

Agriculture in a changing economic, environmental and societal climate: our path to a sustainable food system future

National Farmer's Union Convention

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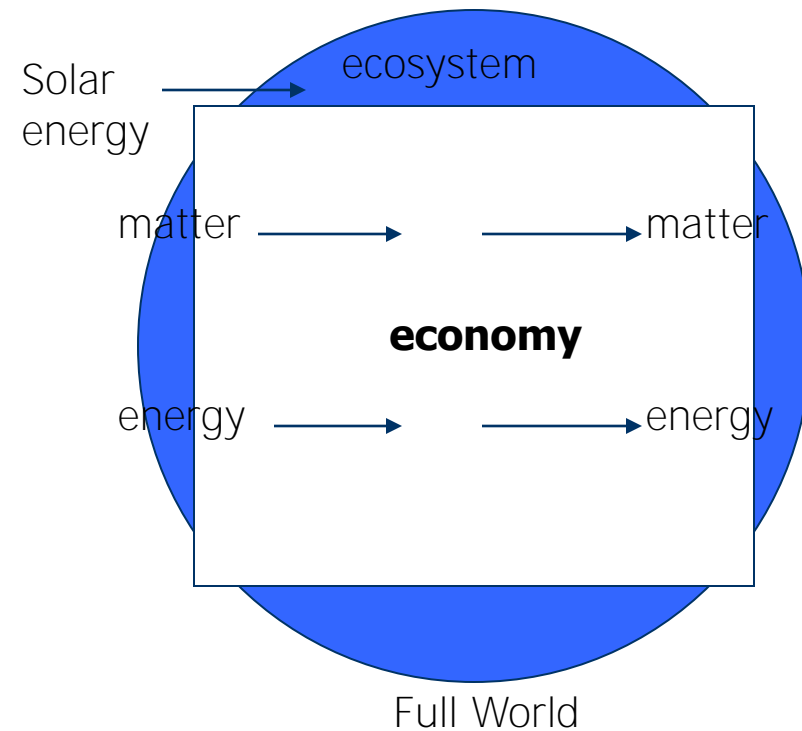
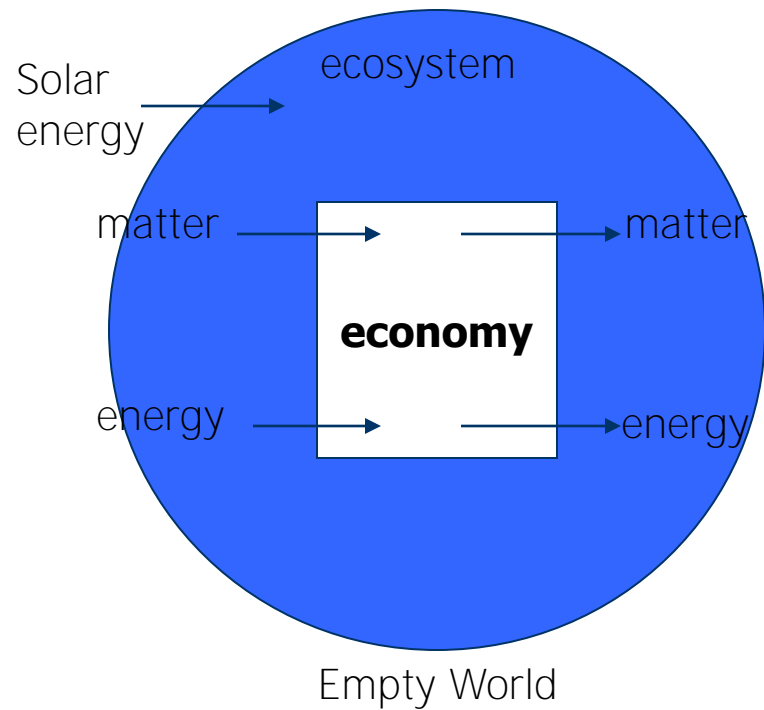
Institute for Sustainable Food Systems

Intent

identify challenges, positive developments, opportunity
motivate positive action



We now live in a Full World



Population – 7.4 billion

to 9.5 billion by 2050, 11.2 billion by 2100

majority urbanized (2009)

Canada- 80% urbanites

Neo-classical economics and laissez-faire capitalism dominate

Rate of return on capital greater than economic growth;
results in excessive wealth concentration, economic power.

Anthropocene

Earth's most recent geologic time period (epoch) in which global atmospheric, geologic, hydrologic, biospheric and other earth system processes are substantially altered by humans.

The Sustainability Imperative





Our food system is the foundation of our sustainability

No sustainable food system,
no sustainable humanity.

Our food system is far from sustainable.

Agriculture is 11, 000 years old



Developed under relatively constant and predictable climate and weather patterns, in soils that took millennia to form

The Production Paradigm

AKA: modern, conventional, industrial, factory farming



is only about 60 years old

To Feed the World production paradigm's meta-ethic



Outcome in a nutshell

Producing more food and feeding more people than ever before

Enough grains, fruits, vegetables, meat for 3,200 calories daily/ person

1.2 billion people food insecure

3.5 million children die annually from nutritional deficiency

1.5 billion are overfed

Canadian food insecurity

9.2% Canadian households food insecure

50% in lowest income group

Nutrient dilution

Yield enhancing methods tend to decrease nutrient density

Recent studies of fruits, vegetables and wheat show a 5 to 35 percent decline in nutrient density during past fifty years

A few nutrients in meat and milk have decreased by as much as 60 percent

43 vegetable crops, 1950-1999

Calcium ↓ 16%

Protein ↓ 6%

Vitamin C ↓ 20%

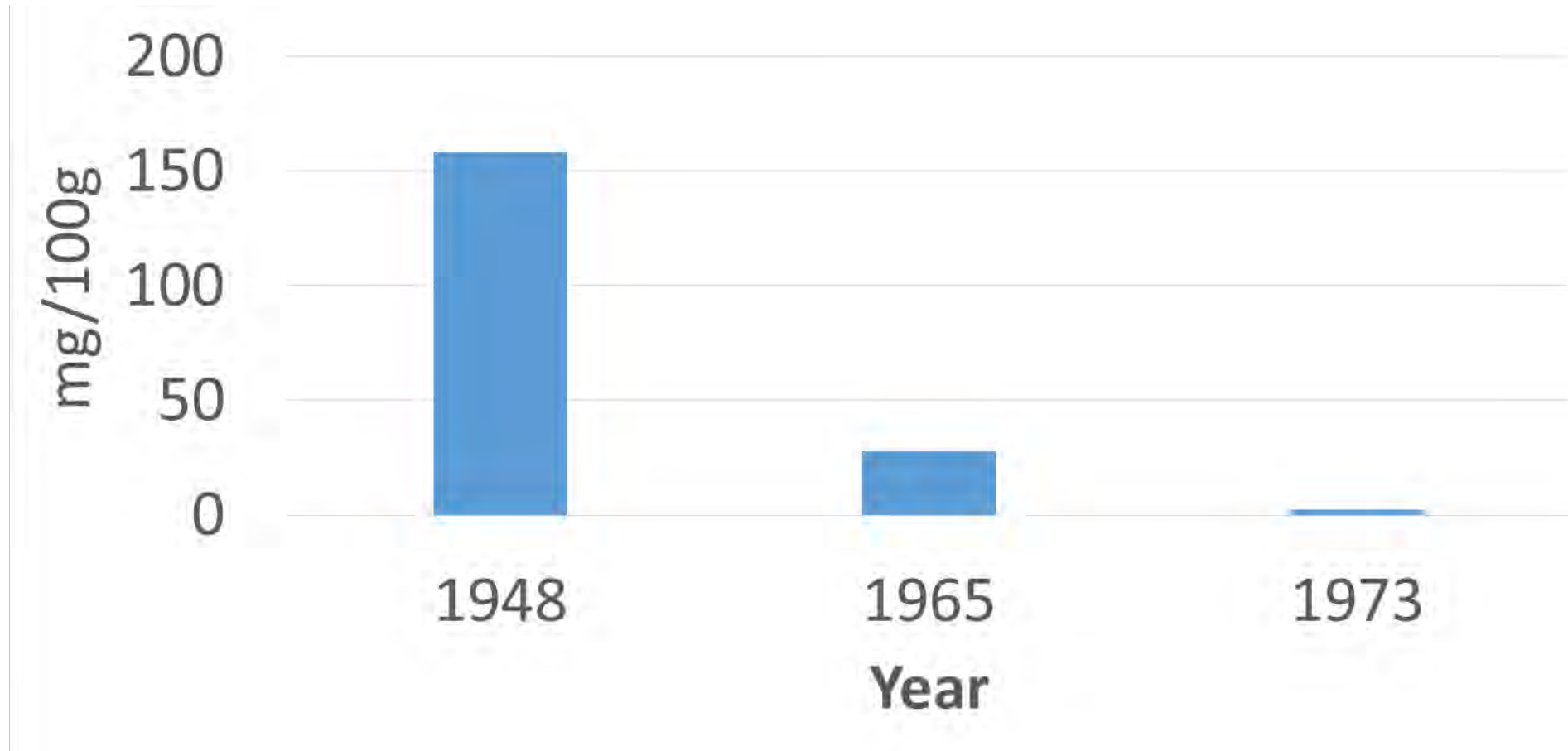
Riboflavin ↓ 38%

Phosphorus ↓ 9%

Iron ↓ 15%

Iron in Spinach

per the U.S. Dept. of Agriculture



Hartmann, T., 2009

Many other food quality/ health related issues

Excessive salt, sugar, fats

Kessler, D., 2010
Moss, M. 2014

Use of antibiotics to enhance 'feed efficiency'

Barton, W. Nutritional Research Reviews. 13(2): 279-299
Khachatourians, G.G. Canadian Medical Assoc. Journal. 159(9): 1129-1136
Witte, W. Science 2279.5353:996-7

Glyphosate probable carcinogen, linked to celiac disease, autism and other
'western diseases'

Samsel and Seneff, 2013, Interdisciplinary Toxicology 6:159-184
Samsel and Seneff, 2013, Entropy 15(4): 1416-1463

'Western disease' epidemic

obesity, diabetes, childhood onset diabetes, high cholesterol, chronic heart disease

Our children may be the first generation with a life span
shorter than their parents

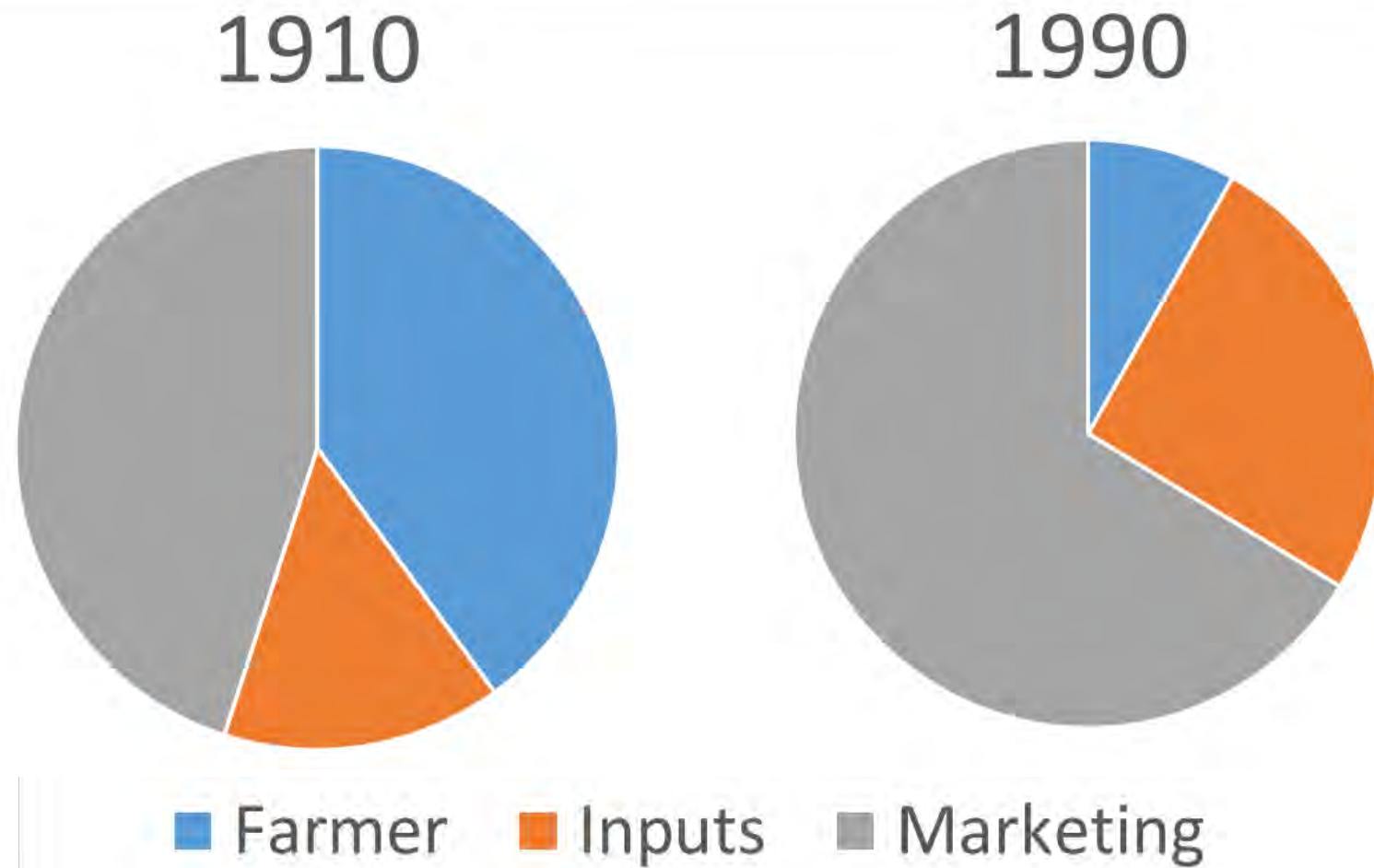
Food costs outpacing inflation

Canadian inflation 2008



Overall-	1.2 %
Food overall-	7.3 %
Cereal products-	12.4 %
Fruits/ vegetables-	26.9 %

Where does our food dollar go?



Marginal Net Farm Income

Canada 2015

\approx \$6.7 billion net

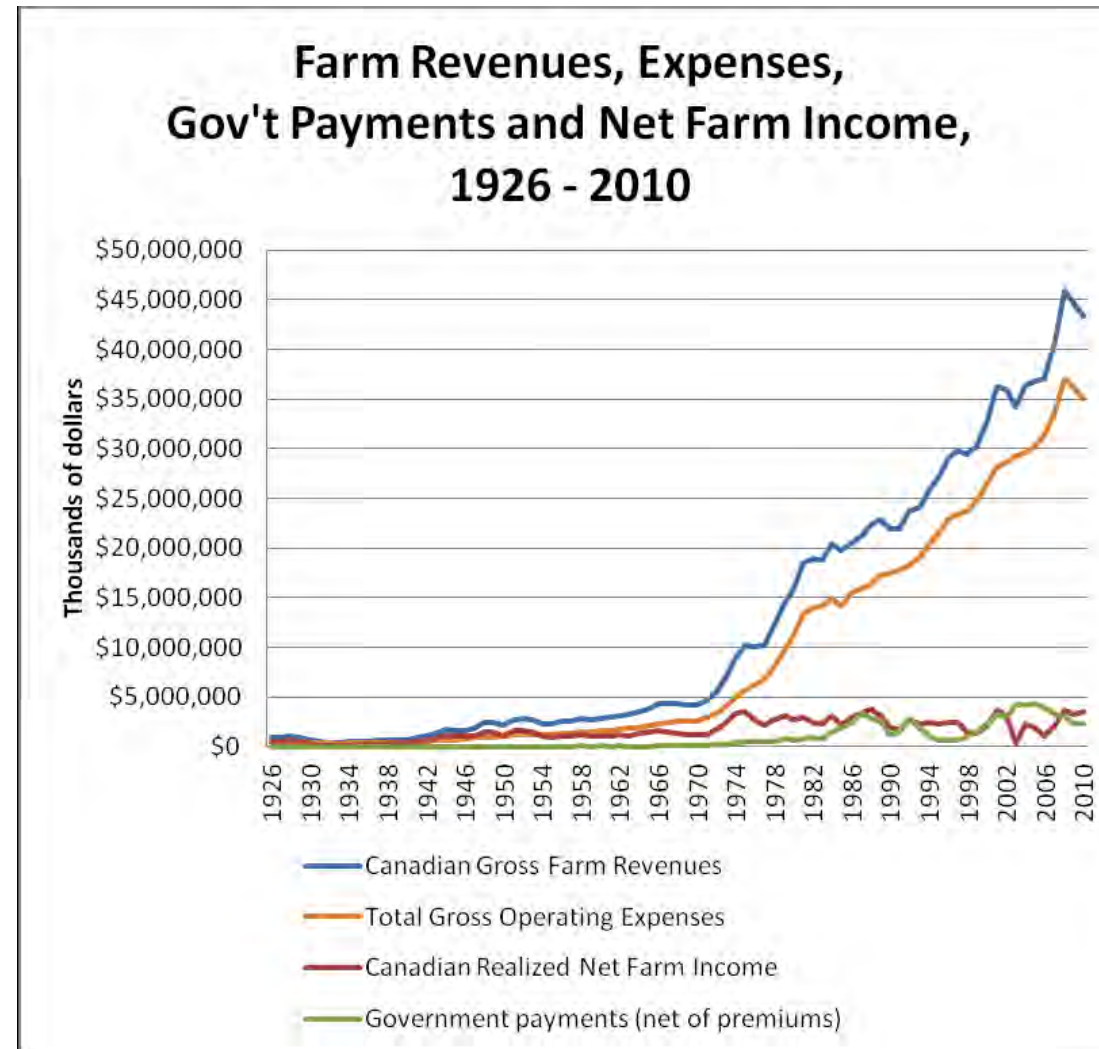
\approx \$33,000 net/ farm

Capital (input) intensive

fuel, mechanization, pesticides, fertilizers, land



Cost of production exceeds revenue potential



“Faith in the paradigm of productivity has made most farmers not only poorer, but also exposed to more risk.”



AUCTION SALE
OF ALL FARM STOCK AND MACHINERY AND HOUSEHOLD EQUIPMENT
PETER L. HAAG FARM
Six Miles North of New Hradec or 14 Miles Southwest of Manning
Wednesday, July 29
Sale Starts at 10:00 A. M. Free Lunch at Noon

LIVESTOCK		
4 Head Horses	4 Heifers	1 Purebred Black Angus
2 Good Milk Cows	2 Steers	Bull, One Year Old
6 Yearlings	7 Spring Calves	100 Young Chickens

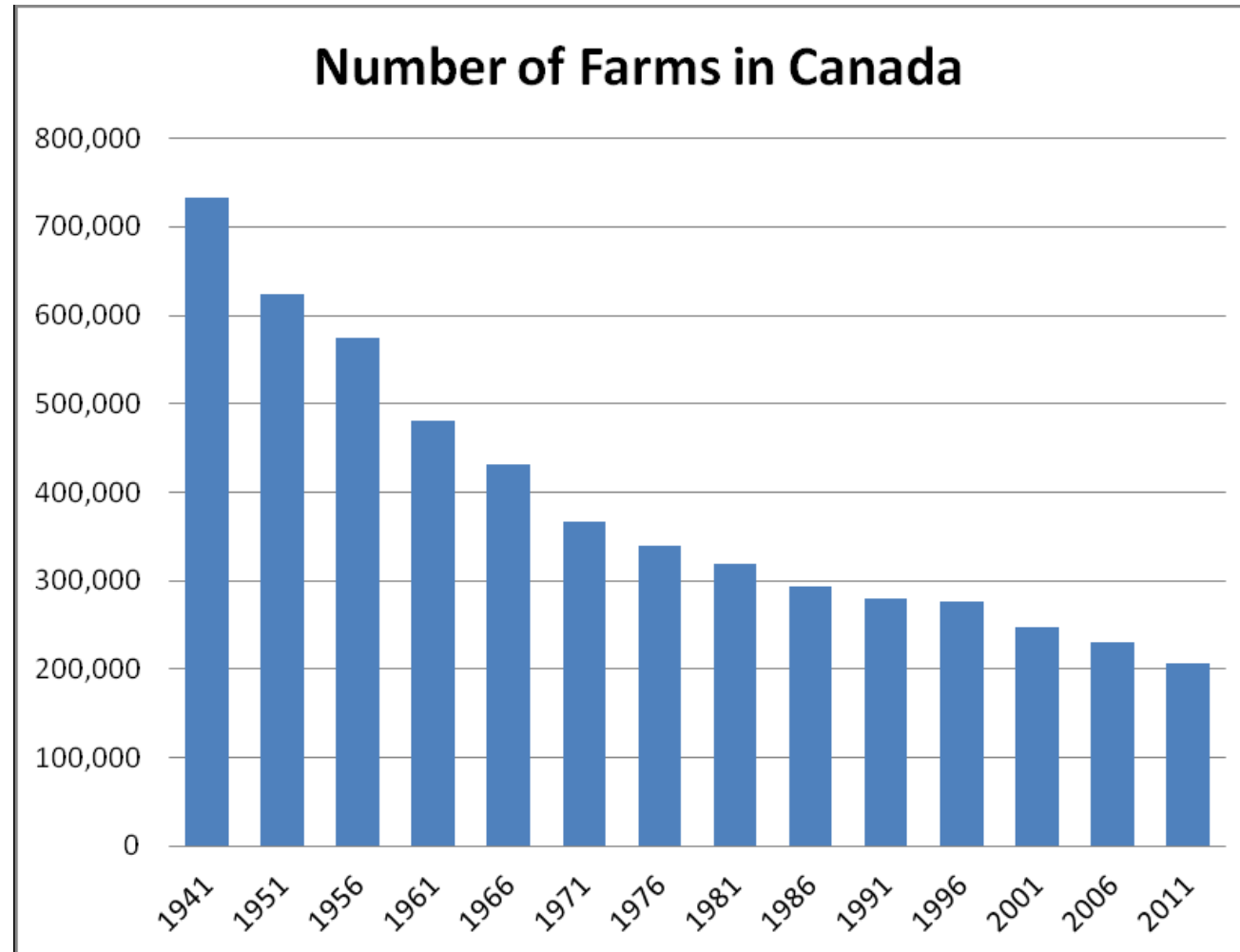
FARM MACHINERY	HOUSE HOLD GOODS	
1 8-Foot McCormick-Deering Binder	1 Water Tank	1 Cook Stove
1 14-Inch Moline Gang Plow	1 4-Wheel Trailer	1 3-Burner Oil Stove
1 16-Inch J. I. Case Sulkey Plow	Set of Blacksmith Tools	1 Large Kitchen Cabinet
1 8-Foot Disc	1 Engine Pump Jack	2 Kitchen Tables
2 Hay Rakes	1 Grind Mill	1 Heater
1 McCormick-Deering Mower		1 Bed Complete With Spring and Mattress
1 22-Foot Steel Drag		2 Bedsteads
1 Horse Potato Cultivator		1 Mattress
1 Bob Sled		1 Sink Wash Stand
2 Wagons With Boxes		1 "Lacta" Cream Separator
1 Steel Truck Wagon With Hay Rack		1 Rug 9x12
		1 Wheel Chair
		1 Wardway Washing Machine (New)
		Dishes, Cream Cans, Kitchen Utensils

Other Articles Too Numerous to Mention

ALL PROPERTY MUST BE SOLD
TERMS—Cash or Negotiable Paper
RAY SCHNELL, Auctioneer PETER J. HAAG, Clerk



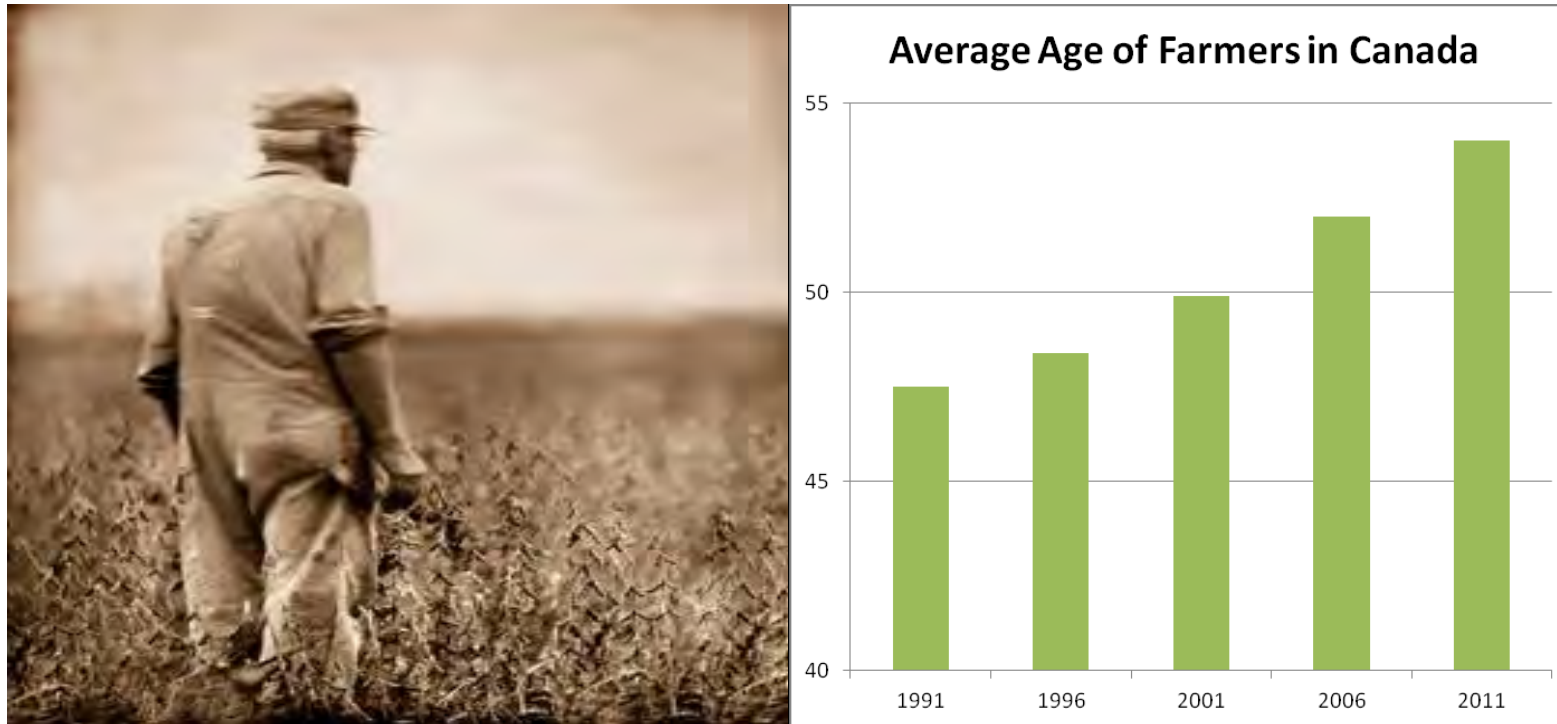
'get bigger or get out' syndrome



Farmers are exiting/ aging

In Canada the average age of farmer ≈ 55 years.

Only 6% of principal farm operators under 35 years.



Industrial agriculture's environmental record

- Habitat/ biodiversity destruction
- Pesticide and fertilizer contamination
- Soil erosion/ salinization/ desertification
- Noxious waste/ pollution of air, water, soil
- Aquifer and ground water depletion
- Genetically Modified Organisms
- Greenhouse gas emissions

Ethical issues abound



Market forces fail to address or rectify these challenges



Corporate hegemony (control)

4 corporations- 80% of Canadian and U.S. beef packing

3 corporations- 75% of Canadian and U.S. pork packing

4 corporations- 62% of Canadian flour milling

3 corporations- 95% of Canadian dairy processing

4 corporations- 62% of Canadian food retail

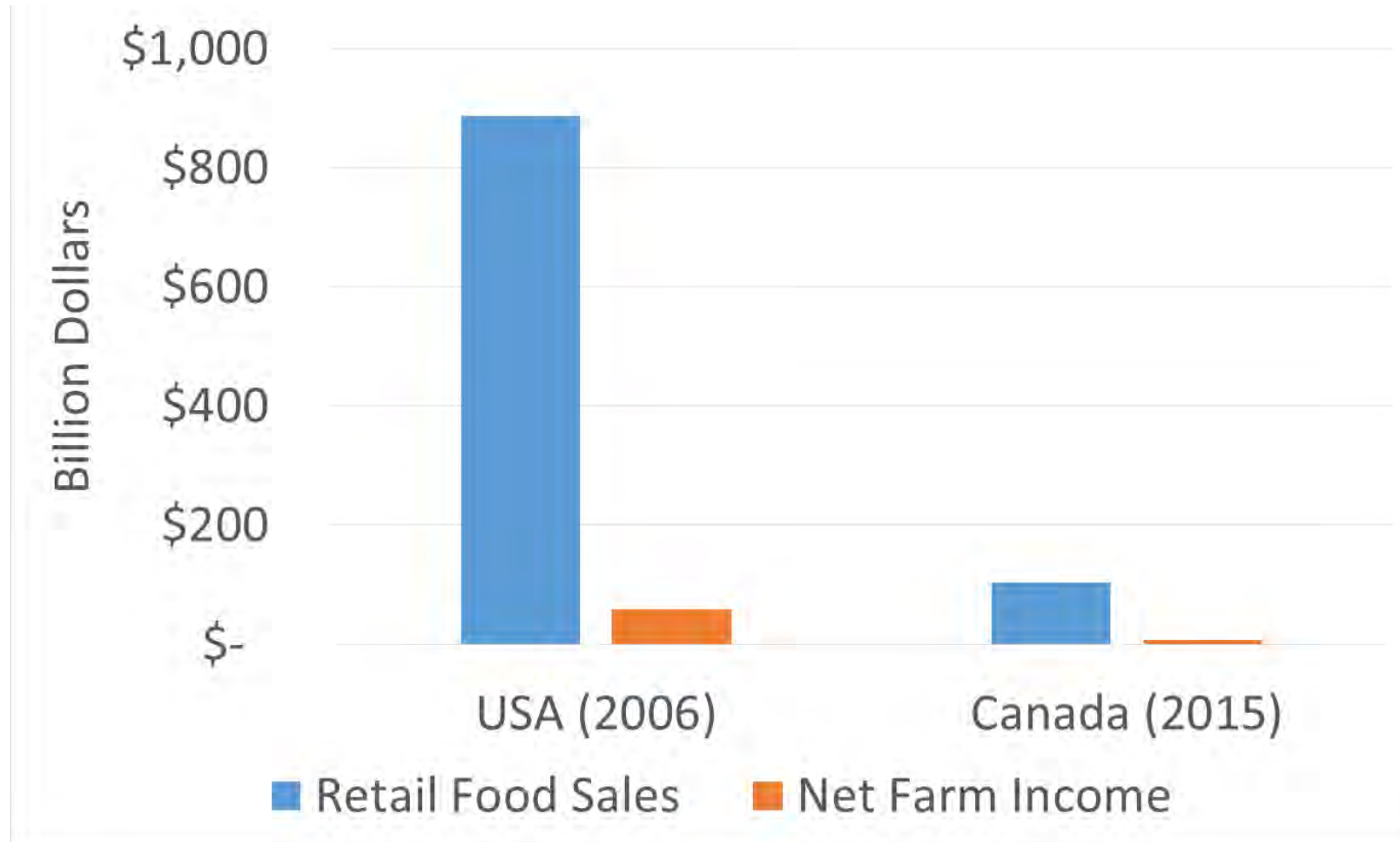
5 corporations- 80% of global crop seed

2 corporations- 100% of global turkey breeding and egg laying stock

National Farmers Union, 1999
Office of Consumer Affairs, Canada, 2013
Vancouver Sun, 2008
Heffernan W., 2003
Gambling, S. 2016

" We now have a global food system that is impervious to true consumer interests. Food is produced, processed and distributed almost entirely to meet the short-term business interests of the global food firms."

Little economic (and therefore political) clout



Lost credibility and social license

Elephants in the room

impacting the sustainability of our food system now and in the future

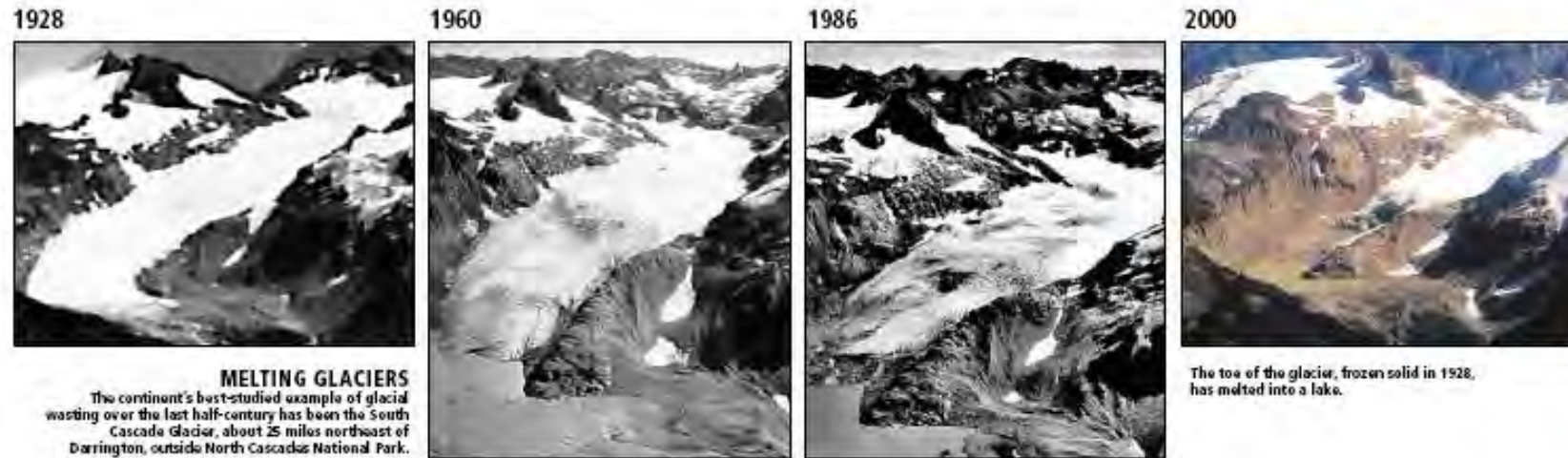
The water and land you use is precious



Agriculture uses 70% of
the worlds fresh water-
we're tapped out

The world is farming all
the land there is to farm-
can't create more

Global climate change wild card



Precipitation patterns/ snow pack

Irrigation water availability

Insect and disease incidence

Unpredictable and severe weather

Crop plant adaptation

Agriculture contributes 10 - 25 % of Global GHGs

The whole agri-food system, up to 50%

Global climate change

350 ppm CO₂ considered safe, now at 400 ppm

10-15% (staple) yield reduction for every 1° C increase

Mean temperatures increased 0.8° C (1.4°F) since 1980

Business as usual- will increase 6°C (11° F) by 2100

Increased incidence of severe weather events

Greater warming in higher latitudes (Canada)



National Academy of Sciences
2009 (from Brown, L. 2012)

the “common assumption that a warming climate will be a boon for agriculture production in northern climates is now recognized as false”

With CO₂ levels at 450 ppm



“world will face irreversible dry-season rainfall reductions much like the Dust Bowl era”

National Academy of Sciences
2009 (from Brown, L. 2012)

99 billion livestock animals

Meat Consumption	1950	2010
Globally	50 million tonnes	280 million tonnes
Per capita	38 lbs	88 lbs

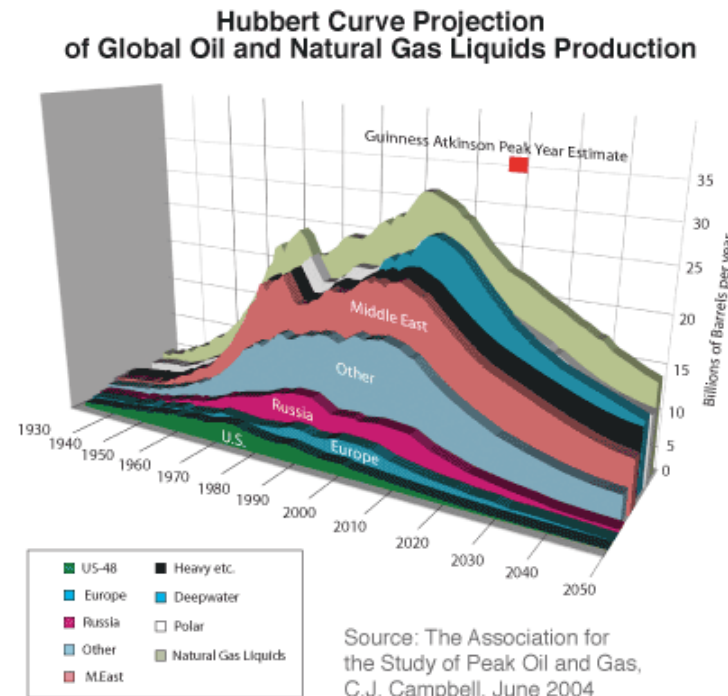
Greenhouse gas emissions
Agriculture for feed
Deforestation
Desertification
Nitrate non-point source pollution

Agriculture has become an energy loser
negative energy return on energy invested (EROEI)

1:5 on average
1:10 or greater for many products
1:50 for your hamburger

formerly agriculture afforded a positive EROEI
2.5:1 in 1940

Dependence on/ use of fossil fuels not sustainable



‘Resurgence of local agriculture, bottling, canning, processing eminent’

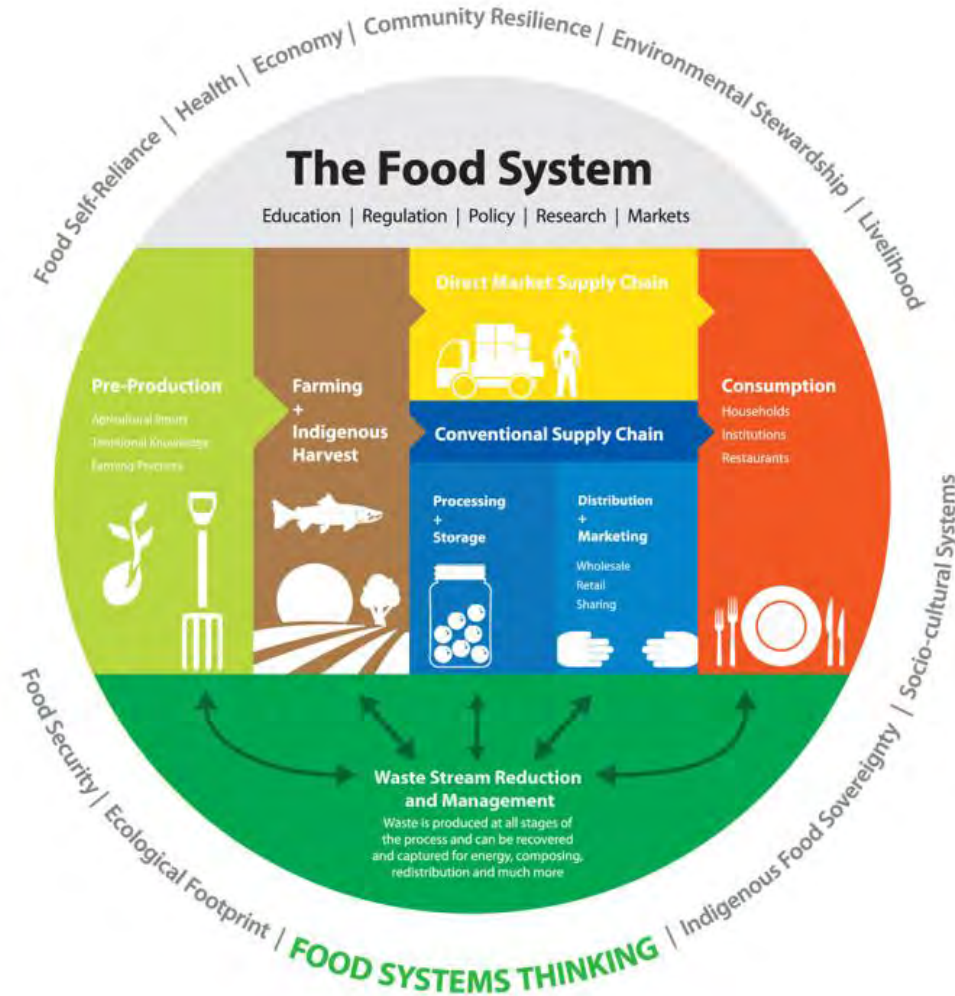
The socio-cultural, economic and political landscape



End of Newtonian, mechanistic worldview

Replaced with understanding of the dynamic interconnectedness
of all living and non-living things

Everything is part of a system within a system



Inputs, Agriculture, Processing,
Storage, Distribution, Sales,
Waste, Society, Governance,
Environment

Emerging ethos

Nature has the ethical and legal right to exist and thrive

Indigenous Peoples worldview and rights
acknowledged and valued

Sustainable Economics and Capitalism

In response to the failure of neo-classical economics and laissez faire capitalism and in recognition that increased GDP does not necessarily equate to increased happiness and satisfaction

How can we feed the world without industrial-global agriculture?



Competing paradigms battling it out

Life science intensive

- Dependence
- Centralization
- Competition
- Domination of nature
- Specialization
- Exploitative, external costs ignored, short-term benefits
- High input

Ecological intensive

- Independence
- Decentralization
- Community
- Harmony with nature
- Diversity
- Restraint, full accounting, long-term benefits
- Renewable resources, conserve for future

Food as Medicine

for individuals, communities, and the earth

People want 'local' food and labels,
they want food dollars to go to farmers

Concern about food self-reliance and security

Dorward, Smuckler and Mullinix, 2016

Food System Planning linked to community

“Food is a sustaining and enduring necessity. Yet among the basic essentials for life—air, water, shelter, and food—only food has been absent over the years as a focus of serious professional planning interest. This is a puzzling omission...”

American Planning Association

Policy Guide on Community and Regional Food Planning
2007

Community and economic development driver

“Local food systems increase business innovation and entrepreneurship, foster regional economic development, and support employment.”

Bioregional Food Systems

Operating per the environmental capacity of the bioregion, for local communities and local economies, and in balance with an appropriate national and trans-national system

Smaller scale farming and businesses

Low input, human intensive

Environmentally sound

Alternate market channels

Community centered

Local economy focused



FAO City-region Food Systems initiative

<http://www.fao.org/fcit/fcit-home/en/>

Targeted empowerment and support for regional scale farming
and food infrastructure/ business

Hodges, J. (UN-FAO, retired), 2013
BCIA Innovations in Agrology Seminar, Vancouver
Pretty, J., et al., 2011

Millennials want to farm

Ecological farming regarded as a noble profession and an important contribution to sustainable society.



Most have no previous farming experience
(fresh eyes and sharp intellects)

Women the majority
(new perspectives and sensibilities)

LaForge, J.M.L. (forthcoming).
New Farmers in Canada: A Baseline Report
National New Farmer Coalition

They embrace a neo-agrarian ethic

Hold farmers and farming in high esteem,
strong earth stewardship ethic and community focus,
disdain for industrial agri-food system

Agro-ecology, the new paradigm

agricultural systems designed and managed based on biological
process and ecological systems principles, e.g. organic

50 million farmers
needed in Canada and U.S. for post peak oil agriculture

20% of our population

Access to land
the greatest limiting factor

movement to de-commodify agriculture land,
eliminate speculative valuation

New agriculture and food systems
education programs emerging
across Canada

Applied research and extension lacking



Lots of questions need to be answered and myths dispelled

Many activist organizations doing much work

Food systems seen to be at the heart of our sustainability challenge

Call for a Canadian Food Security Strategy

Imagine a Canadian food system in which Canadian family farmers capture significantly more of the \$100 billion food market in Canada.

What ideologies, strategies will dominate?

Our big challenge going forward

Agriculture must regain credibility and social license

Traditional family farm sector must regain influence

Create an economy in which family based farming and communities can flourish

Be the foundation for and leaders of sustainable society

National Farmers Union

perfectly positioned, poised to take a leadership role

What's it going to take?

(first, an unequivocal stand- **can't have your cake and eat it too**)

10 Actions

1. Embrace deep sustainability and organic production methods- **it's the high ground**
2. Tell it like it is (challenges, vision, solutions) to the public forthrightly and relentlessly- they are listening and will support you
3. Challenge neo-liberal economics and laissez faire capitalism- there are other ways to organize and operate a healthy, robust economy
4. Demand an end to oligopolistic control of our food system- or accept likely outcomes
5. Champion greater social and economic equity for all- ability to secure basic necessities, good food a human right, not just for the sufficiently affluent

10 Actions

6. Support diversity in farm types, sizes and marketing channels- confers adaptability and resiliency
7. Encourage, mentor the new generation of farmers- they bring lots of new skills, passion
8. Empower women agriculturists- support their perspective, intellect, and energy
9. Ally with diverse activist organizations- sustainable food system, Indigenous rights, environmental, social justice, etc.- they are kindred spirits and will support you
10. Demand and contribute to climate change mitigation- far less expensive than adaptation and far better outcome for you

A 21st century food system vision

A global network of bio-regional food systems operating in concert and balance with appropriate national and trans-national elements.



Our food, our food system, our economy,
and our children's, children's future





"The significant problems we face cannot be solved at the same level of thinking we were at when we created them."

Albert Einstein