IFA/FAO Agriculture Conference - SESSION III
"Farm Management Systems to Meet Global Food Demand: Lessons, Challenges and Opportunities"

Case Study III: Commercial Farms in Developed Countries Insights from Canadian Prairie Agriculture (and 'Subsidy-Free' New Zealand)

Dr. Ben Bradshaw
Simon Fraser University
CANADA
Email: bbradsha@sfu.ca
www.sfu.ca/geography

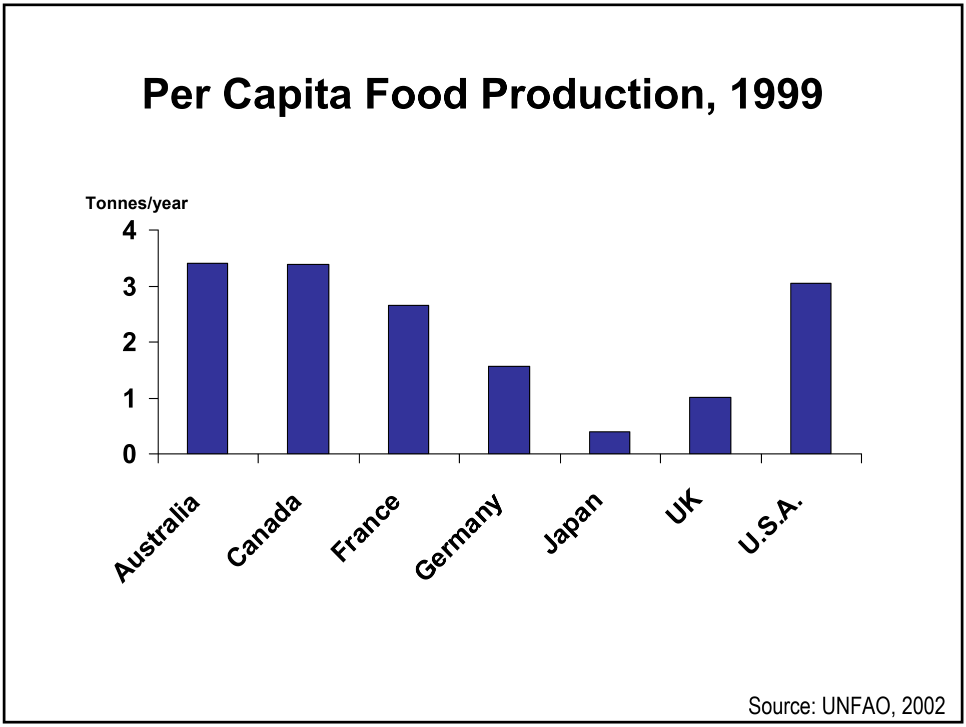
Acknowledgements:
• IFA;
• UNFAO; and
• Natural Resources Canada

Food (In)Security in MDCs

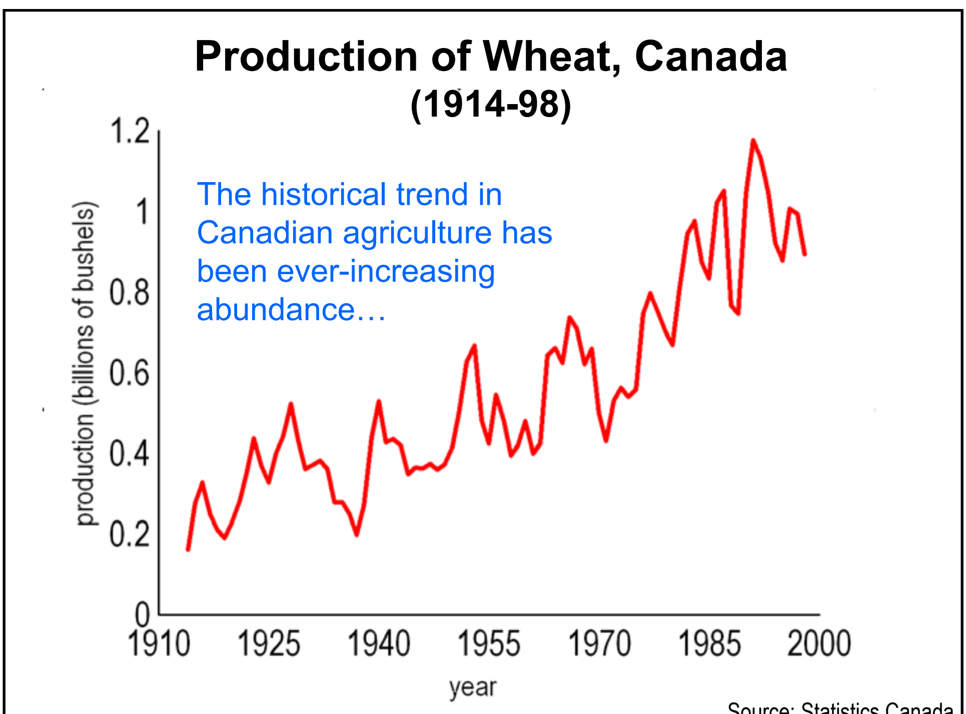
- Certainly, food insecurity is an issue for many; e.g. Statistics Canada Study (1999):
  - 10% of Canadians live in 'food insecure' households
  - particularly problematic for low income ,and lone-parent (female), households

- However, link to domestic agricultural output levels is limited; one part of larger formula…

Food Security = abundance + adequacy + access

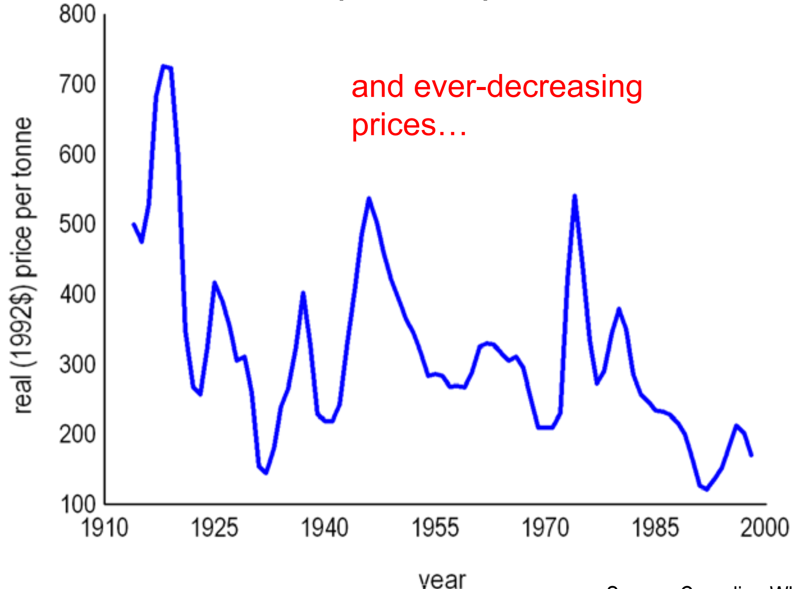


Per Capita Food Production, 1999
Tonnes/year
4
3
2
1
0
Australia
Canada
France
Germany
Japan
UK
U.S.A.
Source: UNFAO, 2002



Production of Wheat, Canada
(1914-98)
1.2
1
0.8
0.6
0.4
0.2
0
production (billions of bushels)
The historical trend in Canadian agriculture has been ever-increasing abundance…
1910
1925
1940
1955
1970
1985
2000
year
Source: Statistics Canada

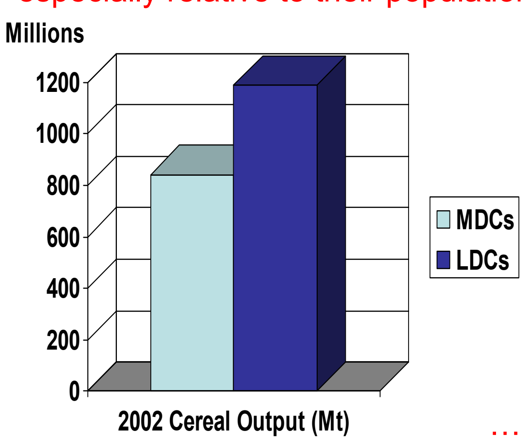
(Real) Price of Wheat, Canada
(1914-98)



Source: Canadian Wheat Board

Meeting Global Food Demand
The Role of Developed World Agriculture

obviously, MDCs are large contributors, especially relative to their populations...

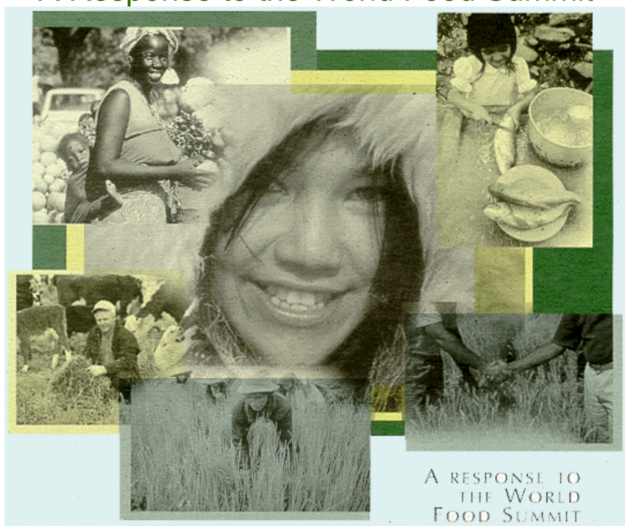


Source: UNFAO, 2003

…but regional self-sufficiency
Is ultimately preferable

Indeed, this view is consistent with…

Canada's Action Plan for Food Security:
A Response to the World Food Summit



See: Food Security Bureau, Agriculture and Agri-Food Canada

Implications of these two points

1. limited link between domestic agricultural output levels and domestic food security in a place like Canada; and
2. declining emphasis on the contribution of MDC agriculture to meeting global food demand

for this talk's focus…

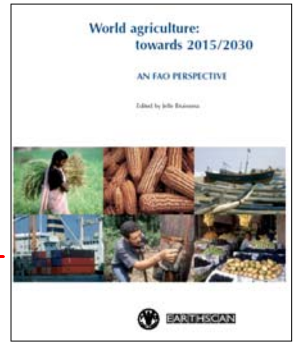
Not: farming system productivity within MDCs

But Rather: farming system viability within MDCs

(from the perspective of both the system as a whole and individual producers)

Outline of Talk

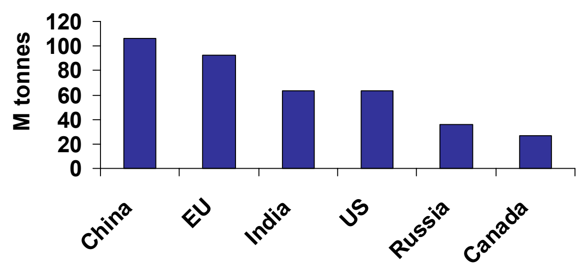
- Canadian prairie agriculture (and the ‘trajectory’ of agriculture in MDCs)
- Current challenges/opportunities
  - climatic change (& variability)
  - domestic agricultural policy (& the international trade environment)
  - market conditions
  - biotechnology
  - public/environmental pressures
- Recommendations



Pinstrup-Anderson, P
American Agricultural Economics Association Fellows Address, July’02

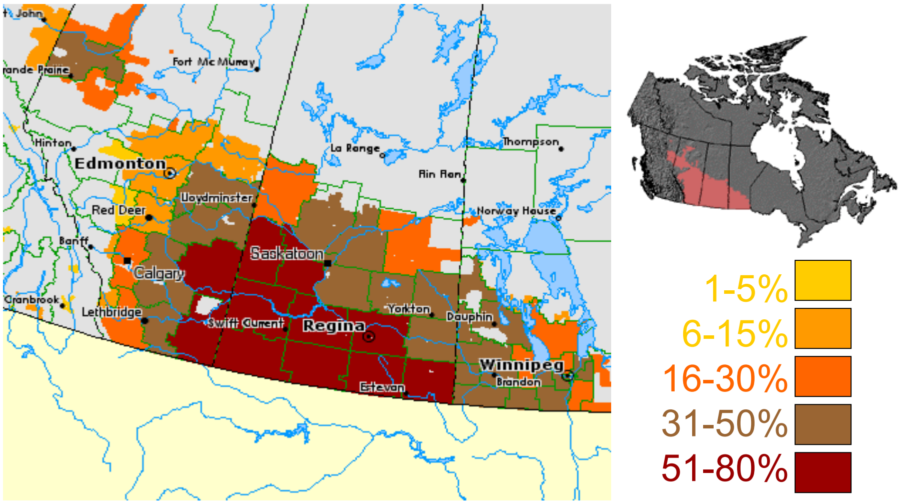
Canadian Prairie Agriculture

Wheat Production (10 yr avg 1991-2000)

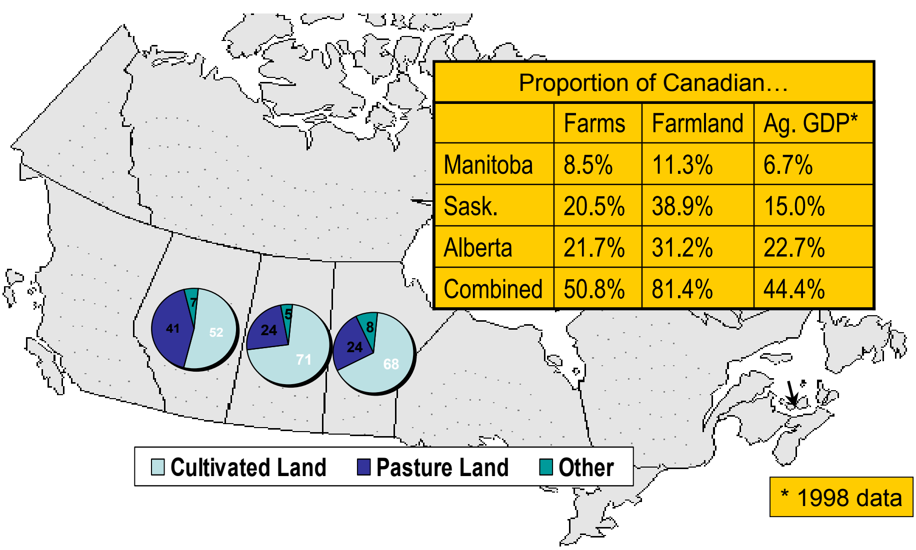


- semi-arid grassland
- primary outputs:
  - cereal production (especially hard red spring wheat; Canada is world’s #6 producer, and the prairies produce 94% of Canada’s total)

Percent of Prairie Cropland in Wheat



Prairie Agricultural Land Use, 2001

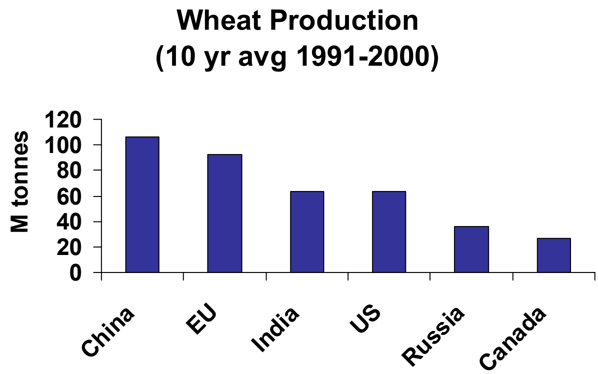


Proportion of Canadian…			
	Farms	Farmland	Ag. GDP*
Manitoba	8.5%	11.3%	6.7%
Sask.	20.5%	38.9%	15.0%
Alberta	21.7%	31.2%	22.7%
Combined	50.8%	81.4%	44.4%

* 1998 data

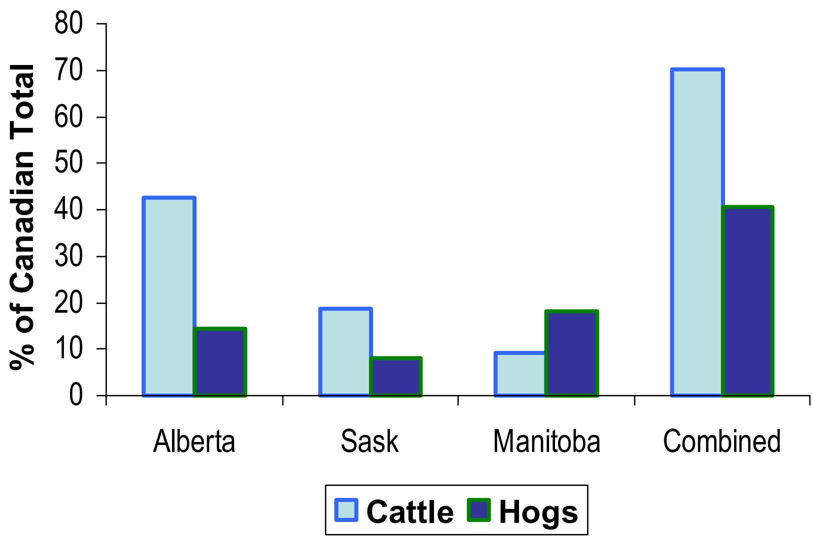
Source: Statistics Canada

Canadian Prairie Agriculture



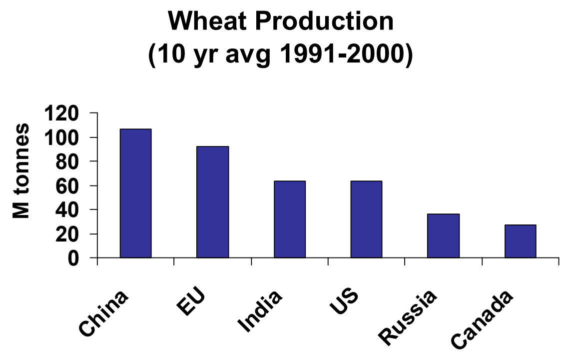
- semi-arid grassland
- primary outputs:
  - cereal production
  - livestock (cattle, hogs)

Prairie Livestock Numbers as a Proportion of the Canadian Total



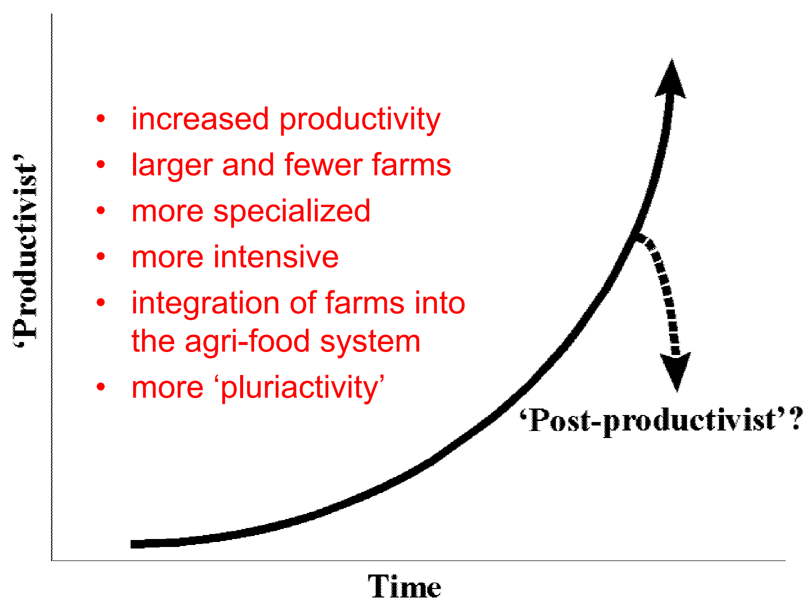
Source: Statistics Canada

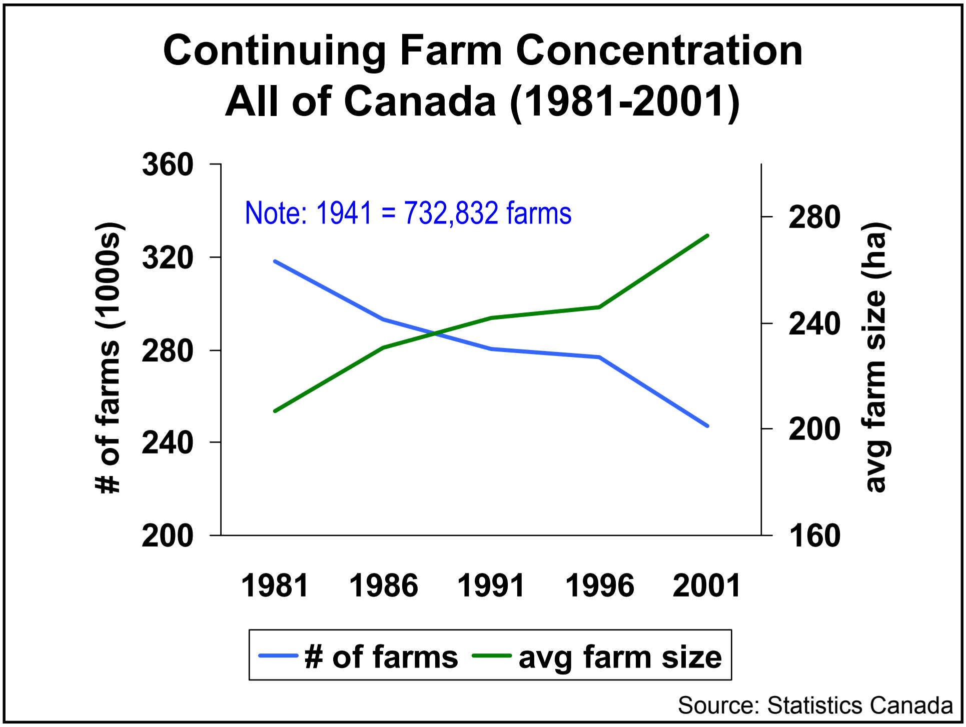
Canadian Prairie Agriculture



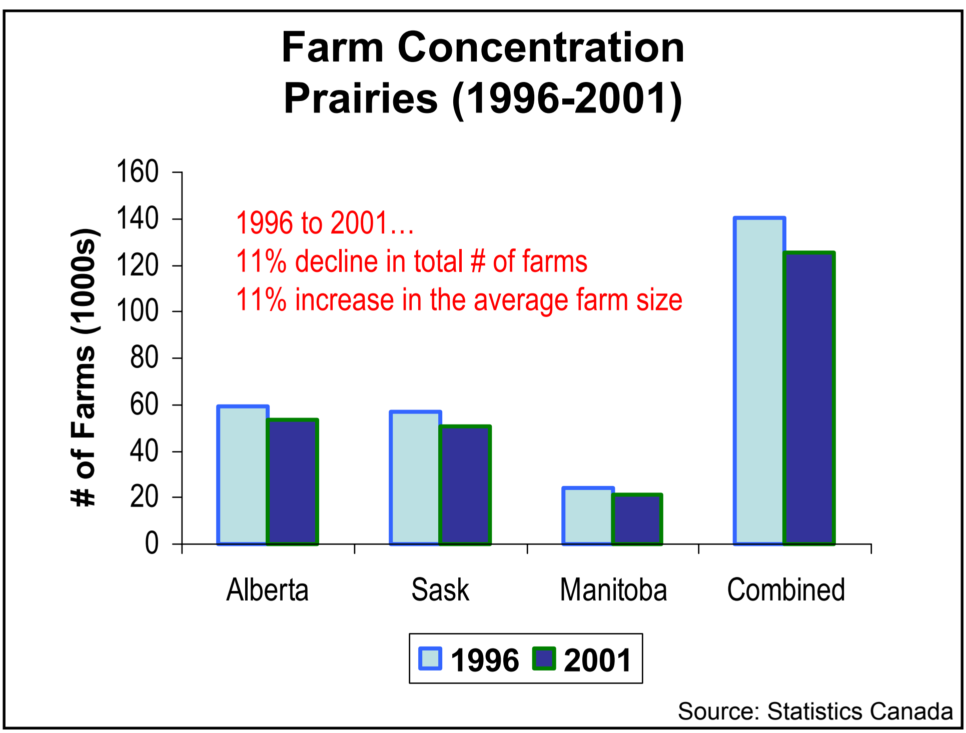
- semi-arid grassland
- primary outputs:
  - cereal production
  - livestock (cattle, hogs)
- export-oriented (e.g. world's #2 wheat exporter)
- quite typical of MDC agriculture…

The 'Trajectory' of MDC Agriculture



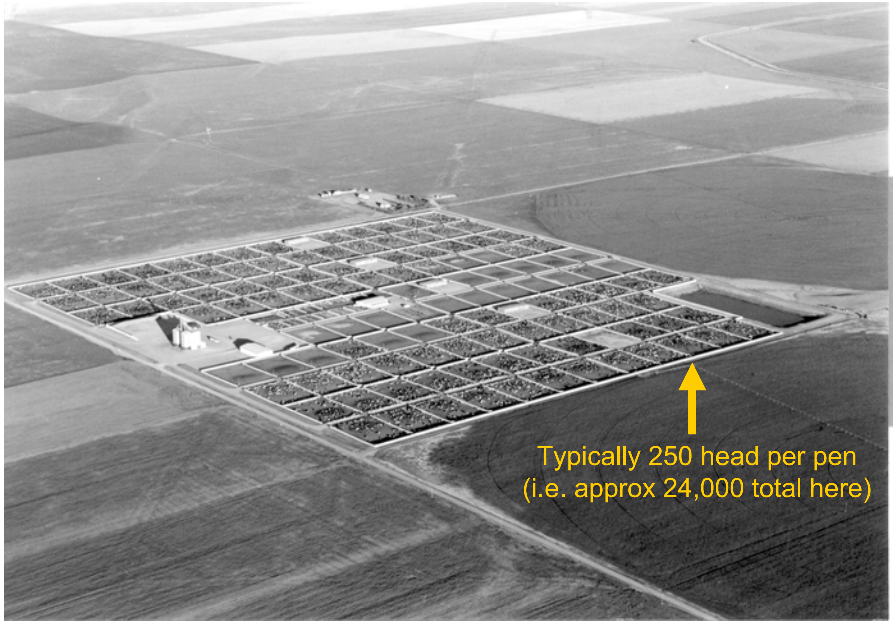


Continuing Farm Concentration
All of Canada (1981-2001)
Note: 1941 = 732,832 farms
# of farms (1000s)
360
320
280
240
200
avg farm size (ha)
280
240
200
160
1981
1986
1991
1996
2001
# of farms
avg farm size
Source: Statistics Canada

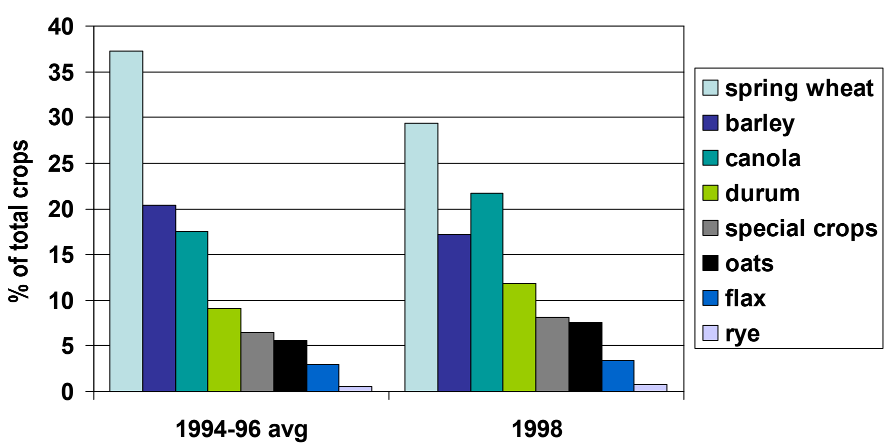


Farm Concentration
Prairies (1996-2001)
1996 to 2001…
11% decline in total # of farms
11% increase in the average farm size
# of Farms (1000s)
160
140
120
100
80
60
40
20
0
Alberta
Sask
Manitoba
Combined
1996
2001
Source: Statistics Canada

Cattle Feedlot, Alberta

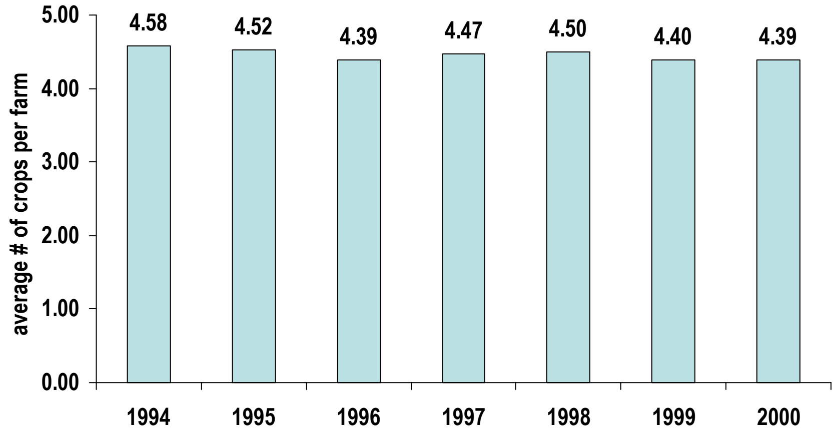


Recent Evidence of Crop Diversification For the Canadian Prairies as a Whole



Source: Agriculture and Agri-Food Canada

…but not at the individual farm scale (Prairies, 1994-2000)



Source: Bradshaw, 2002

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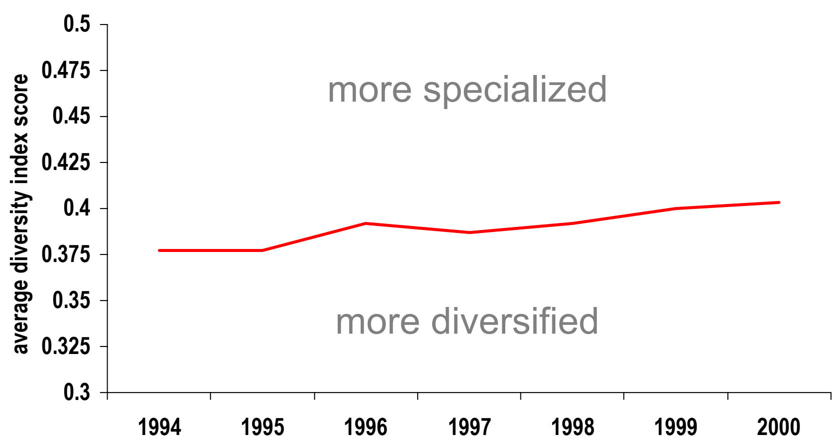
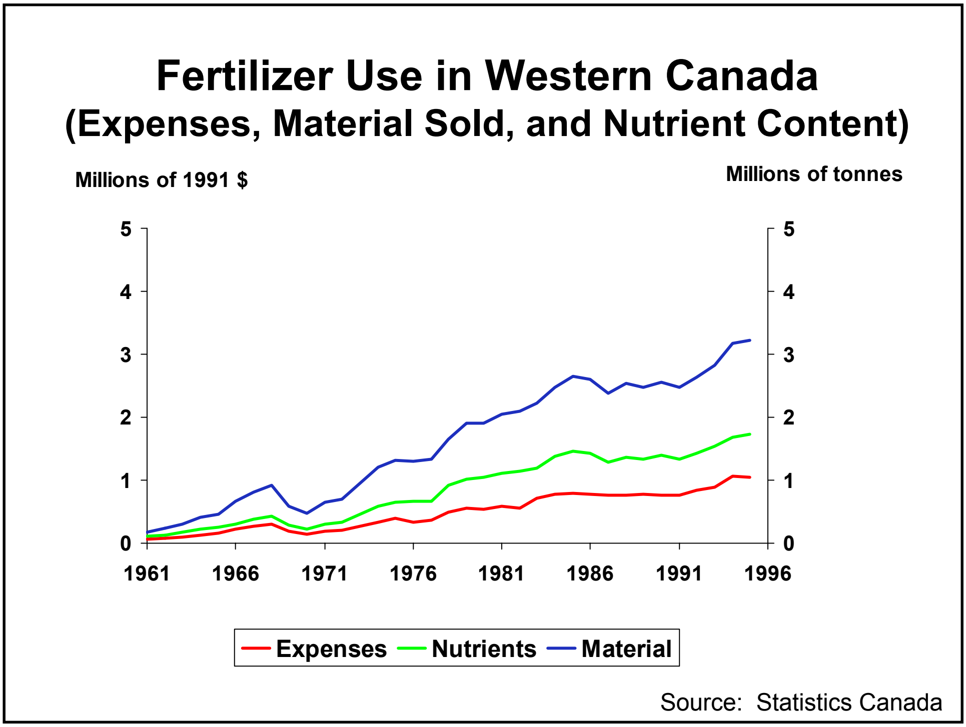
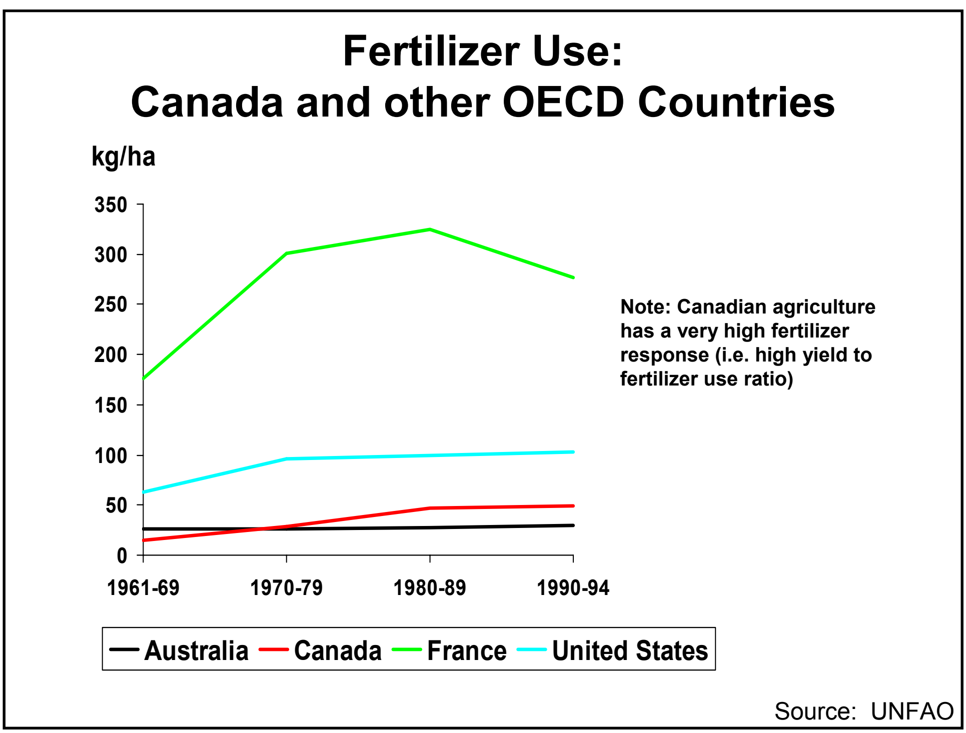
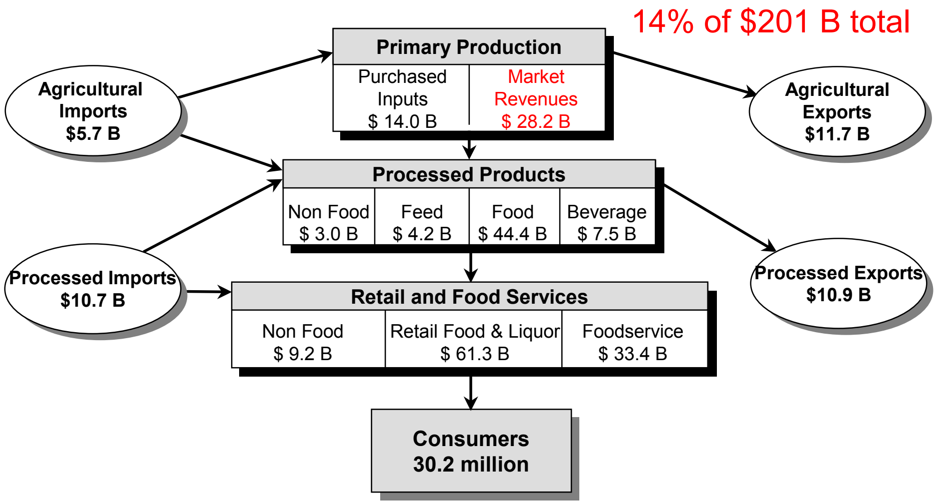


Source: Bradshaw, 2002


Fertilizer Use in Western Canada
(Expenses, Material Sold, and Nutrient Content)
Millions of 1991 $
Millions of tonnes
5
4
3
2
1
0
1961
1966
1971
1976
1981
1986
1991
1996
Expenses
Nutrients
Material
Source: Statistics Canada

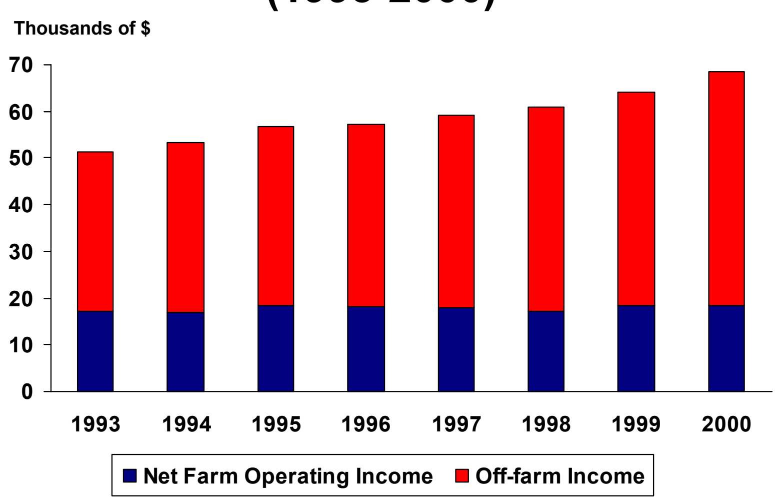

Fertilizer Use:
Canada and other OECD Countries
kg/ha
350
300
250
200
150
100
50
0
1961-69
1970-79
1980-89
1990-94
Note: Canadian agriculture has a very high fertilizer response (i.e. high yield to fertilizer use ratio)
Australia
Canada
France
United States
Source: UNFAO

Canada's Agri-Food System
The Value of Primary Production, 1998



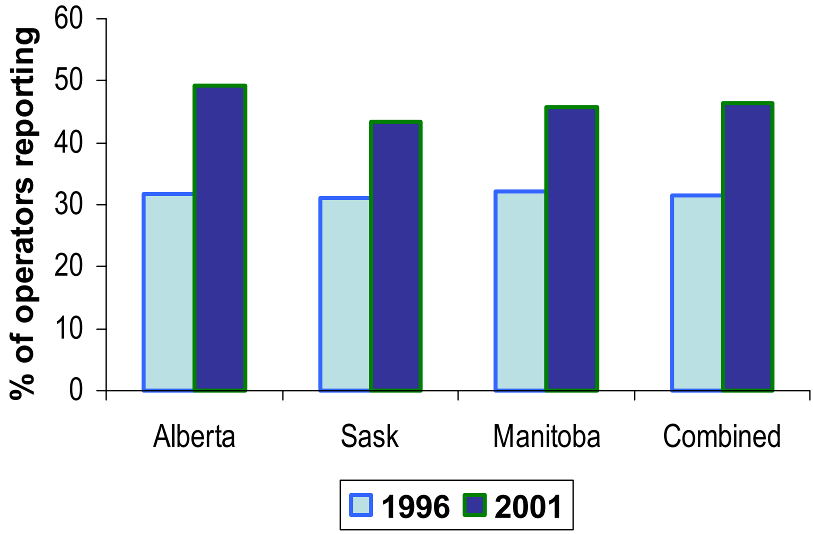
Sources: Statistics Canada; Canadian Restaurant and Foodservices Association; Agriculture and Agri-Food Canada.

Total Farm Family Income, Canada (1993-2000)



Source: Statistics Canada

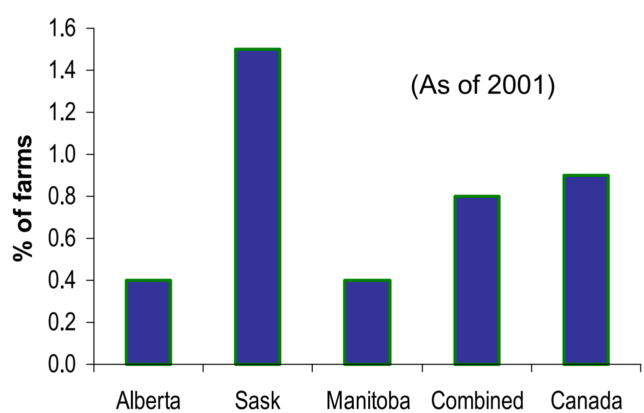
Prairies: Off-Farm Work (1996 & 2001)



Source: Statistics Canada

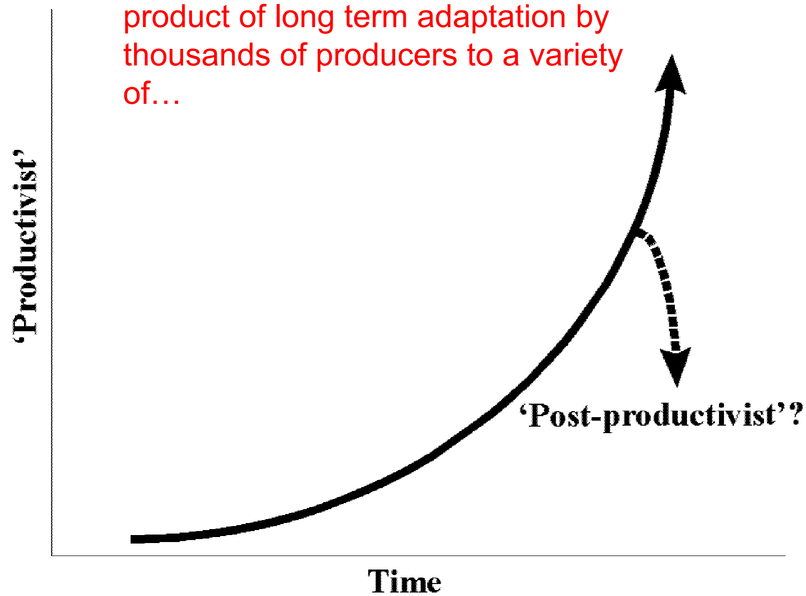
'Post-Productivism'

- focus on quality, not quantity (maximization)
- differentiated goods for niche markets; e.g. organic sector…

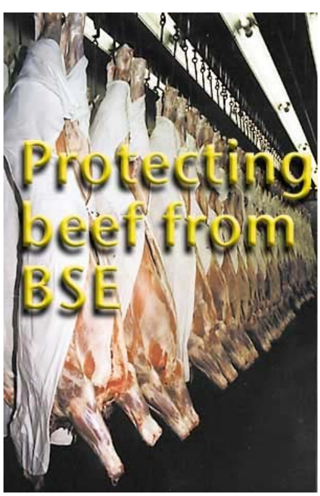


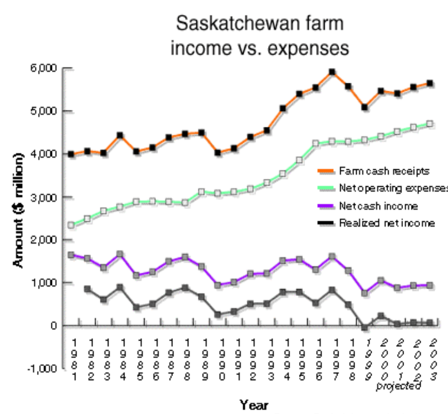
Source: Statistics Canada

Useful to think of this ‘trajectory’ as a product of long term adaptation by thousands of producers to a variety of…



Challenges & Opportunities





Current Challenges/Opportunities:
Climatic Change (and Variability)

- opportunities for Canadian prairie agriculture to contribute to *mitigation* of climatic change
- additionally, the farming system will clearly be *impacted* by climatic change, both positively and negatively
- however, *adaptation* will likely reduce negative impacts
- climatic *variability* (year-to-year weather and extreme events) will be a greater concern than change in average climatic conditions

Anticipated Climate Change Impacts on Cereal Yields (2080)

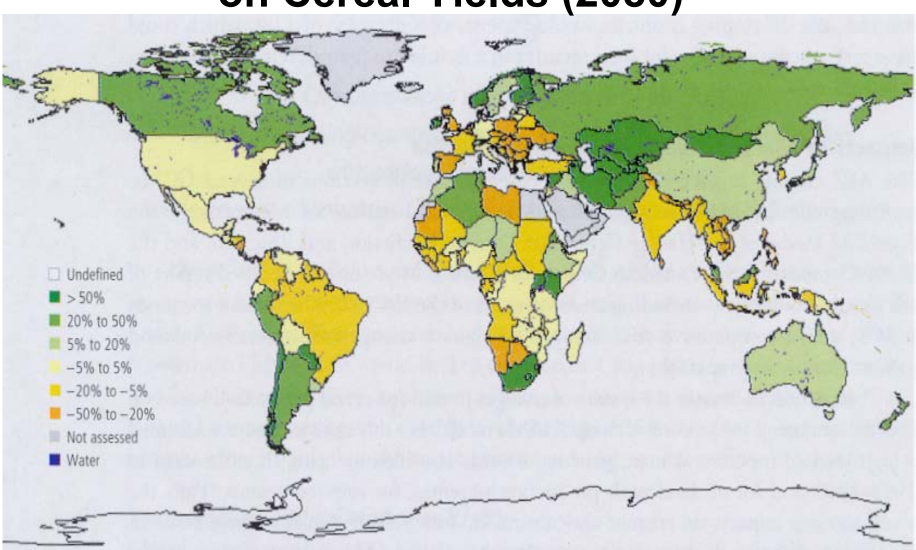
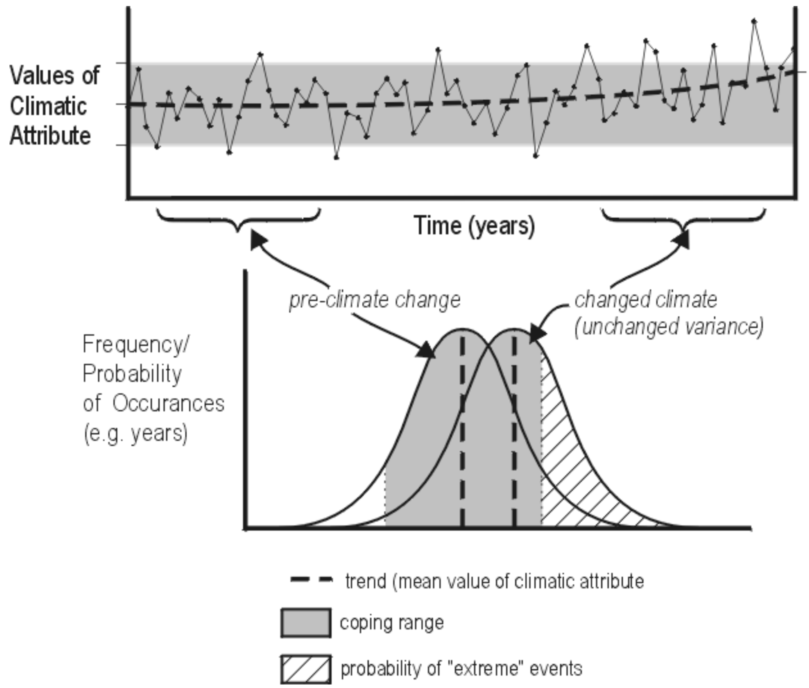
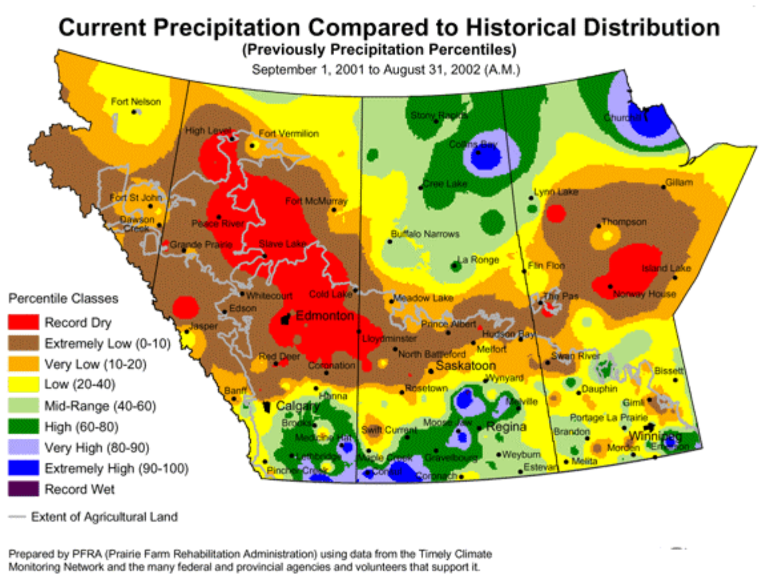


Figure 11. Max Planck Institute of Meteorology/ECHAM4 2080: Country-level climate change impacts on rain-fed cereal production potential in currently cultivated land.

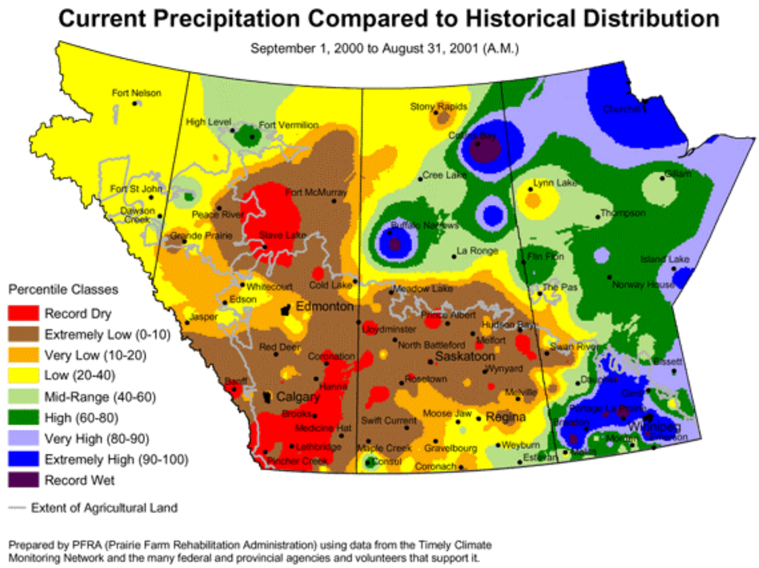
Source: Fisher et al 2001



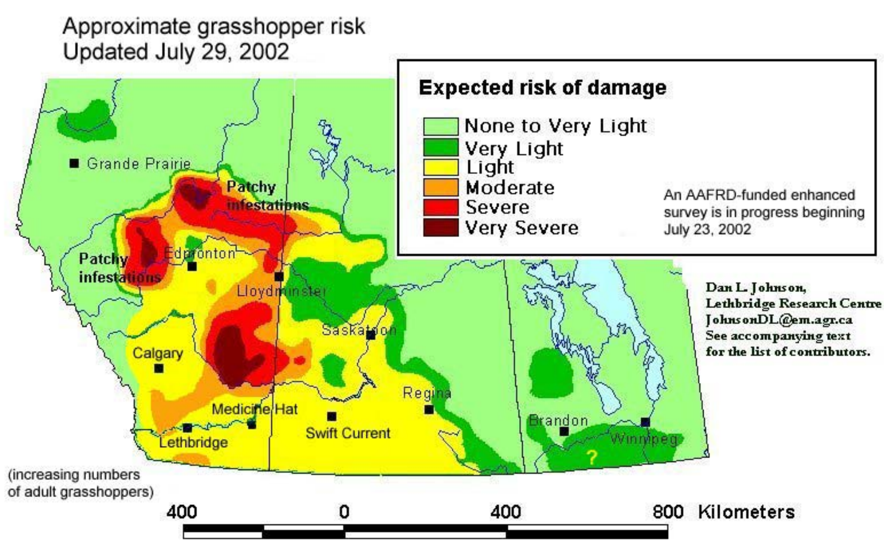
End of summer 2002…



End of summer 2001…



Plus grasshoppers in 2002!

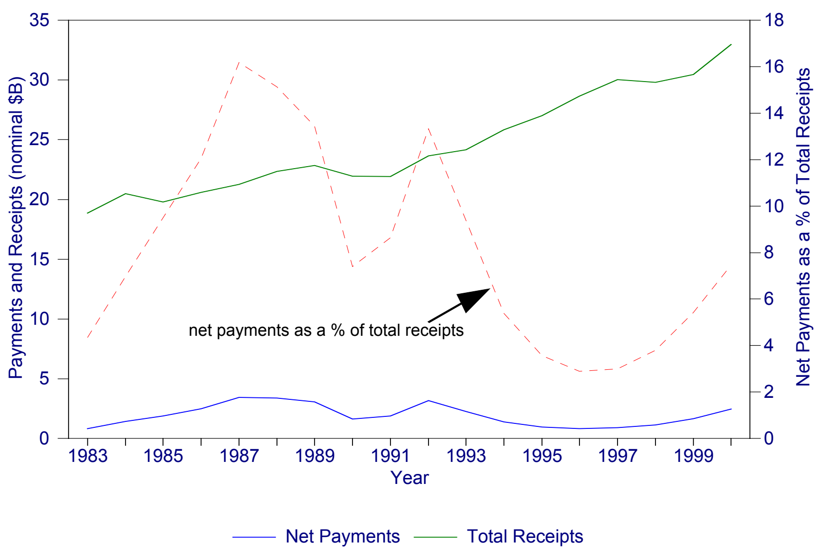


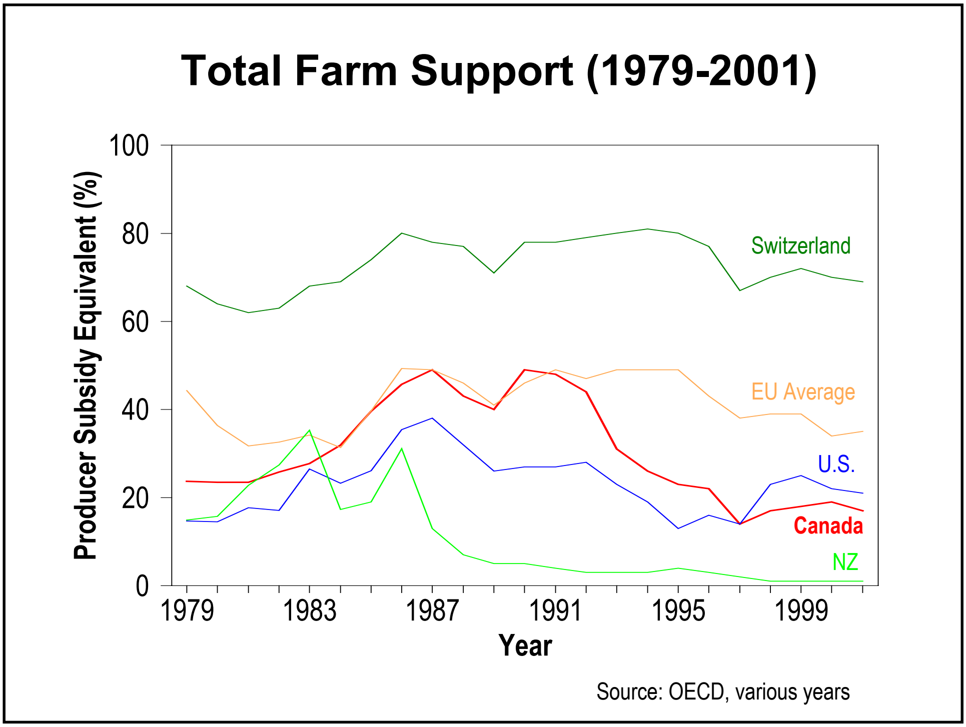
Current Challenges/Opportunities: Domestic Agricultural Policy (and the International Trade Environment)

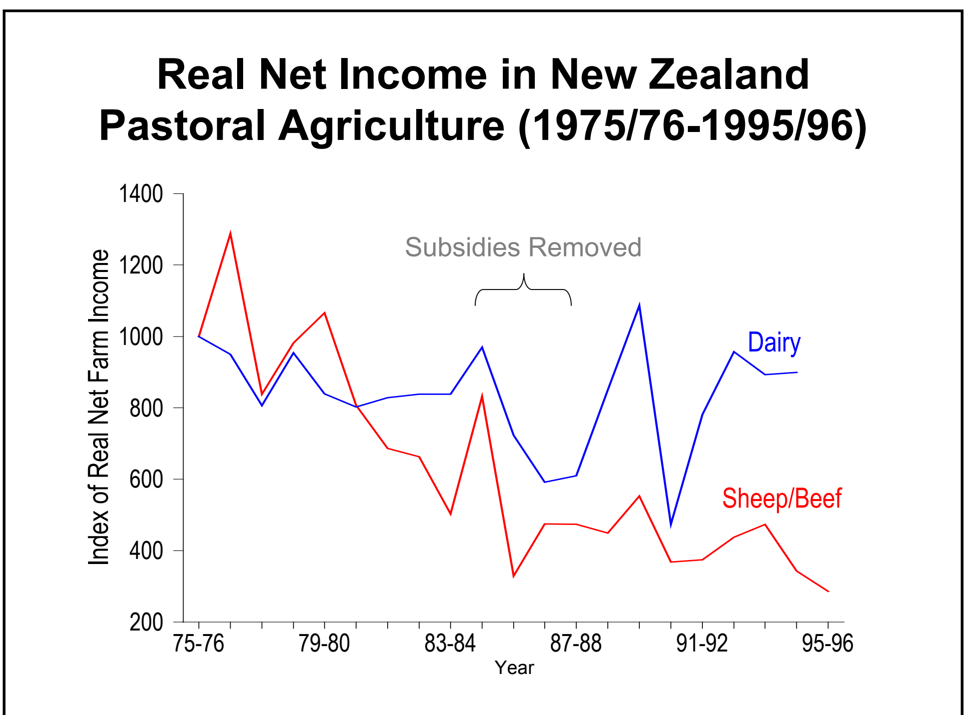
- for Canadian prairie agriculture, the past decade has been a time of significant change (an overall decline) in government support; e.g.
  - 30% decline in stabilization funding;
  - termination of grain/oilseed export subsidy and dairy subsidy;
  - etc.

- result of both domestic budget priorities and international trade agreements (e.g. NAFTA and GATT)

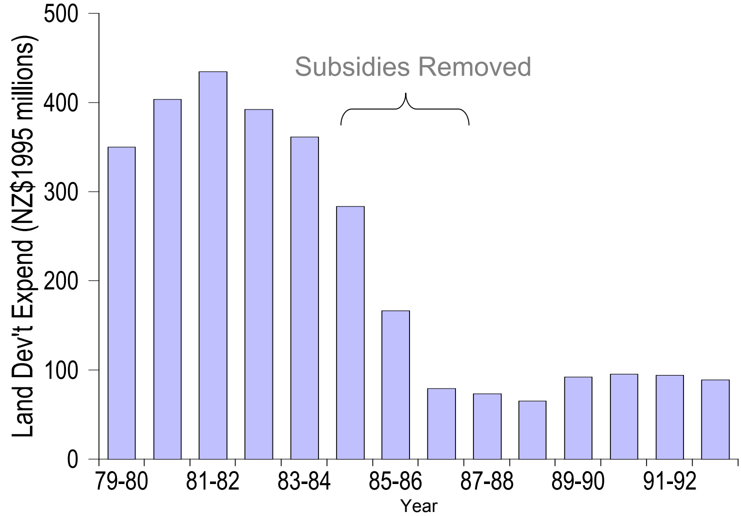
Canadian Farm Support Relative to Total Farm Receipts (1983-2000)




Total Farm Support (1979-2001)
Producer Subsidy Equivalent (%)
100
80
60
40
20
0
Switzerland
EU Average
U.S.
Canada
NZ
1979
1983
1987
1991
1995
1999
Year
Source: OECD, various years

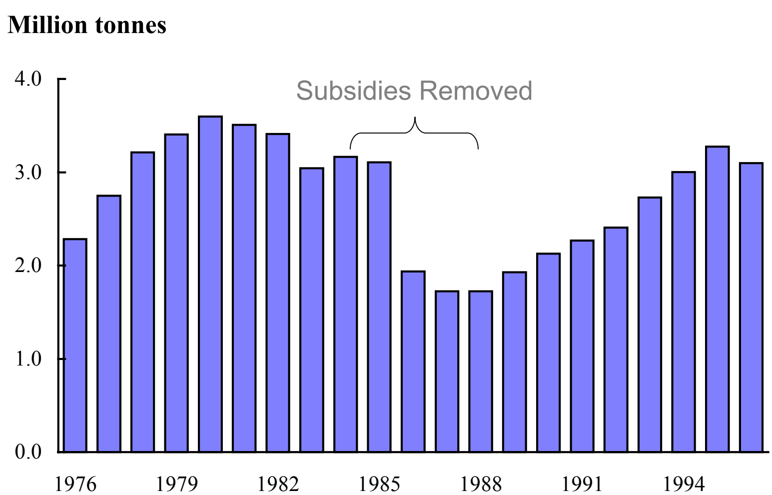

Real Net Income in New Zealand Pastoral Agriculture (1975/76-1995/96)
Index of Real Net Farm Income
1400
1200
1000
800
600
400
200
Subsidies Removed
Dairy
Sheep/Beef
75-76
79-80
83-84
87-88
91-92
95-96
Year

Land Development Expenditures In New Zealand (1979/80-92/93)



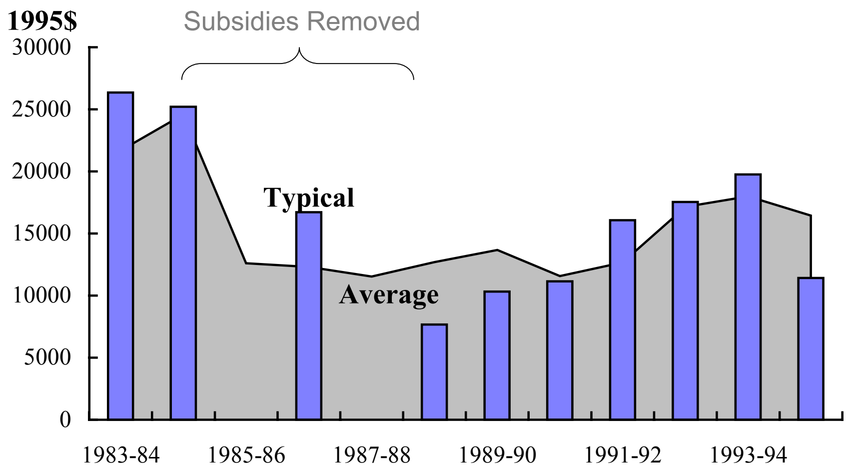
Source: Statistics New Zealand, various years

Fertilizer Use in New Zealand (1976-96)



Source: Statistics New Zealand, various years

Average And Typical Expenditures On Fertilizer Sheep/Beef Farmers, Northland, New Zealand



Source: Annual survey NZMWBES; MAF regional farm model

Changing Attitudes re: Fertilizer Use

The Subsidy Era:

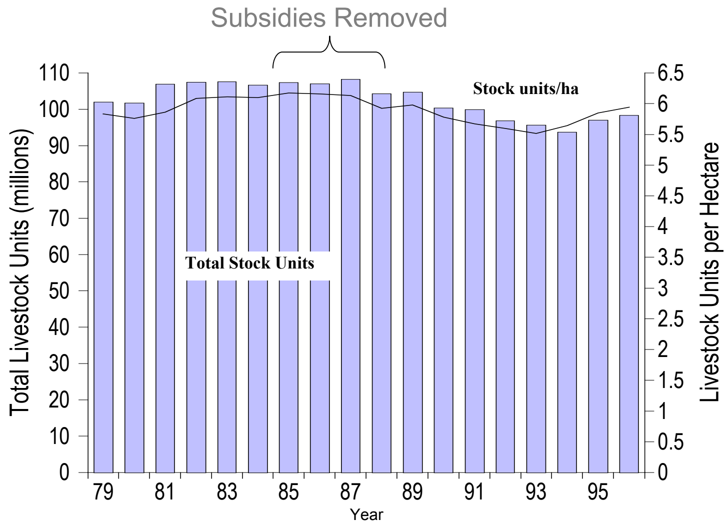
We put it on because we could pay for it, and it was almost like a populist thing, you've got to put fertilizer on; the more you put on the better, regardless.

The Post-Subsidy Era:

Of course now, we're a little bit more sensitive about the cost...and so we're more specific. That is why we soil test and we blood test the cattle, and look carefully at what is needed.

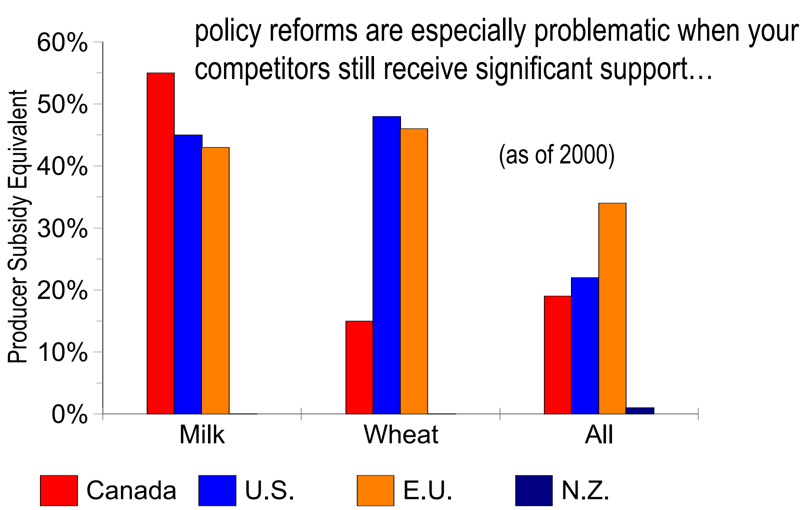
Source: Bradshaw, 1999

Livestock Numbers and Stocking Rates in New Zealand (1979-96)



Source: Statistics New Zealand, various years

Current Challenges/Opportunities: Domestic Agricultural Policy and the International Trade Environment



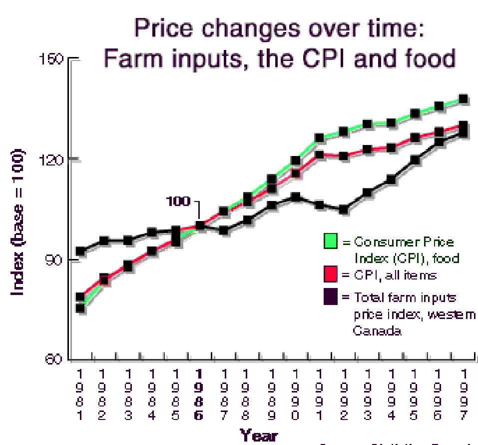
Source: OECD, 2002

Current Challenges/Opportunities: Domestic Agricultural Policy and the International Trade Environment

- and tariff and non-tariff barriers prevent or limit access; e.g. March 4, 2003: US announces 3.94% tariff on Canadian wheat imports
- of course, Canada is also guilty of protectionism, and many argue that such protectionism severely limits agricultural-based economic development in LDCs (see Pinstrup-Anderson, 2002; Bradshaw, 2002)

Current Challenges/Opportunities: Market Conditions

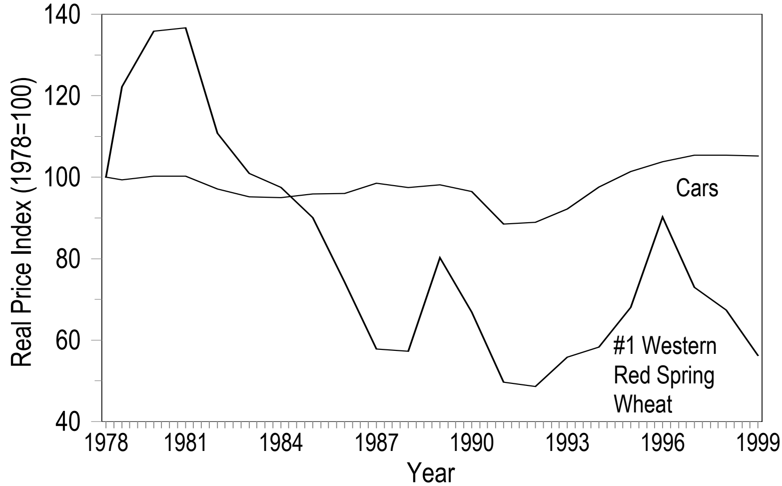
- while 2002 prices were stronger, recent prices for Canadian prairie outputs are at near historic lows in real dollar terms
- with rising input prices (albeit at below CPI rates), Canadian prairie farmers are caught in…



of inputs

of outputs

The Infamous 'Cost-Price Squeeze'

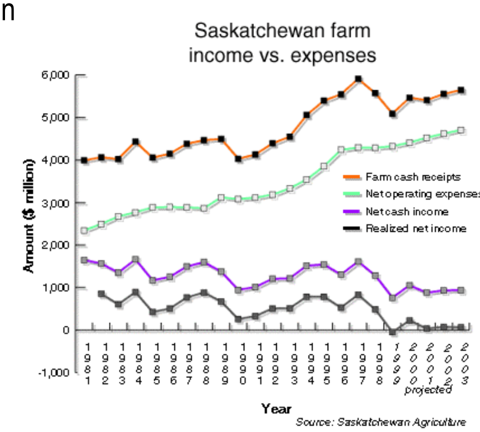


Sources: Canadian Wheat Board, 1999; Statistics Canada, 1999

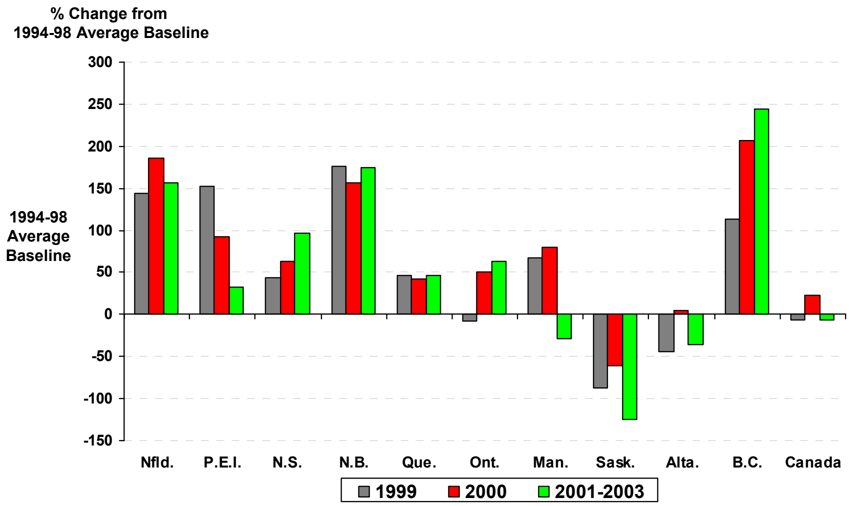
Declining Net Farm Incomes (and Narrow Profit Margins)

- net farm incomes in Saskatchewan are on the decline

- and profit margins are very tight; from 2001 census:
  - beef cattle farms = $0.94 in expenses per $1 revenue
  - large operations ($100,000 - $250,000 in receipts) = $0.81 expenses per $1 revenue
  - small operations (<$25,000 in receipts) = $1.68 expenses per $1 revenue



Realized Net Income, Canada and Provinces



Source: Agriculture and Agri-Food Canada; Statistics Canada

Current Challenges/Opportunities: Biotechnology

- adoption has been fairly aggressive…

Crop	Transgene	% Canadian Total (1999)
Canola	herbicide	50%
Soybeans	herbicide	30%
Corn	Bt insecticide	20%
Potato	Bt insecticide	20%

Explaining Adoption: The Case of GM Canola

- 80% of growers; 55% of total Canola acreage
- implications (adopters relative to non-adopters):
  - more direct seeding/no-till; hence less tillage and less fuel usage
  - 6000 less tonnes of herbicide used (40% less cost)
  - 10% higher yields
  - increased growers revenue by $5.80/acre

Source: Survey of Membership, Canola Council of Canada (2000)

Current Challenges/Opportunities: Biotechnology

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Potato	Bt insecticide	20%

- but public 'distaste' is growing in both domestic and international markets

Current Challenges/Opportunities: Public/Environmental Pressures

- pressure to reduce, for example:
  - agri-chemical use
  - GHGs (agriculture = 9.5% of Canadian emissions)
  - soil erosion (via reduced summer fallow and tillage of marginal soils, or conversion to pasture)
  - soil salinity
- and pressure to provide or protect, for example:
  - healthy, cheap food
  - rural water quality
  - biodiversity and wildlife habitat
  - scenic amenities

Of course, Canadian prairie farmers recognize the benefits of these acts…

- what is good for agricultural environments is usually good for agricultural livelihoods, and this holds true in both MDCs and LDCs…

Sustainable agriculture and rural development practices offer the best hope of reducing hunger and poverty: They help the poor make the transition to agricultural methods that provide food and income while conserving, restoring and improving the environment.

- Jacques Diouf, UNFAO, August 2002

The Constraint?
Farm-Level Costs may exceed Benefits

Benefits (✓) and Costs (✡) of adopting conservation-tillage or no-till	Scale		
	Farm	Regional	Global
Reduced costs (e.g. time, labour)	✓		
Stabilization of soil		✓	
Reduction of CO_2 emissions			✓
Purchase of specialized equipment	✡		
Short-term pest problems	✡		

Source: FAO, 2002

i.e. many of these demanded acts produce a 'public good'

The Rationale for Public Support of Agri-Environmental Stewardship

To maintain land, people are going to have to be helped....I see us as caretakers of the land, but it isn't just here for us to take. We are here to look after it, and that is really important. We want to see this land still be good land in a 100 years time. But at this rate, with what we are able to earn off it...we've got to be helped to keep control of the erosion, planting [etc.]...there needs to be assistance in that respect.

- New Zealand Sheep/Beef Farmer, 1996

Source: Bradshaw, 1999

Recommendations (Policy for the Canadian Prairies)

- financially support and encourage agri-environmental stewardship (public interest must match public stake)
- maintain/expand (decoupled) support to stabilize incomes; e.g. Net Income Stabilization Account
- defend export-oriented sectors but recognize limits of the 'productivist' model
- focus on reducing vulnerability and facilitating adaptation; e.g. preparing for climate change

Recommendations (Trade Liberalization at the WTO)

- Canadian prairie producers would clearly benefit from a more 'level playing field'; hence, need to further eliminate coupled-support (especially export subsidies) and promote improved access to markets
- however, this should not be done at the expense of producers in LDCs:
  - 'green box' programs are justifiable
  - accept need for 'development box' programs; i.e. special measures to assist cash cops exports and staple crop production for improved 'food security'