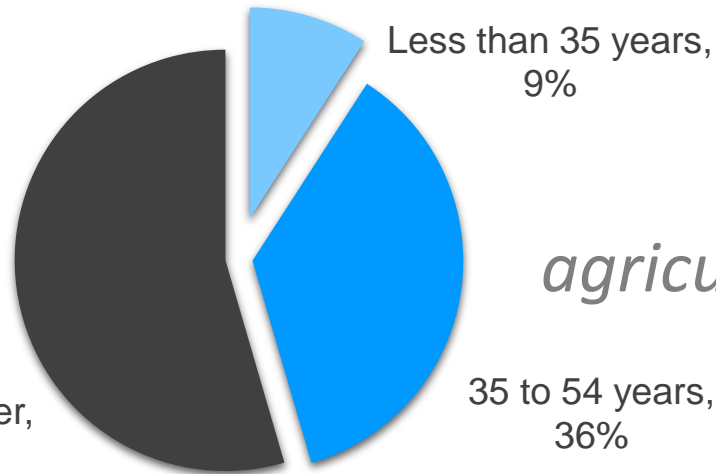
number of employees

Legend: ■ Year-round employees   ■ Temporary or seasonal employees

Source: Census of Agriculture.

Farmers are getting older

general population

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%

agriculture operators

55 years and older, 55%

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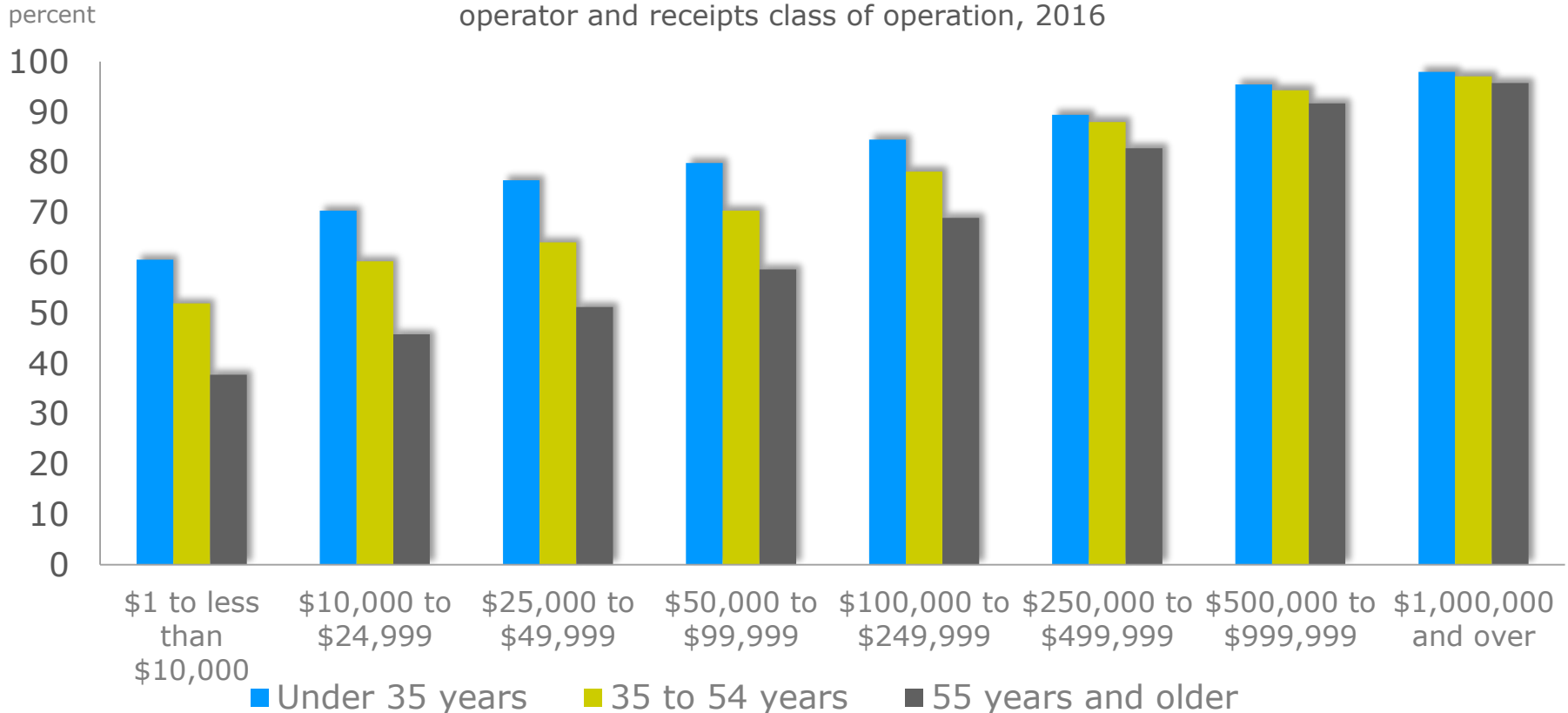
On large farms, older farmers are as likely to use technology

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

percent

Legend: Under 35 years | 35 to 54 years | 55 years and older

Receipts classes: $1 to less than $10,000 | $10,000 to $24,999 | $25,000 to $49,999 | $50,000 to $99,999 | $100,000 to $249,999 | $250,000 to $499,999 | $500,000 to $999,999 | $1,000,000 and over

Source: Census of Agriculture.

Canadian agriculture

Innovation in an evolving industry

Canadian farms are innovating
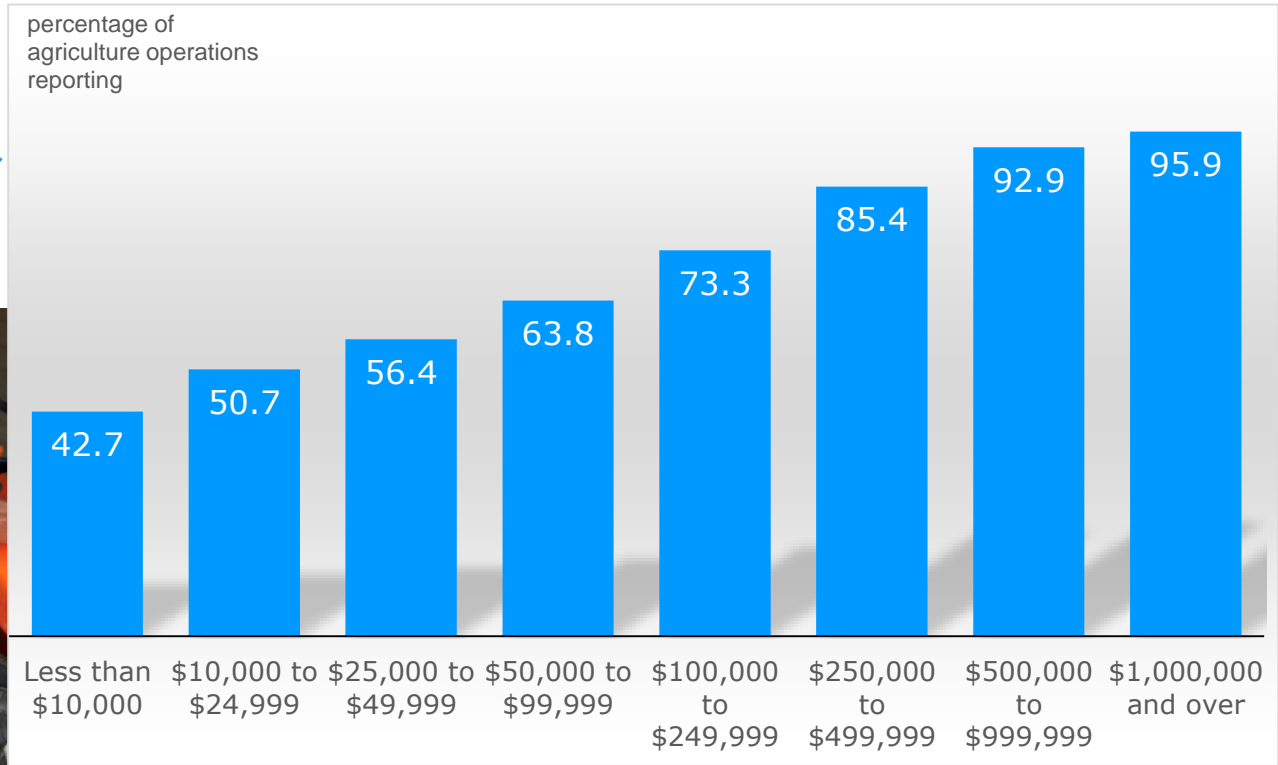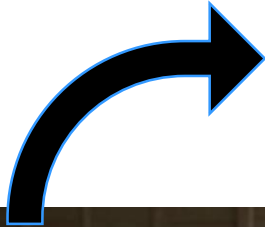
product *process* *organization* *marketing*

Technology allows farmers to manage larger operations

percentage of agriculture operations reporting

Category	Percentage
Less than $10,000	42.7
$10,000 to $24,999	50.7
$25,000 to $49,999	56.4
$50,000 to $99,999	63.8
$100,000 to $249,999	73.3
$250,000 to $499,999	85.4
$500,000 to $999,999	92.9
$1,000,000 and over	95.9

Source: Census of Agriculture.
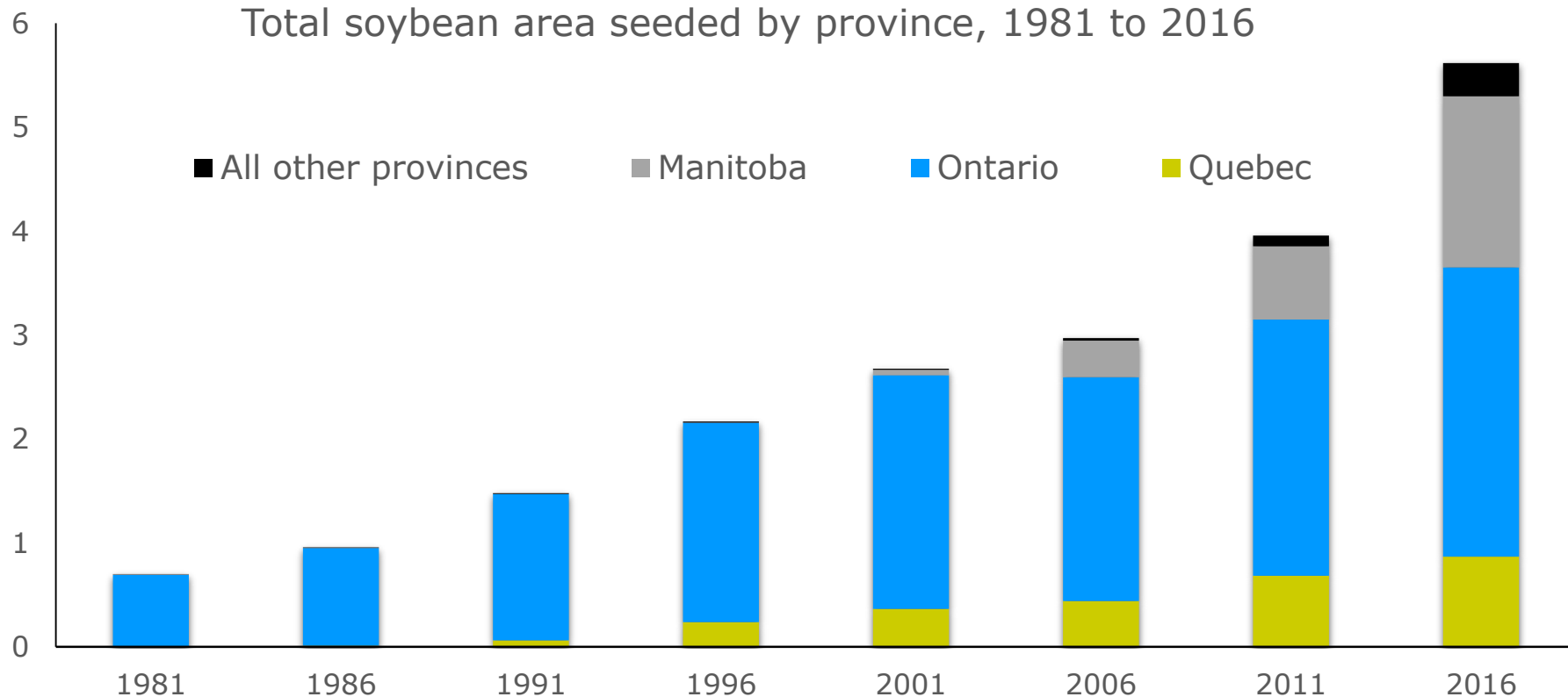
Crop farms grow with technology

Proportion of agricultural operations reporting selected technology by cropland acreage, 2015
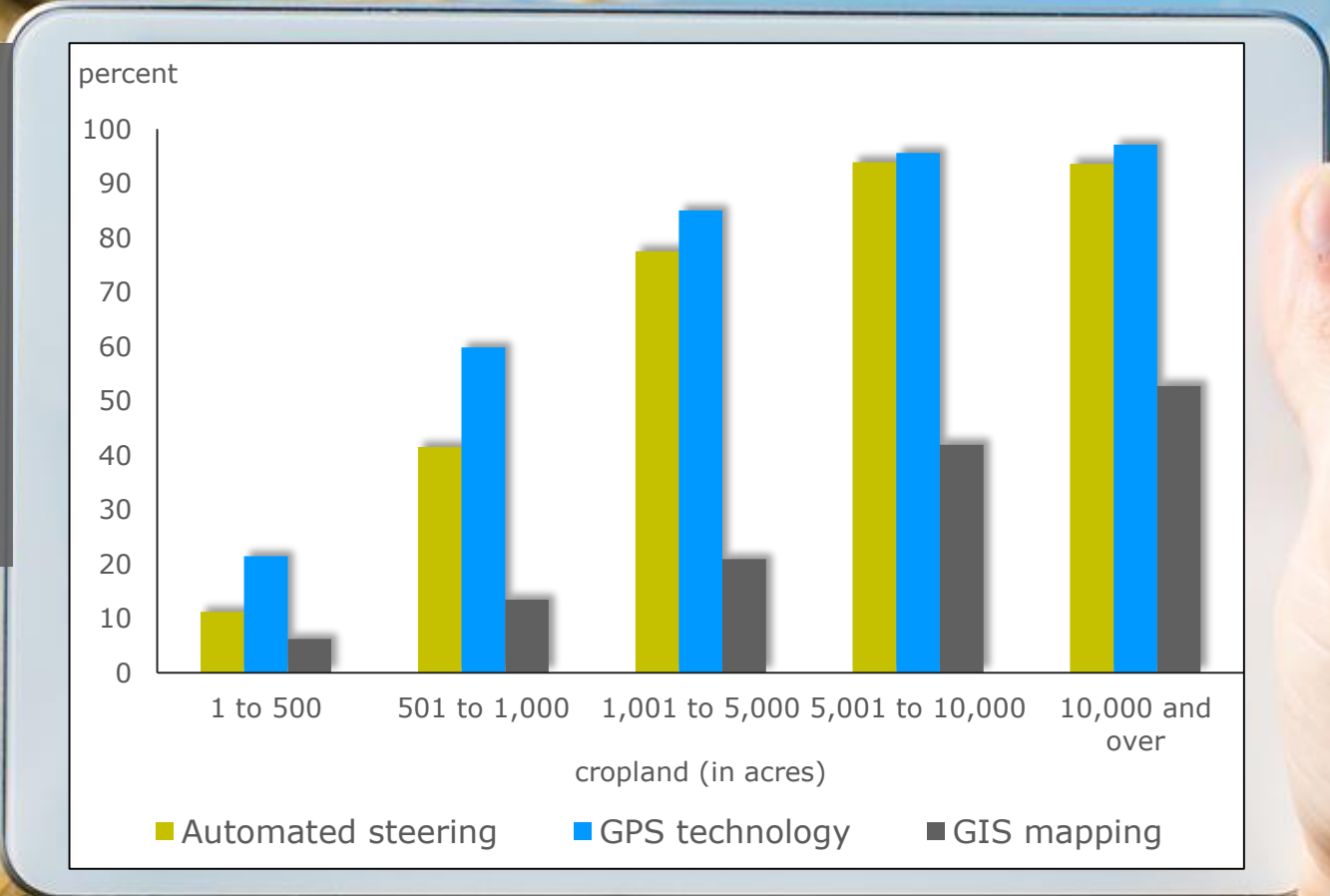
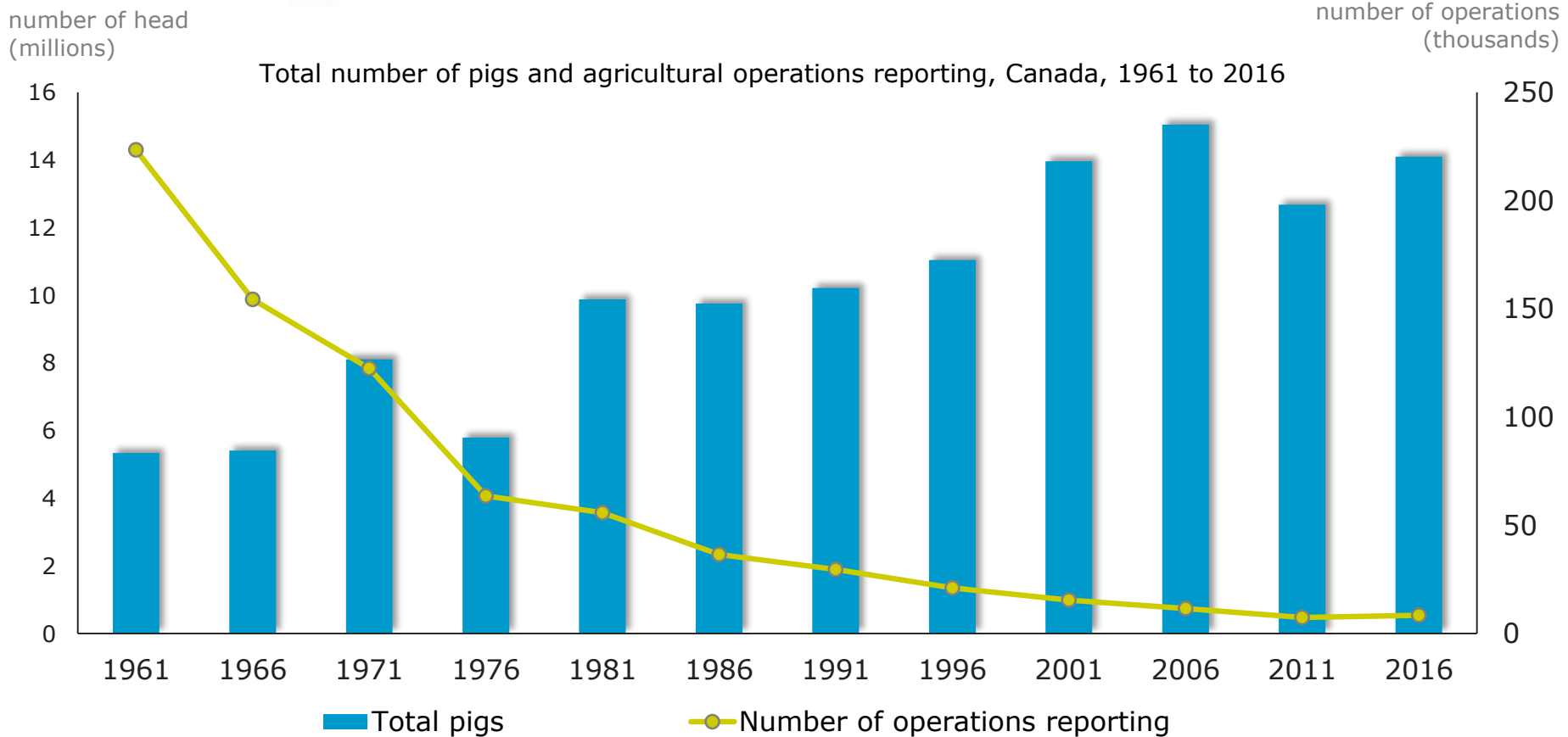# New crop varieties expand growing area

acres (millions)

Total soybean area seeded by province, 1981 to 2016

■ All other provinces   ■ Manitoba   ■ Ontario   ■ Quebec

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.

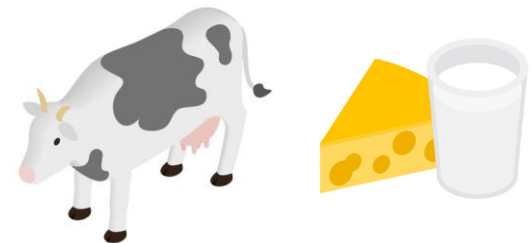# Innovation: Producing more with less

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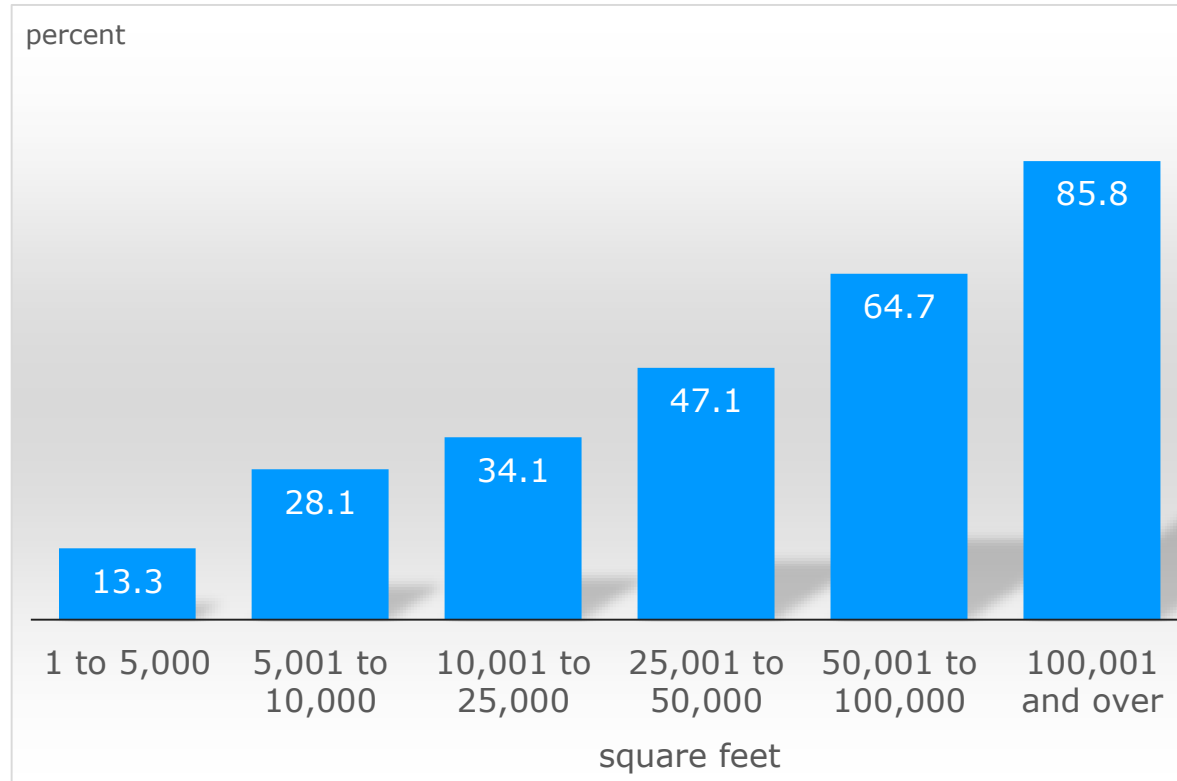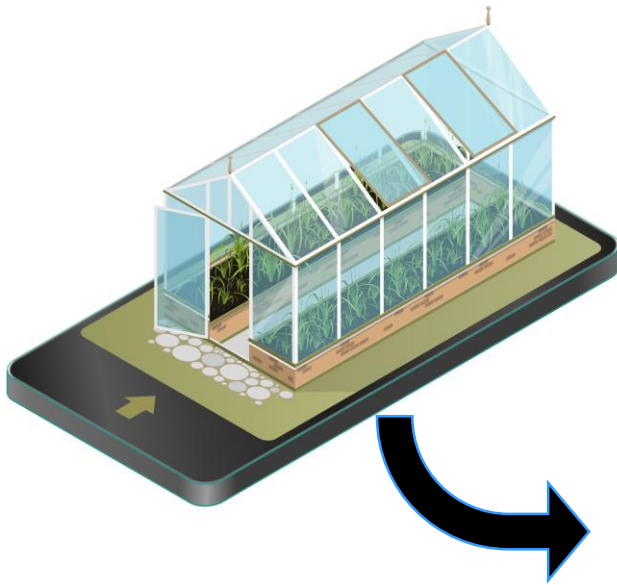Milk production: 7.3 million kilolitres

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

Source: CANSIM 002-0068.

Automation increases size of production
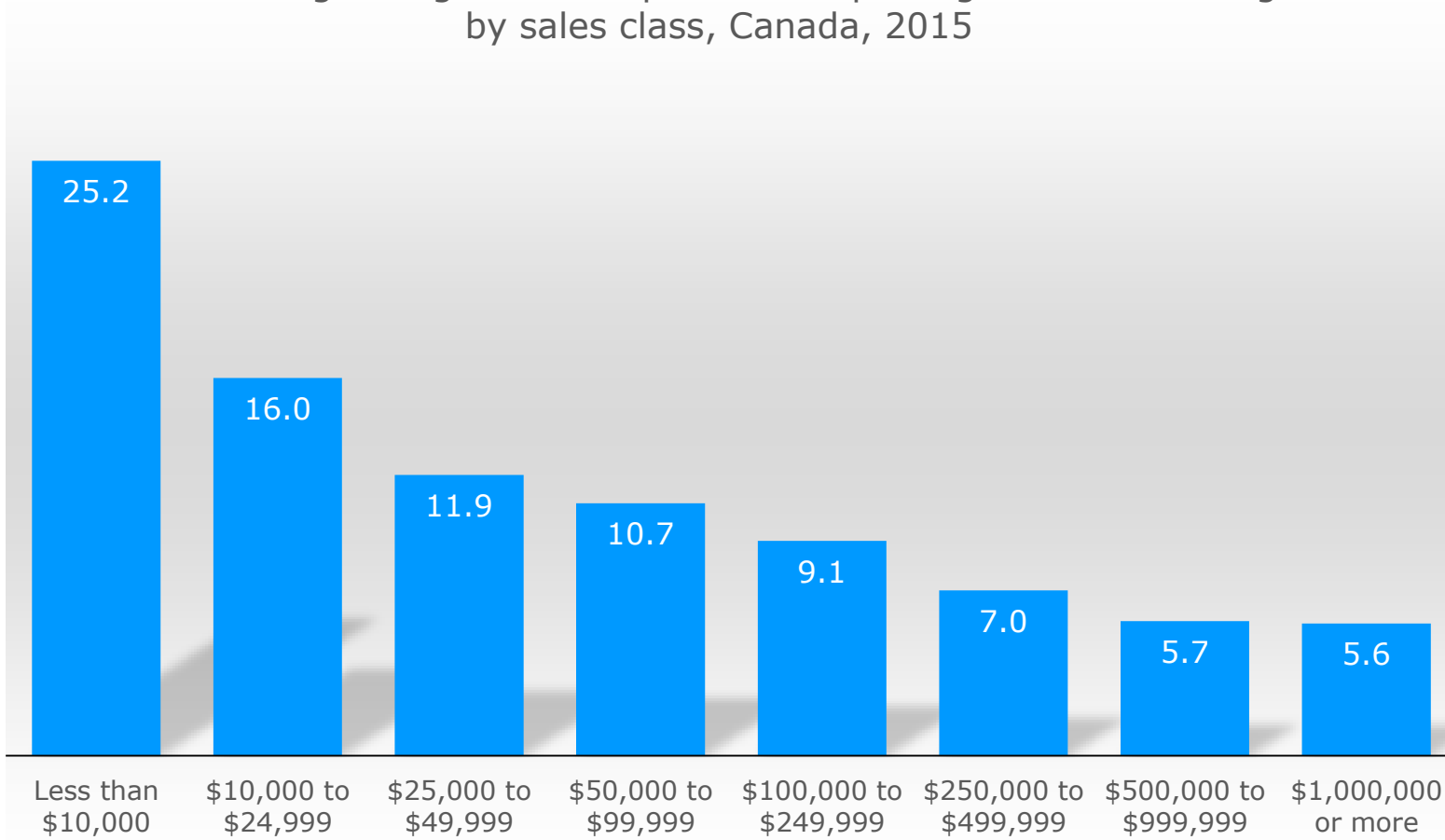

Proportion of greenhouse, nursery and floriculture type operations using greenhouse automation by square feet under glass, Canada, 2016

percent

Category	Percent
1 to 5,000	13.3
5,001 to 10,000	28.1
10,001 to 25,000	34.1
25,001 to 50,000	47.1
50,001 to 100,000	64.7
100,001 and over	85.8

square feet

Small farms innovate

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

percent

Sales class	Percent
Less than $10,000	25.2
$10,000 to $24,999	16.0
$25,000 to $49,999	11.9
$50,000 to $99,999	10.7
$100,000 to $249,999	9.1
$250,000 to $499,999	7.0
$500,000 to $999,999	5.7
$1,000,000 or more	5.6

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
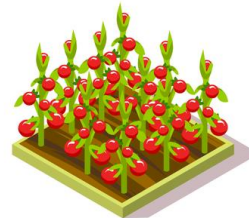
Hog and pig
8.2%

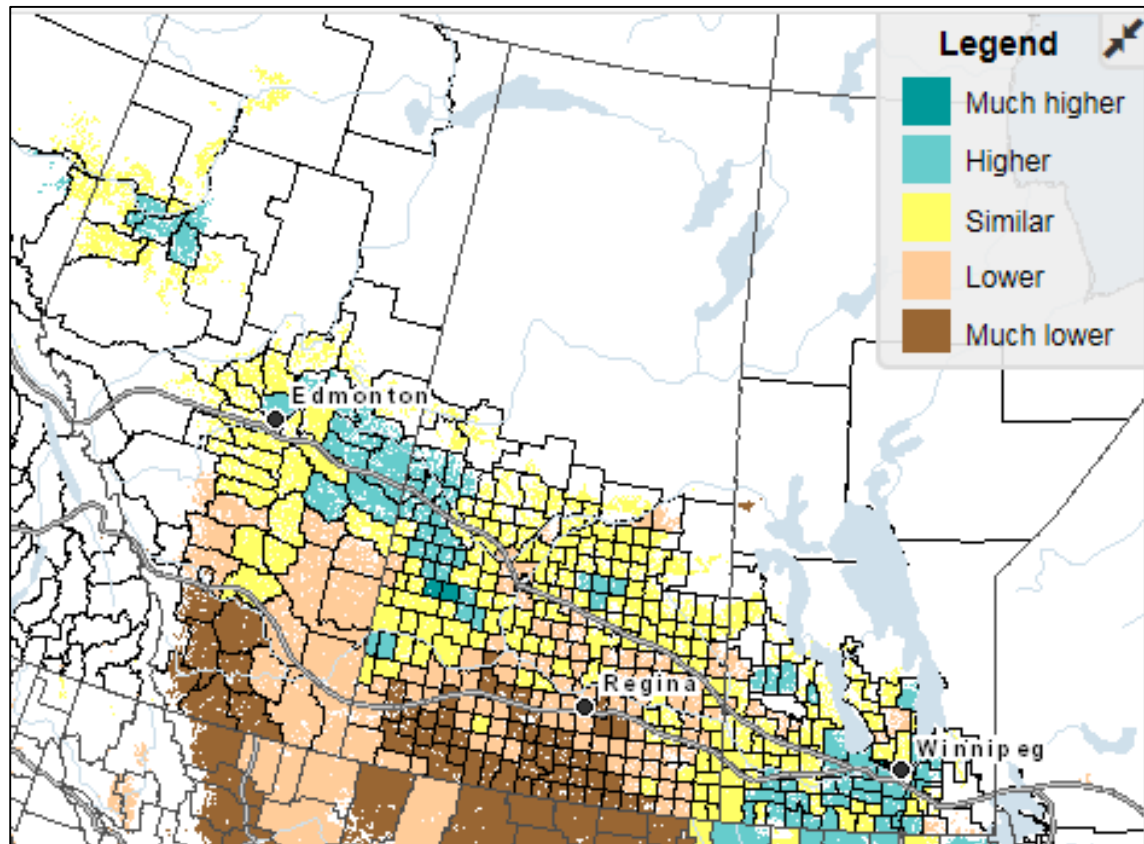Greenhouse
5.6%

Poultry and egg
8.1%

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)

Collecting data without contacting farmers

Yield model results

Crop	July Survey (bu/ac)	Yield Model[1] (bu/ac)	Difference (%)
Barley	63.2	64.0	1.3
Canola	35.2	38.1	8.2
Corn for grain	153.4	160.9	4.9
Flaxseed	19.6	19.4	-1.0
Mixed grains	58.5	58.4	-0.2
Oats	90.0	93.2	3.6
Peas, dry	34.4	35.0	1.7
Rye, fall	50.8	51.9	2.2
Soybeans	39.3	42.2	7.4
Wheat, durum	28.1	31.0	10.3
Wheat, spring	44.4	47.2	6.3
Wheat, winter	73.9	73.9	0.0

Partnership:
Statistics Canada
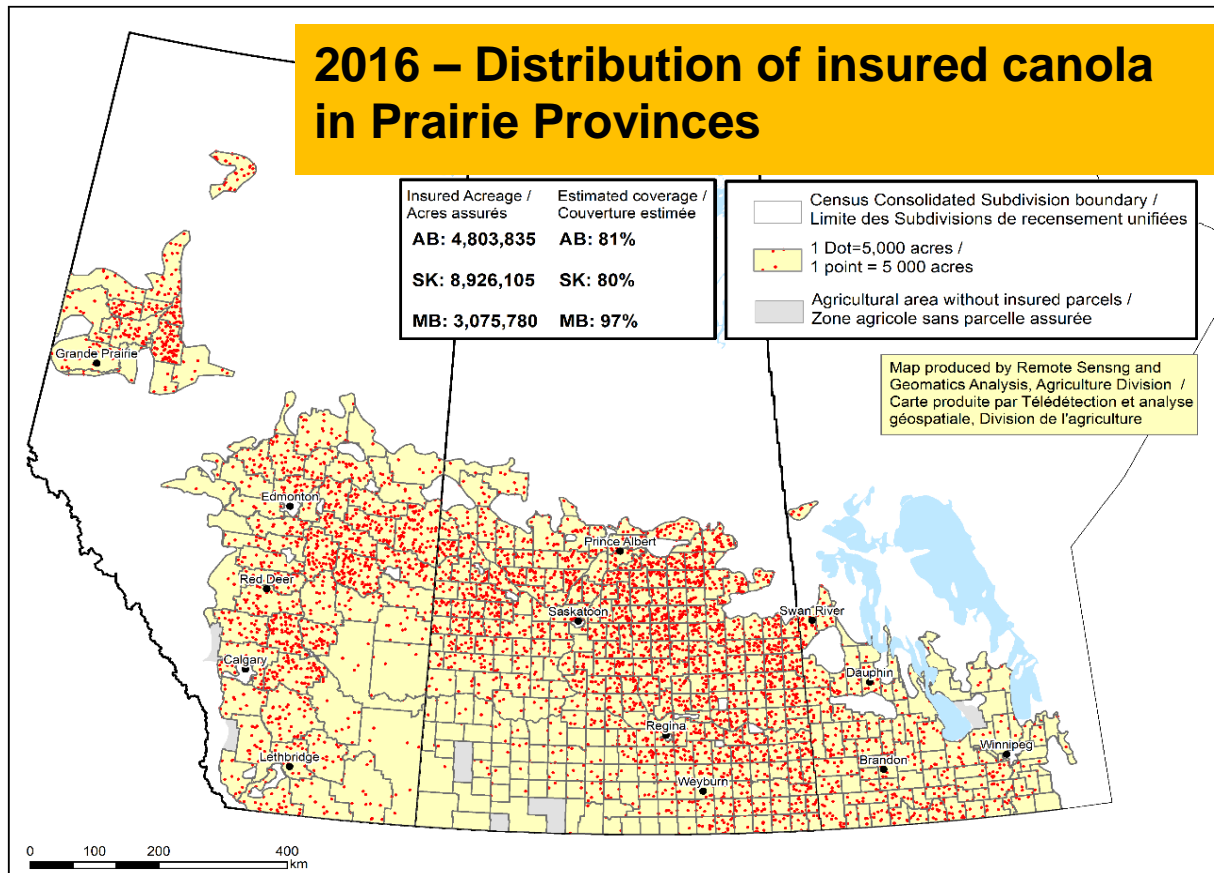Agriculture and Agri-Food
Canada
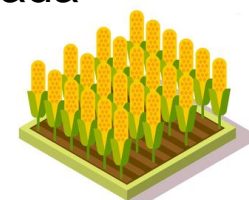
Three data sets:
1. Satellite data
2. Agro-climatic data
3. Historical yield estimates

[1] CANSIM Table 001-0075.

Innovative ways to use alternative data

2016 – Distribution of insured canola in Prairie Provinces

Insured Acreage / Acres assurés	Estimated coverage / Couverture estimée
AB: 4,803,835	AB: 81%
SK: 8,926,105	SK: 80%
MB: 3,075,780	MB: 97%

Census Consolidated Subdivision boundary / Limite des Subdivisions de recensement unifiées

1 Dot=5,000 acres / 1 point = 5 000 acres

Agricultural area without insured parcels / Zone agricole sans parcelle assurée

Map produced by Remote Sensng and Geomatics Analysis, Agriculture Division / Carte produite par Télédétection et analyse géospatiale, Division de l'agriculture

- High accuracy

- 70-98% coverage, varying by crop type and province

- Shared with Statistics Canada since 2015

Looking forward:

Challenges and opportunities

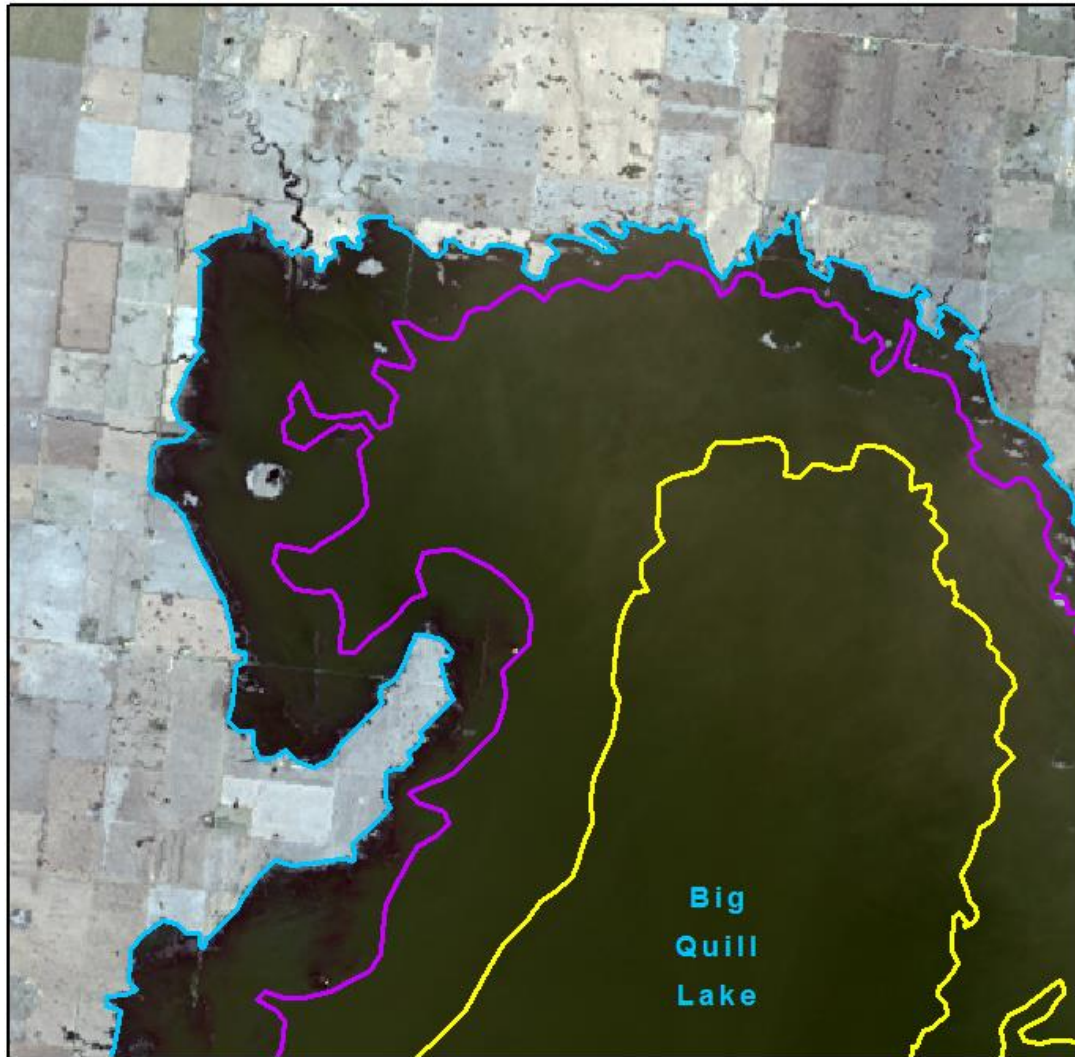# Innovation will continue to shape the agriculture industry

The future of Canadian agriculture

Transportation

Demographics

Research and development

Land values

Environment

Labour

The future of Canadian agriculture

Background satellite image

2017

The future of Canadian agriculture

Global markets

Regulation and policies

Technology

Prices

Trade agreements

Agriculture surveys

Census of Agriculture

Agriculture data at Statistics Canada

Satellite data

Administrative data

Greenhouse identification and area estimates using satellite data

Estimating area

Kingsville

Leamington

5 km   ■ Greenhouse

Background imagery: Rapideye 5m resolution, April 16, 2016, true colors

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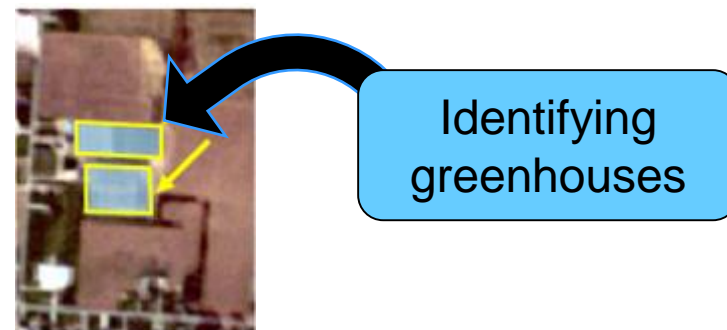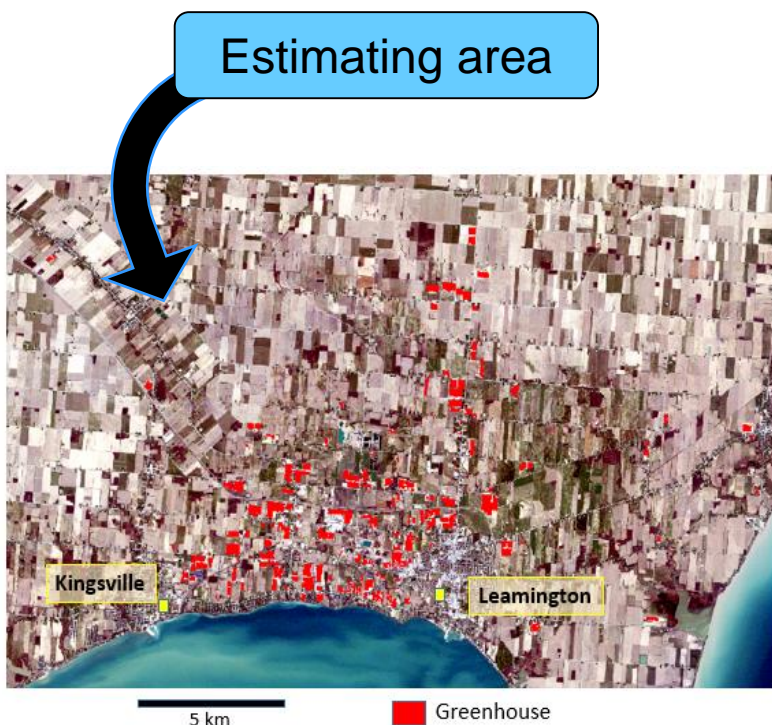
Comparison of greenhouse area between satellite and the Census of Agriculture for Leamington/Kingsville area

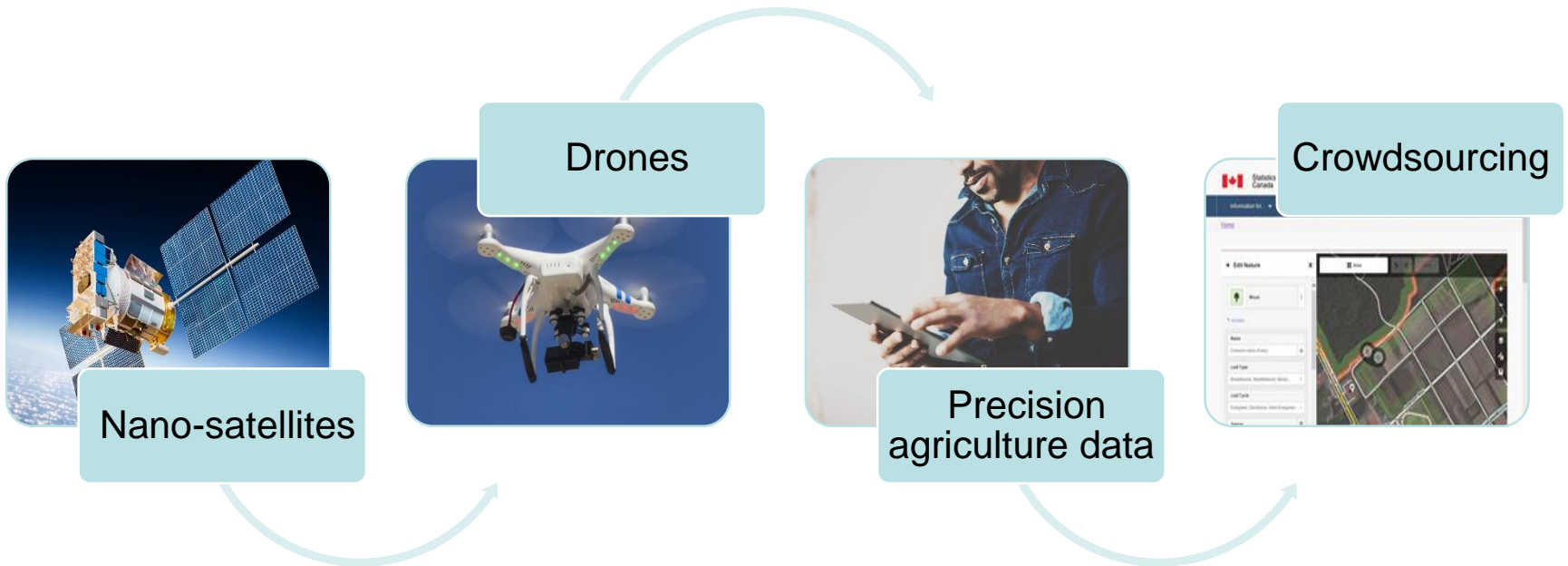| Year	Greenhouse area (million square feet)	
	From satellite	CEAG[1]
2011	64.3	65.9
2014	84.6	
2015	96.6	
2016		83.7

[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