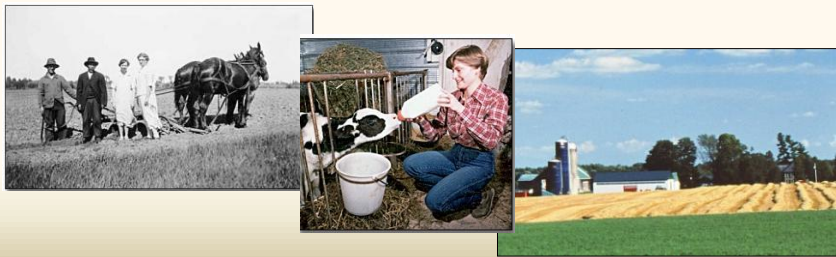




Long-term Transformational Agricultural Change in Rural Ontario

Paul Smith



1

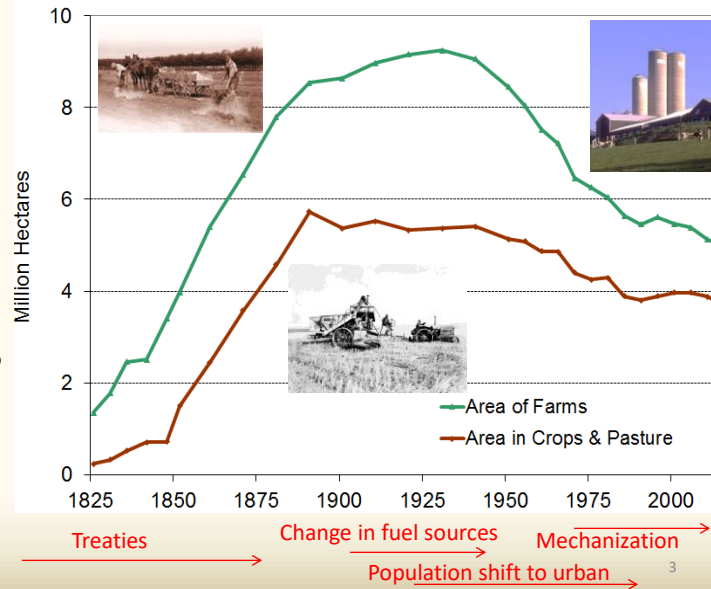
Outline

- Long-term trends in agricultural land use and agri-environmental variables.
- Use the data to tell the story of change in rural Ontario.
- Compare with change in other provinces, US, Europe and beyond where data available.
- Inform evidence-based agri-environmental policy.
- Variety of data: Census, fertilizer sales, pesticide survey, stewardship statistics
- Variety of time frames depending on data set, e.g. 1826-2016, 1976-2016

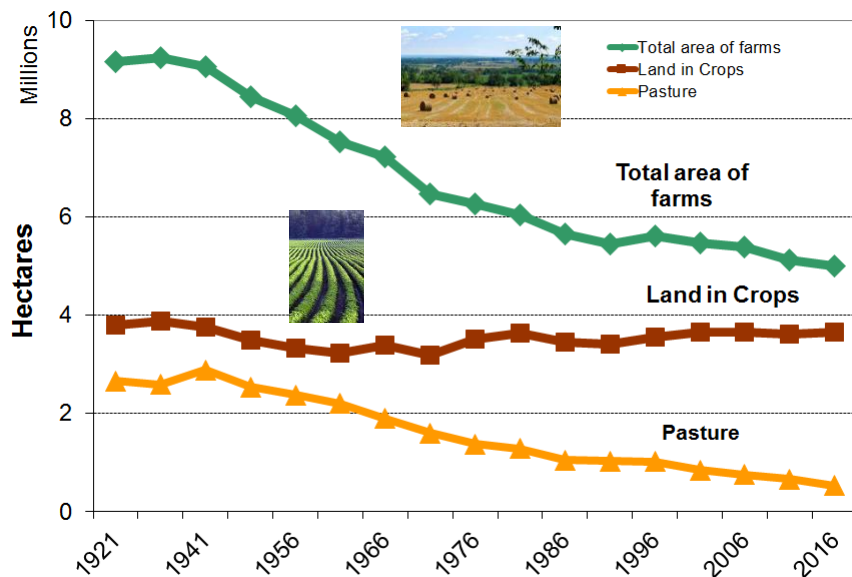
2

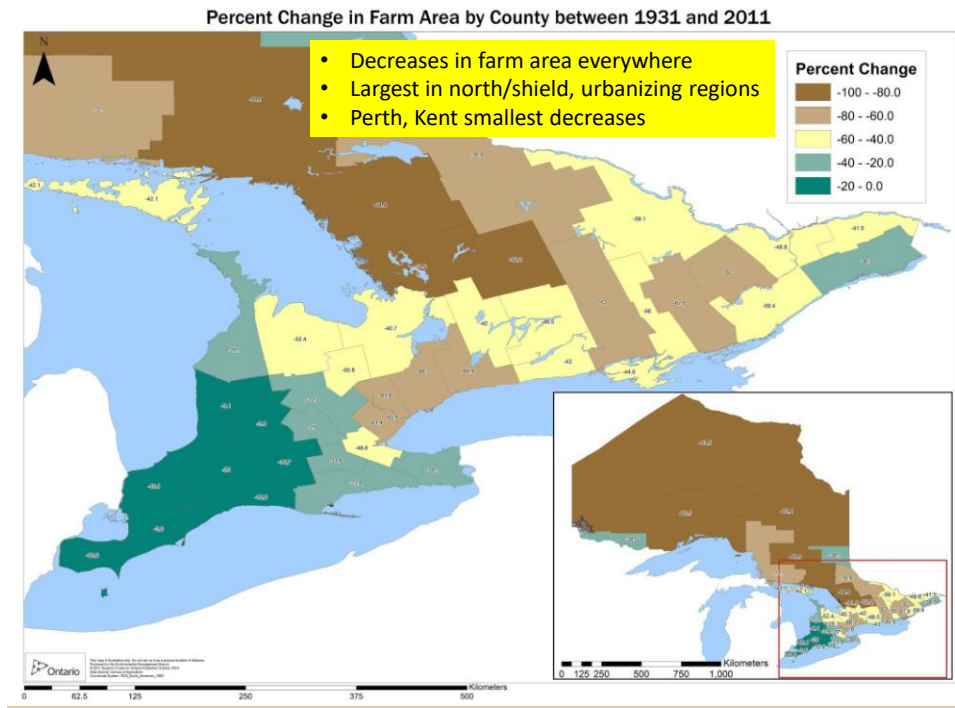
Ontario Farm Area 1826-2016

- First Nations agriculture significant pre-contact
- Post-contact growth of agriculture to 1931
- 45.9% drop in farm area 1931-2016
- 10.1% to 5.6% of Ontario area
- 61% to 35% of southern Ontario
- Continued small declines in farm area
- Remarkable production boosts



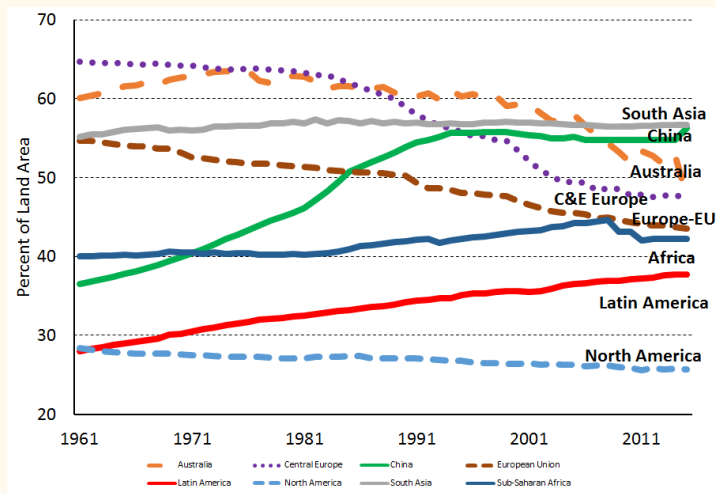
Ontario Farm, Crop & Pasture Area 1921-2016





Global Trends in Farmland

- Major decrease in farmland in many OECD nations
- Increased production on smaller footprint
- Increases in farmland in many developing nations
- China & India more complex
- Major farmland abandonment in former Soviet countries

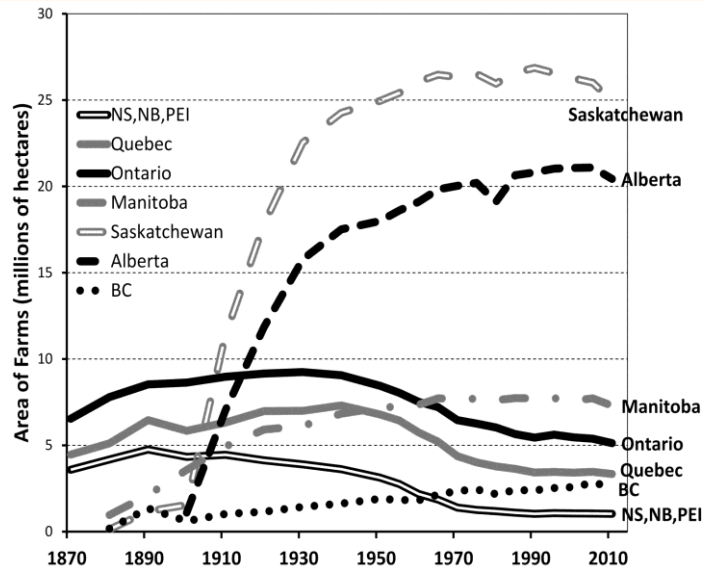


Source: World Bank 2018



Farm Area Trends - Provinces

- Distinct eastern + western patterns
- Earlier eastern peaks in early 20th century
- Western peaks in late 20th century
- Similar in USA
- Reflects colonial history
- Major decrease in farm area & cropland in many OECD nations
- Increases in developing nations

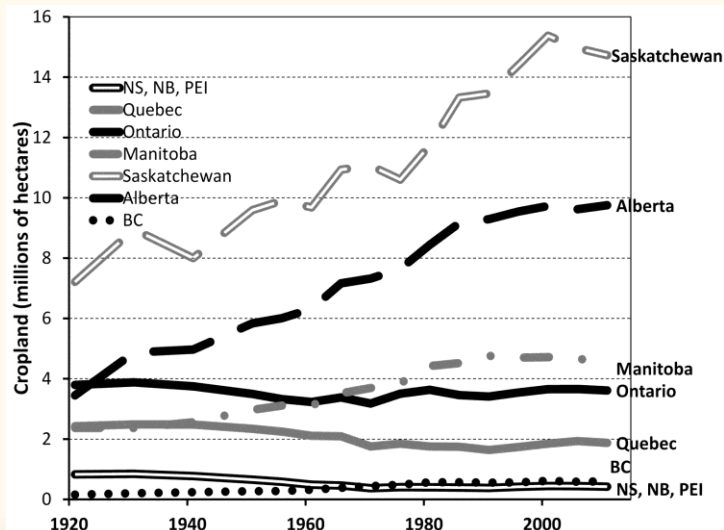


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Cropland Trends - Provinces

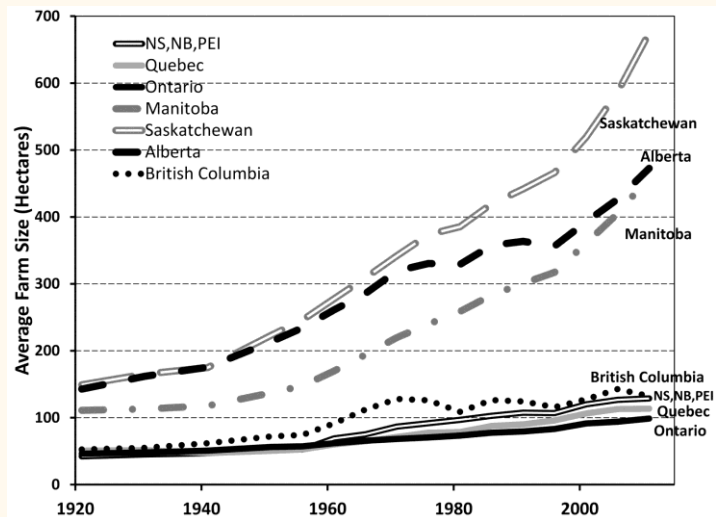
- Distinct eastern + western patterns
- Stable or declining in east
- Western peaks in late 20th century
- Similar to Farm Area trends



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Average Farm Size Trends - Provinces

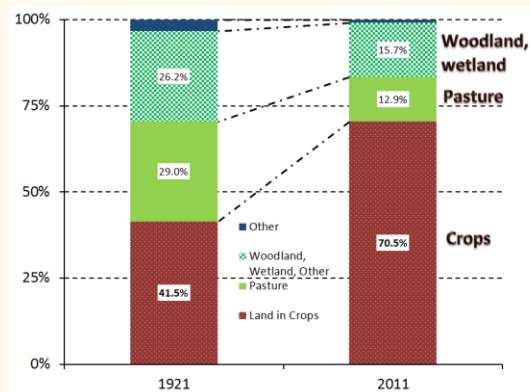
- Farm size often discussed
- Size is of limited value in overall trends
- Ontario has smallest AVERAGE farm size, except NL
- Similar to farm size in NE USA and UK
- Economic phenomenon across all sectors
- Masks trends by sector



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Change in Farm Land Use

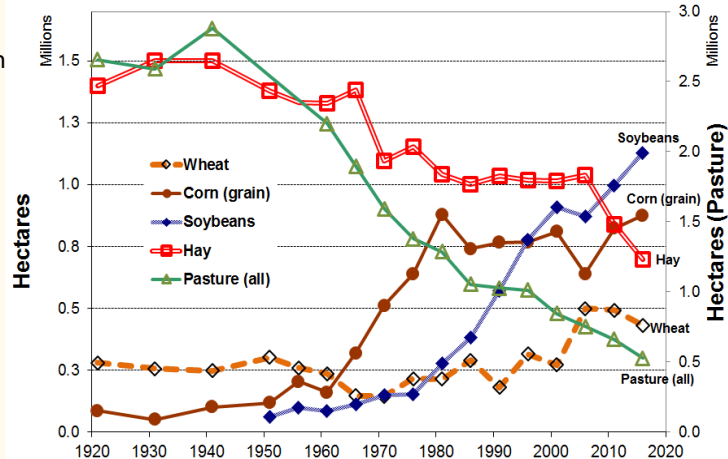
- 1921-2011 large shift in composition of farmland
 - More crops, less pasture, woods & wetland
- Mechanization, fuel switching a significant factor
- Decreases in relative amount of woodland & wetland on farms
- Not necessarily loss of the habitat
- More forest now overall, especially north, east & central
- Shift in who owns these non-production lands
- Large growth in non-farm rural landowners



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Ontario Field Crops 1921-2016

- Shift toward annual crops
- Soybeans, corn
- Cereals stable
- Enormous increases in yield
- Decreases in hay, pasture
- Linked to livestock change
- Major trend
- Simplified rotations

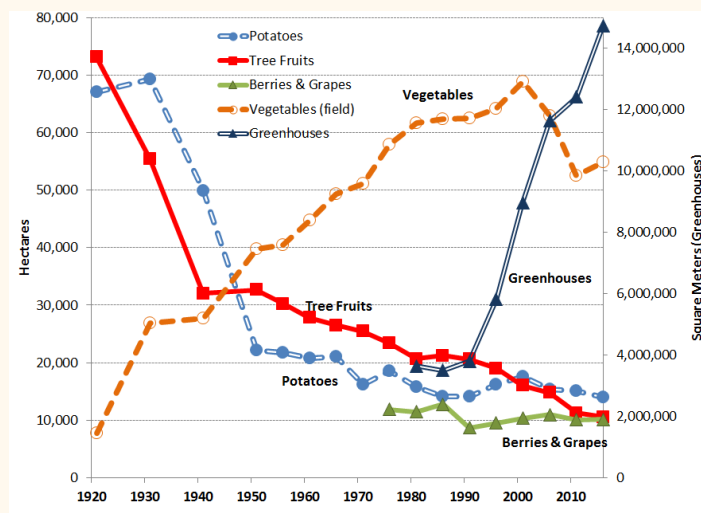


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Horticulture crops 1921-2016

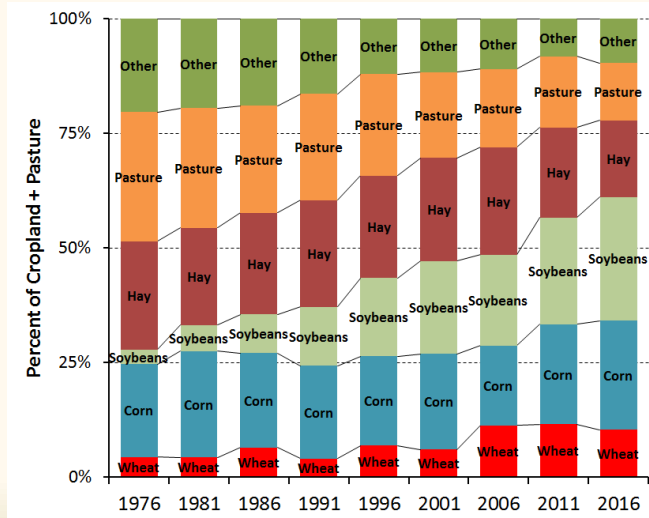
- Fruit acreage decreased, but production increased
- Field vegetable acreage increase until 2001
- Challenges in processing capacity
- Major growth in greenhouse sector, vegetables & flowers



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Crop Diversity 1976-2016

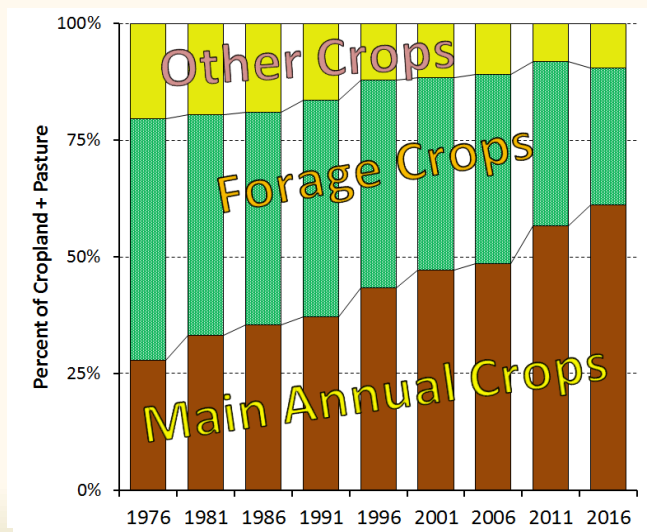
- Shift toward annual crops
- Soybeans, corn
- Cereals stable
- 3 annual crops change from 28% to 61% of land 1976-2016
- Simplified rotations
- Fewer crops in rotations
- Decreases in hay, pasture
- Linked to livestock change
- Major trend



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Crop Diversity 1976-2016

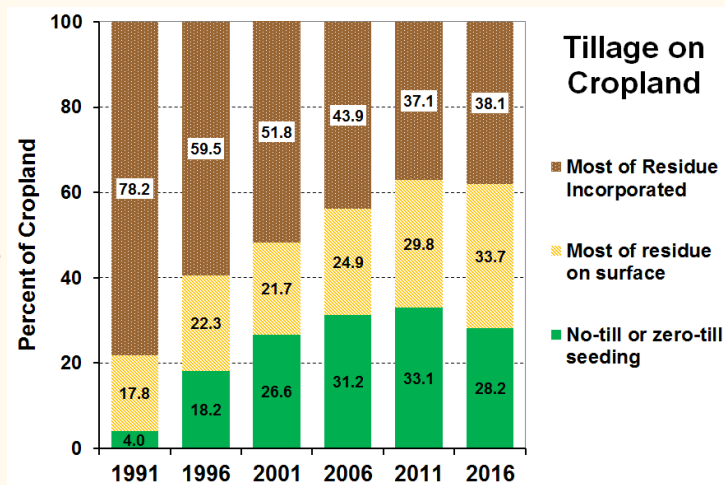
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Tillage 1991-2016

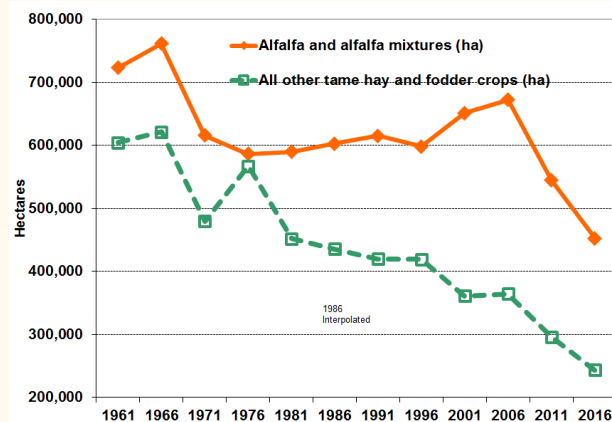
- Census question on tillage has 3 categories
- Tillage decreased 1991-2011
- 2016 first time tillage increased since 1991
- Implications for soil health



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Hay Crops

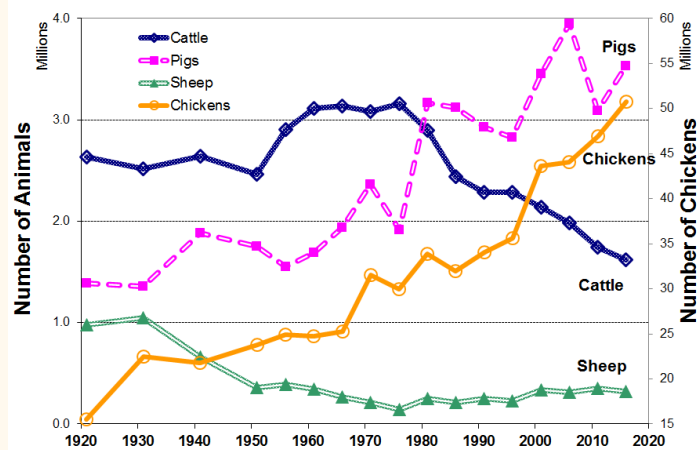
- Census tracks two categories of hay
- Decreases in both alfalfa mixtures & other hay
- Essentially "dairy" & "beef/sheep" mixes
- Decline after 1976 linked to beef decreases
- Decline after 2006 linked to high crop prices
- Forages benefit pollinators & grassland wildlife



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Change in Livestock 1921-2016

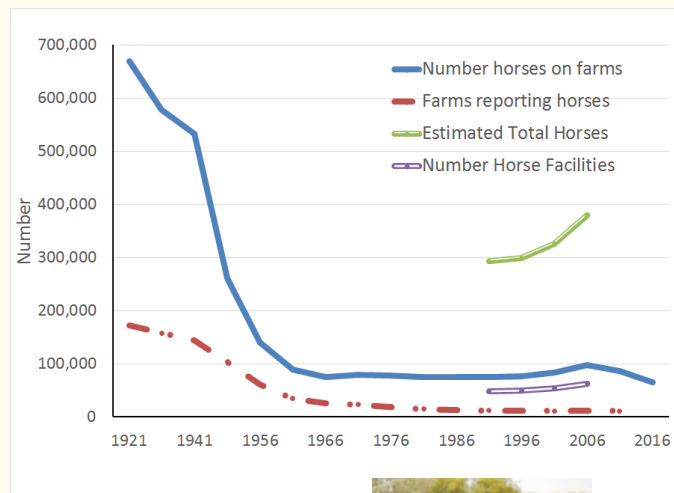
- Since 1976, decreases in cattle numbers, dairy & beef
- Production increases
- East to west shift in Canada in beef
- Major change
- Less hay, pasture, manure
- Ongoing increases in poultry
- Cyclical changes in pig numbers
- Reduced manure



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Changing Horse numbers

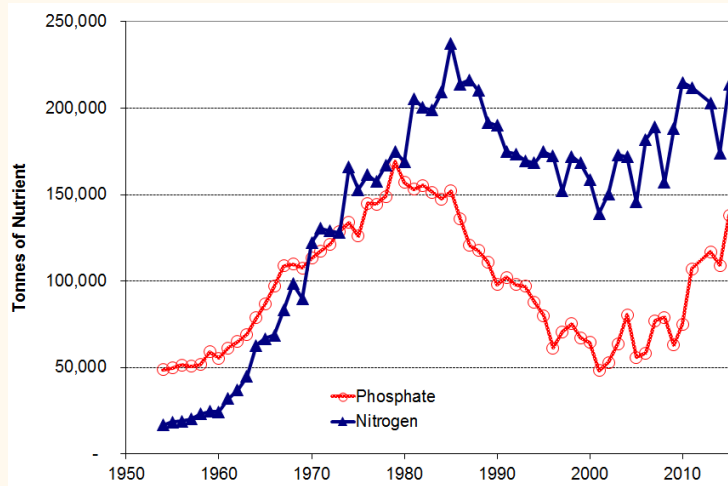
- Census records horses on farms
- Large decreases with mechanization
- 2016 census 64,536 horses
- Recreational use of horses
- Estimates of total numbers of horses 230,000-380,000 (2006)
- Concentrated in urban fringe



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Nitrogen + Phosphorus from Fertilizer

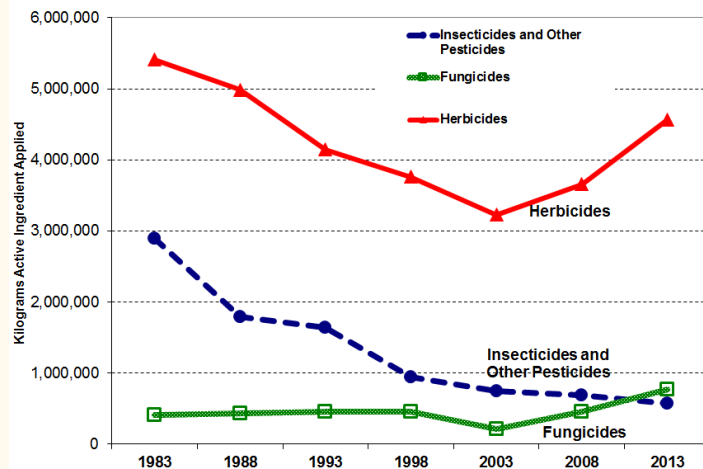
- Growth 1950s to 80s
- Decline to early 2000s
- Growth in yield & nutrient efficiency
- 2008 start of high price period
- Conversion to annual crops, especially soybeans
- Decrease in manure over same time



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Pesticide Use 1983-2013

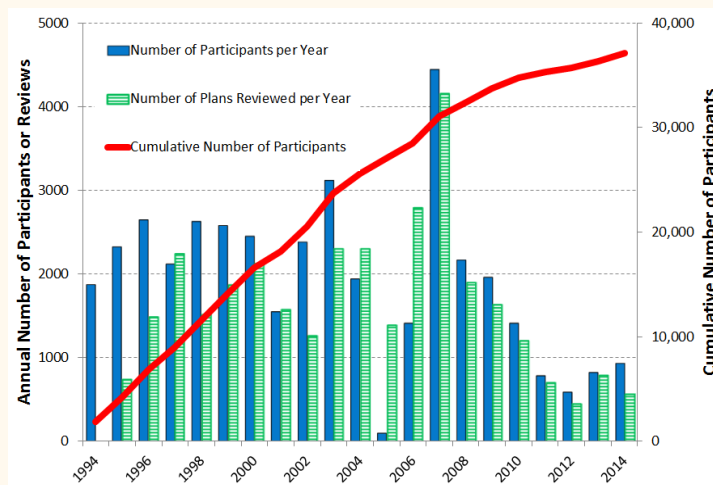
- Growth to 1980s
- Food Systems 2002 led to decreases
- Herbicide switching
- Glyphosate increases
- Similar trends in US, Europe
- More significant reductions in ON vs US



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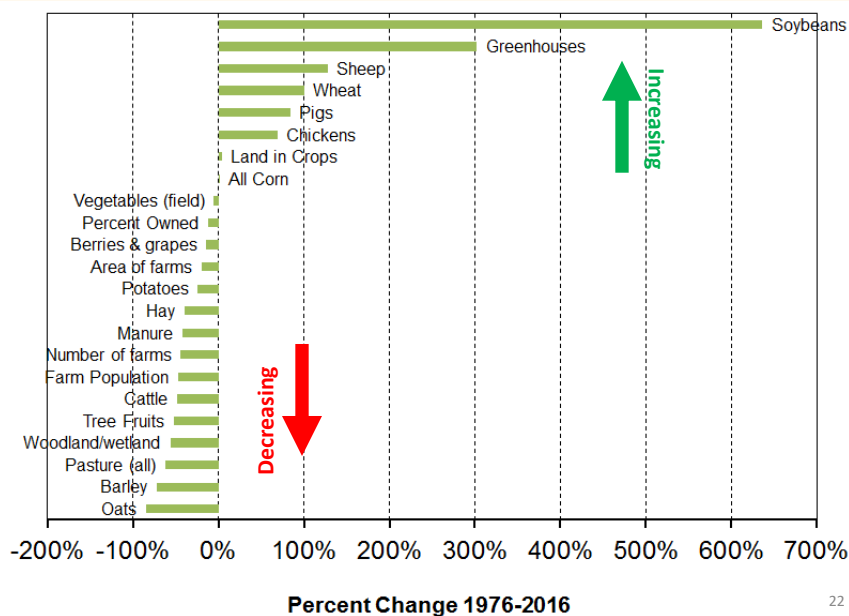
Ontario EFP Participation

- EFP participation strong 1994-2004
- Surge in participation during APF and early Growing Forward
- Diminished participation in Growing Forward 2
- Recent increase due to Great Lakes Ag Stewardship Initiative



APF Growing Forward GF2

What Changed 1976-2016?



Key Findings

- Long-term decrease in overall area of agriculture in Ontario (-45.9%, 1931-2016)
- From 10.1% to 5.6% of Ontario area 1931-2011 (61% to 35% of southern Ontario)
- Stable area of cropland, increase in annual cropping, decrease in forages (-50% hay, -80% pasture; 1921-2016).
- Decrease in cattle (-34%), increases in chicken & hogs
- >1970s, agri-environmental stewardship increased, some environmental risks decreased, reduced pesticide use (-45%), phosphorus fertilizer (-30%) & manure volumes (-43%).
- Ontario trends unique, differing considerably from western Canada, some similarities with other eastern provinces, the mid-west and eastern US and other developed countries.

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Published Research

- Open access publication
- Source: Smith, Paul G. R. 2015. "Long-Term Temporal Trends in Agri-Environmental and Agricultural Land Use in Ontario, Canada: Transformation, Transition and Significance," Journal of Geography and Geology, 7: 32-55.
- www.ccsenet.org/journal/index.php/jgg/article/view/47706

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