NAE Chapter 2 Figures

Figure 2-1. Change in farm size and number of farms in North America from 1940-2000

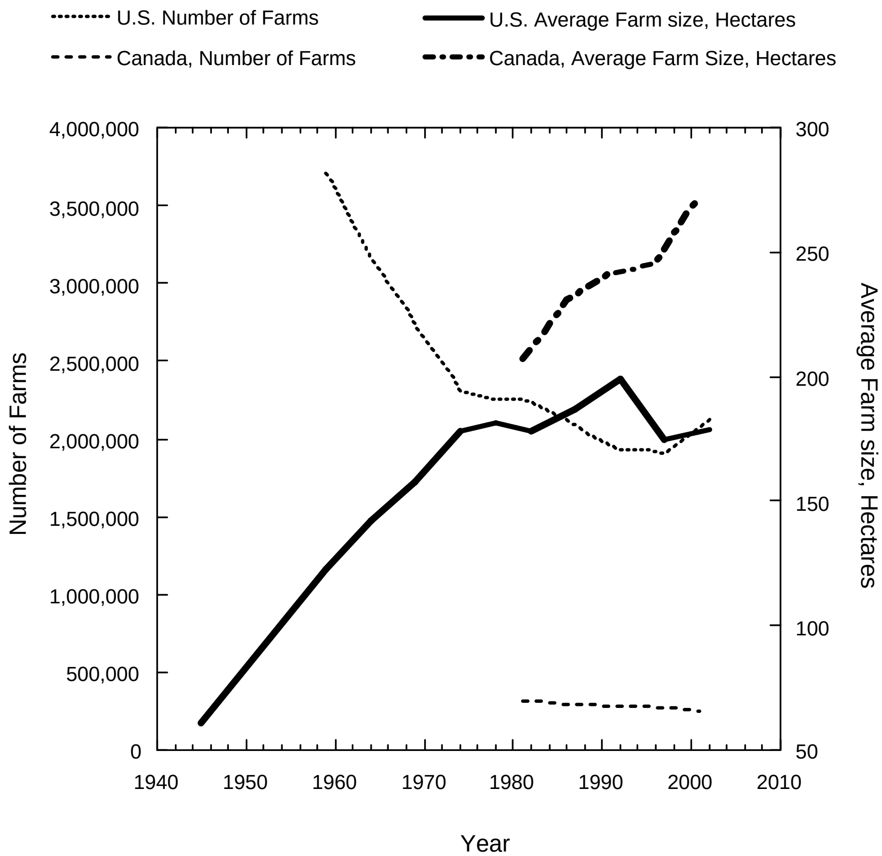


Figure 2-2. Distribution of commodities by sales class in U.S. Source: USDA, 1999.

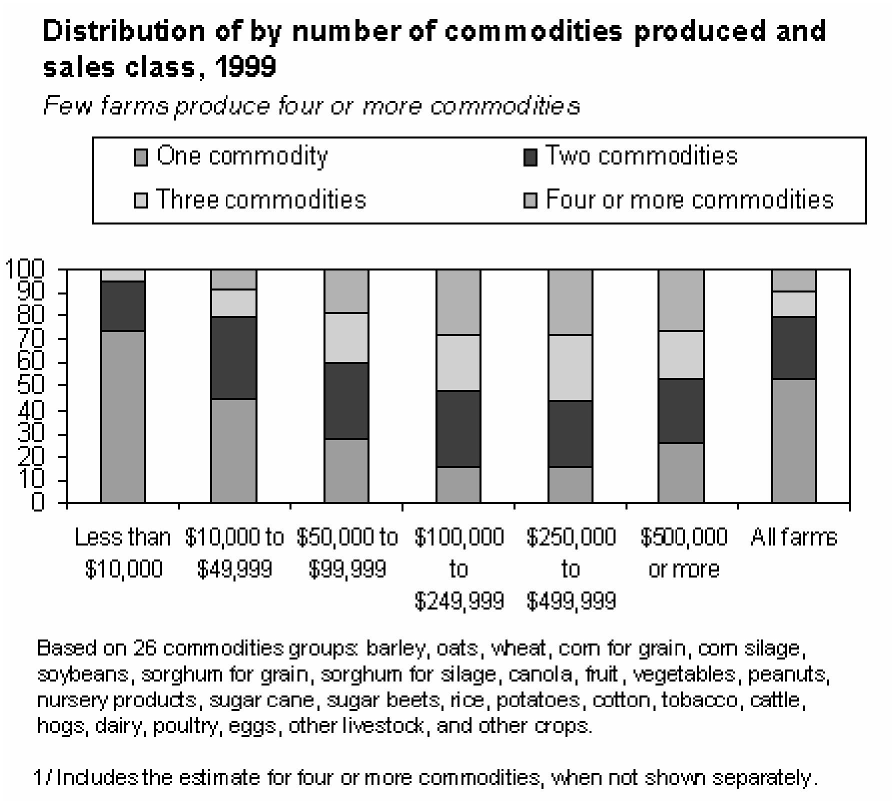
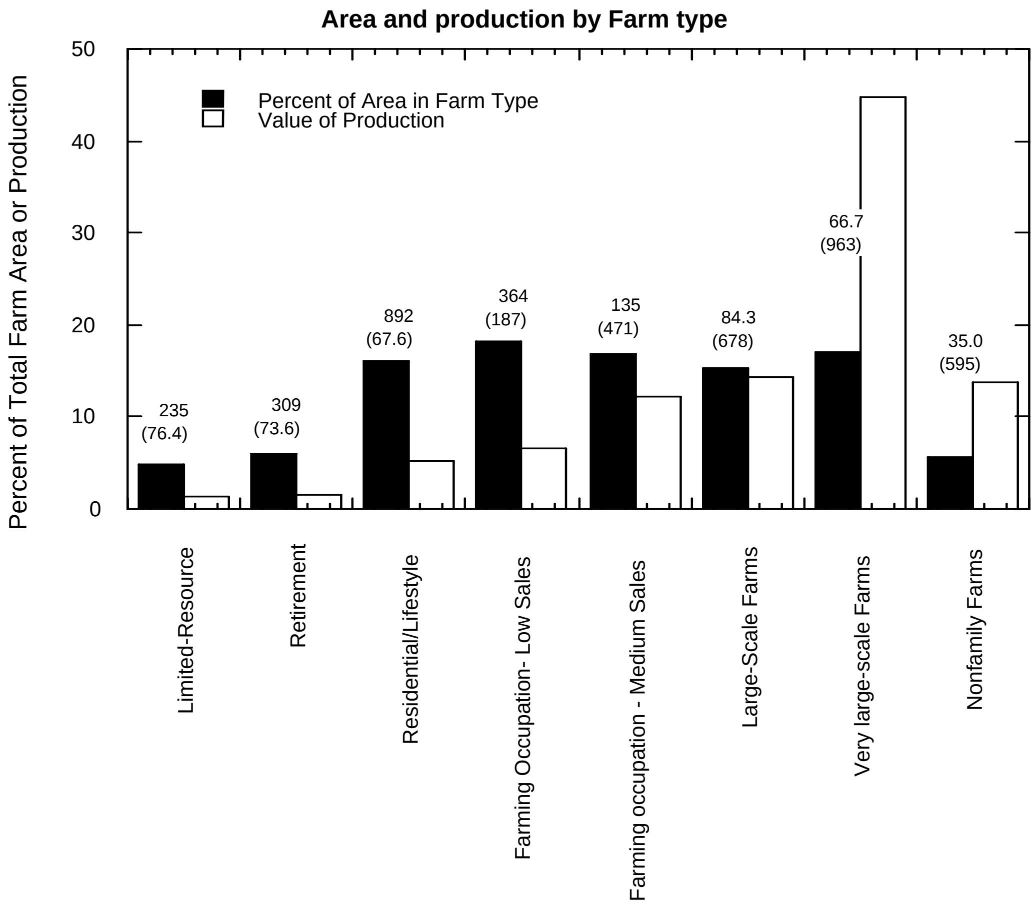


Figure 2-3. US farmland area (%) and total U.S. farm production (%) by type of farm in 2005. Source: Hoppe and Banker, 2006.



The numbers above each category are the number of farms (thousands) in this category and in brackets is the average size in hectares for the category. The categories are defined as: Limited Resource = small farms with operator household income below poverty level; Retirement = small farms whose operators report they are retired; Residential/Lifestyle = small farms whose operators report a major occupation other than farming; Farming occupation, Low-sales = sales less than $100,000; Farming occupation, Medium-sales = sales between $100,000 and $249,999; Large family farms = Sales between $250,000 and $499,999; Very large family farms = sales of $500,000 or more. Non-family farms = Farms organized as non-family corporations or cooperatives as well as farms operated by hired managers.

Figure 2-4. Change in rural and farm populations as percent of total population in North America from 1930-2000.

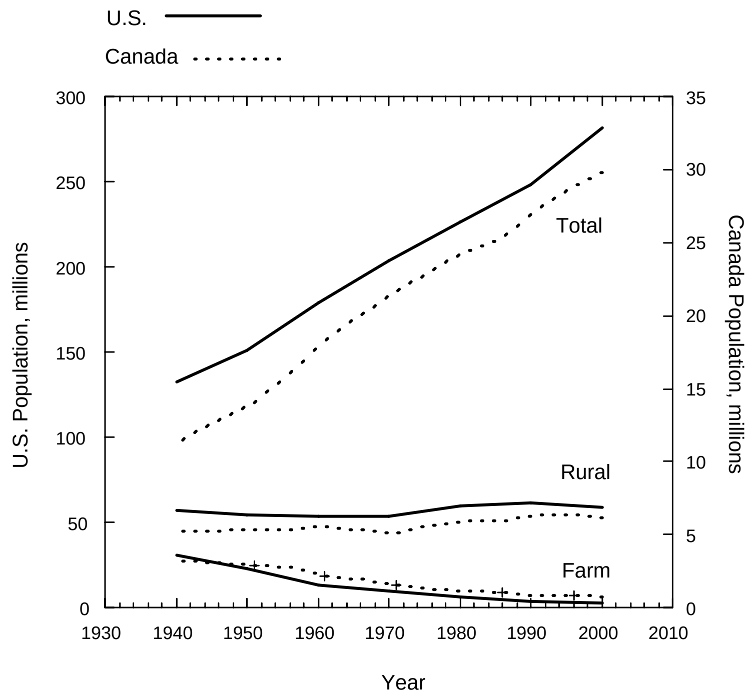


Figure 2-5. Changes in the number of farms in West Germany 1949-2001 These figures represent typical responses for changes in the whole of Western Europe. Source: Germany, 2006.

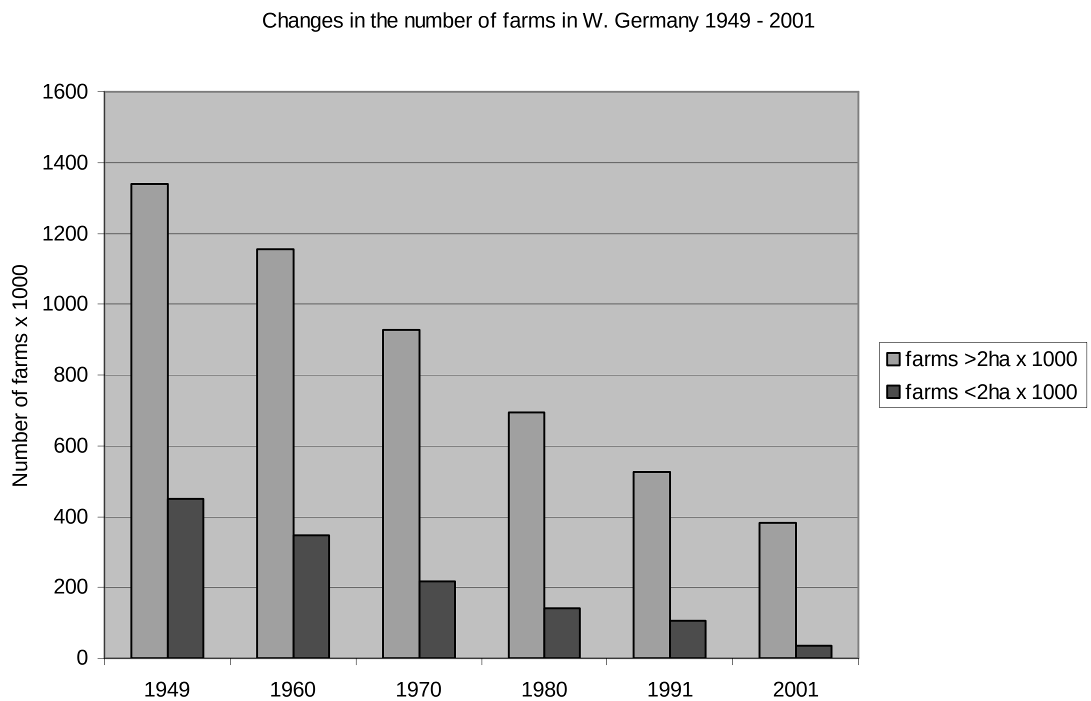


Figure 2.9 Trends in consolidation in the U.S. food industry from 1990 to 2007.

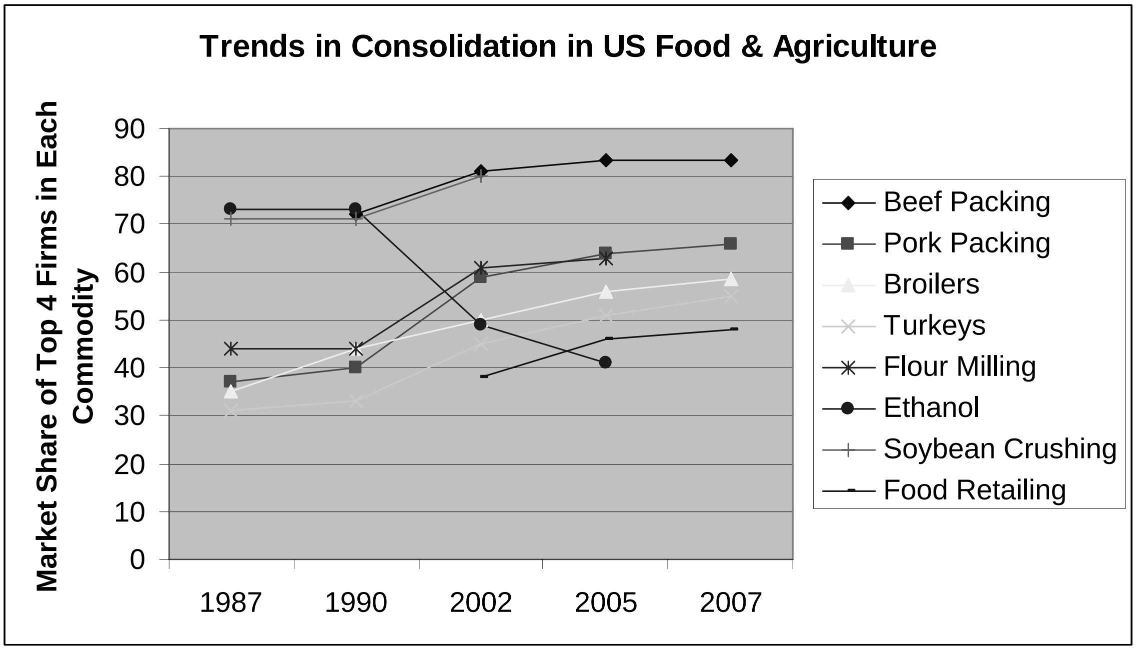


Figure 2.10 EU-25 Food and drink sector 2001, value of production (EUR bn,). Source: USDA-FAS

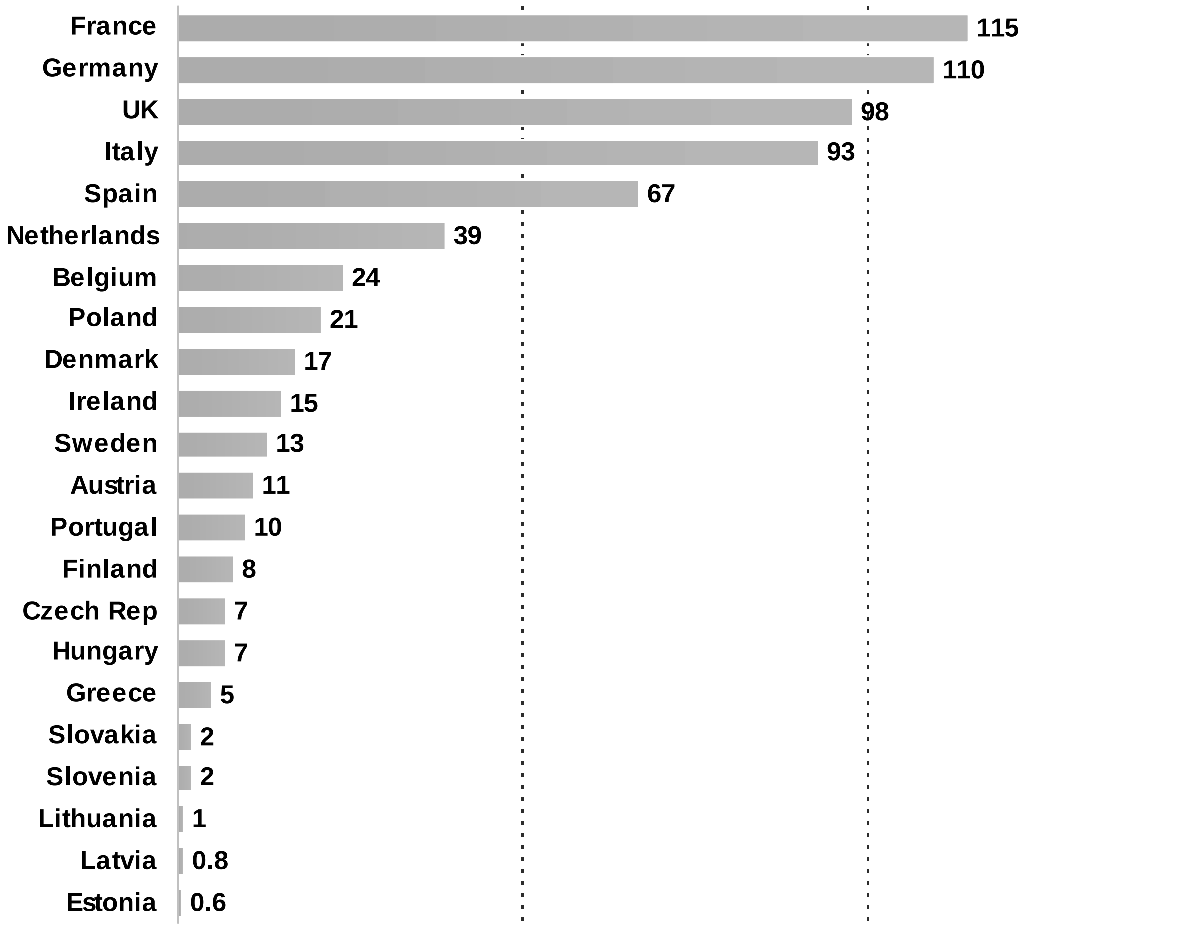
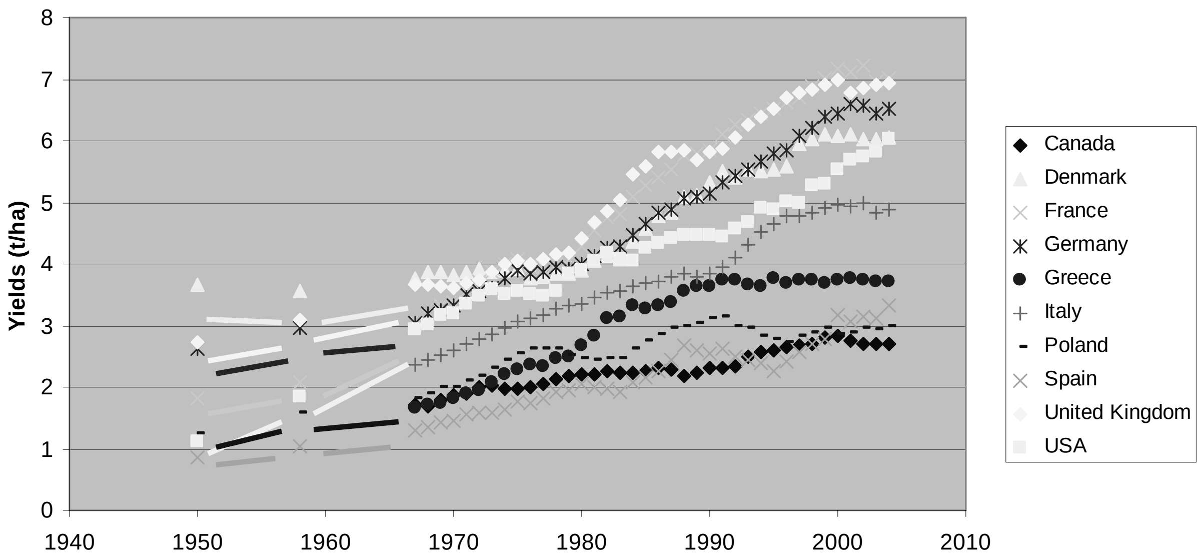
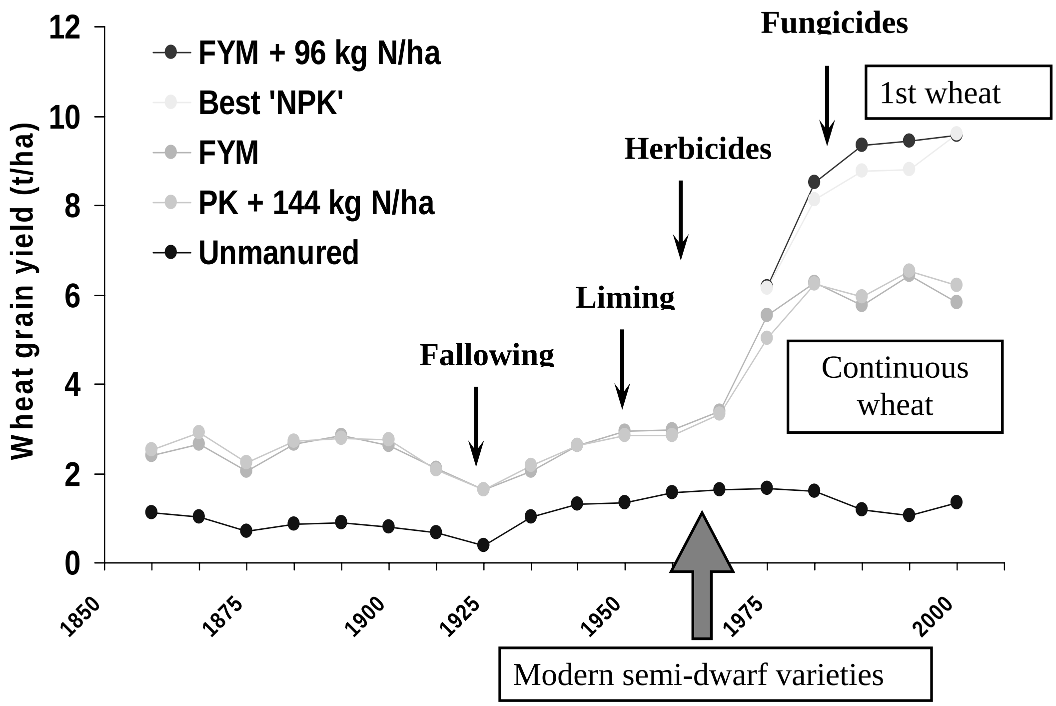


Figure 2.11 Wheat yields in ten NAE countries since 1950. Source: FAOSTAT, 2006; FAO Yearbooks 1950 and 1958.



Note: Data for 1950 and 1958 are single year values, whereas those for 1967 onwards are rolling 5 year means.

Figure 2.12 Yield responses on the Broadbalk winter wheat experiment at Rothamsted Research (UK)* since 1843 in relation to the introduction of novel agronomic practices. Source: FAO statistics.



Plots have contrasting levels of organic (FYM) and inorganic nutrients (NPK). Updated from Poulton, 1995) FYM = farmyard manure from cattle, 1st wheat = wheat as the first crop in a 4-year rotation.

***Rothamsted Research (UK)**

Inorganic and organic fertilizers (NPK) made the earliest contribution to increasing wheat yields. The value of providing a suitable pH was recognized in the 1950s. The first herbicides were developed at this time and improved cultivars started to impact on production. The arrival of the semi-dwarf cultivars in the 1960s enabled farmers to increase fertilizer use still further. The combination of their short stature combined with disease resistance and availability of fungicides and insecticides, further increased yields. Over the period 1950 to 2000 yields had tripled. This example shows how agricultural science and technology had created an environment whereby farmers could continue to increase their crop yields.

Figure 2.16 Adoption of genetically engineered crops initially grew steadily and then leveled off in the U.S. after yield increases and cost savings did not live up to expectations. Source: Fernandez-Cornejo, 2005.

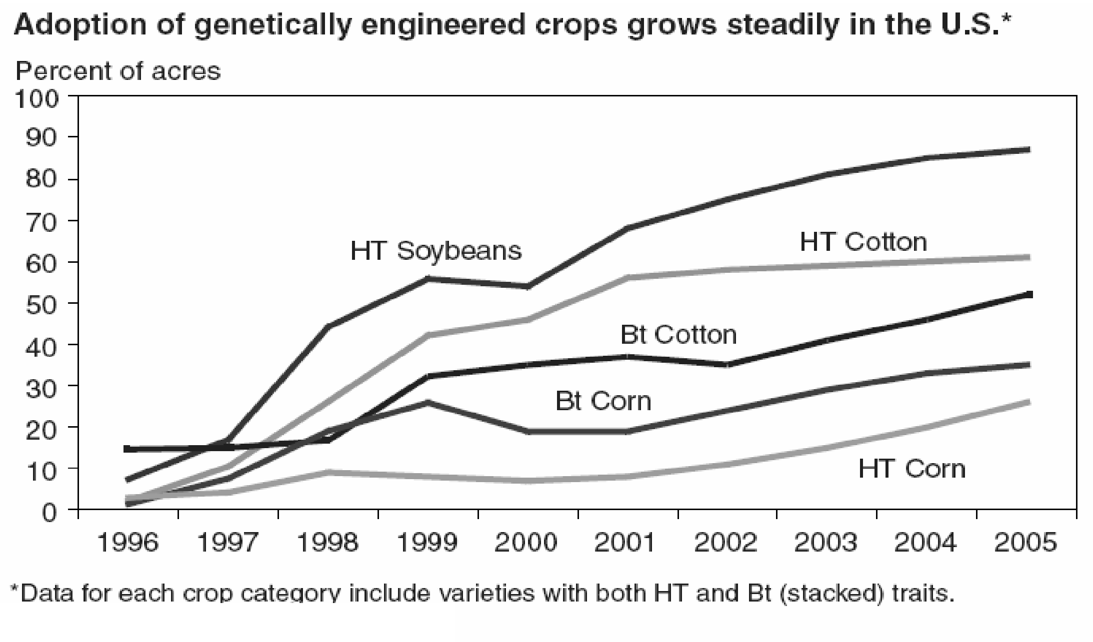
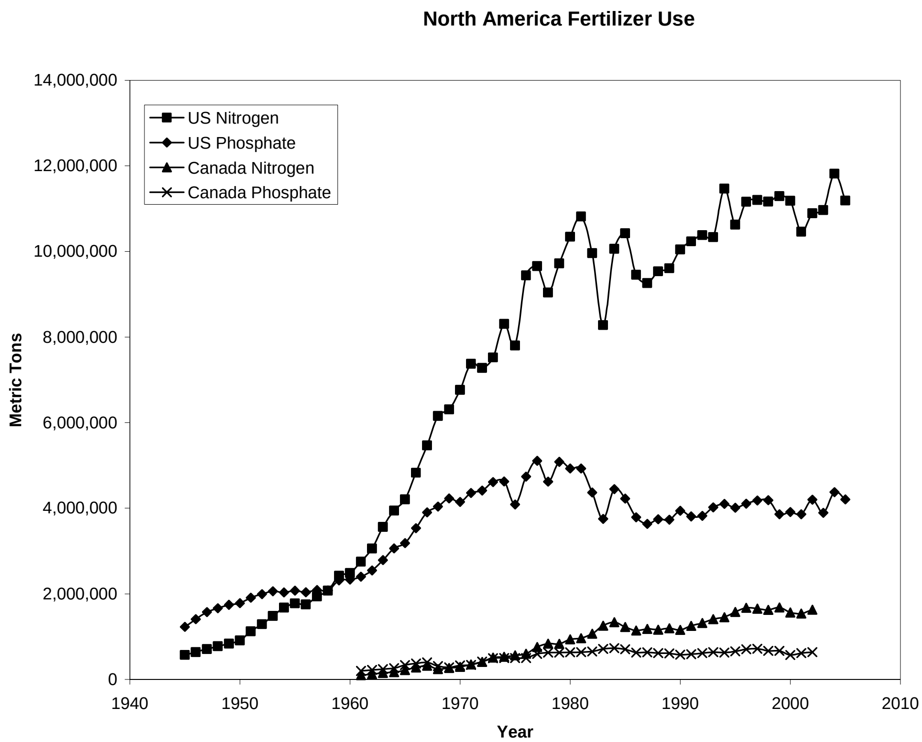


Figure 2.17 Fertilizer use in North America. Nitrogen is reported as applied elemental nitrogen. Phosphate contains on an elemental basis 43.66% Phosphorus. Sources: U.S. data -U.S. Department of Agriculture, Economic Research Service. Canada -FAO statistics.



Note: there is a one year offset in data provided by ERS and that reported by FAO with the ERS data being one year earlier.

Figure 2.18 Nitrogen and phosphorus fertilizer use in Europe and the Baltic States. Nitrogen is reported as applied elemental nitrogen. Phosphate contains on an elemental basis 43.66% Phosphorus. Source: FAO statistics.

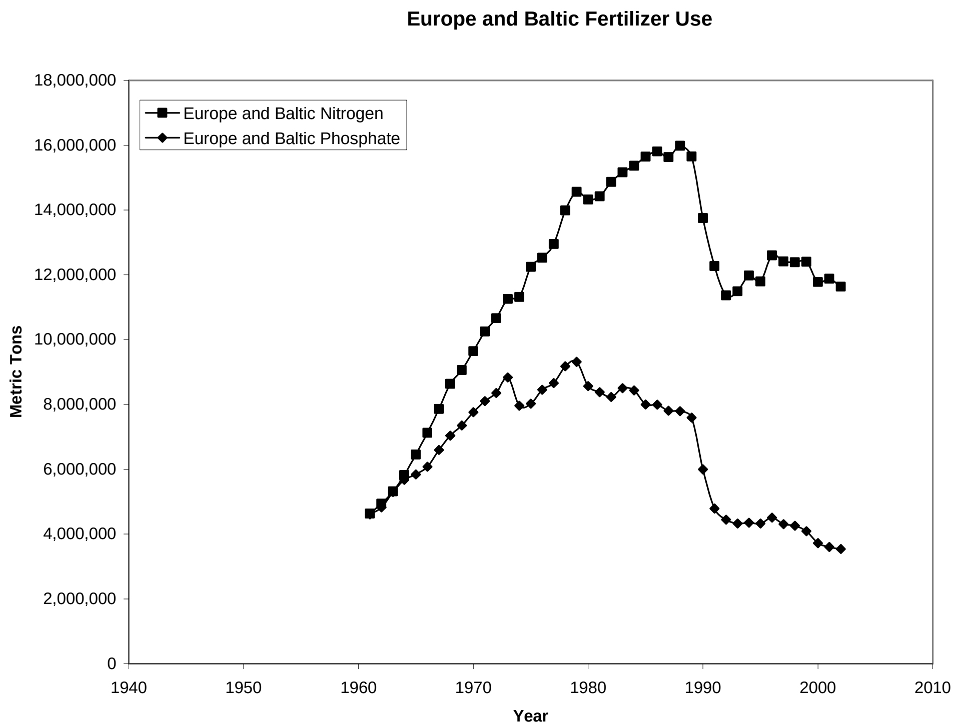


Fig. 2.19 Trends in US pesticide use. Values are for tons of active ingredients. Other conventional pesticides include nematicides and fumigants, (primarily) and also includes rodenticides, molluscicides, fish and bird pesticides. Source: Kiely et al., 2004; Aspelin, 1997, 2003.

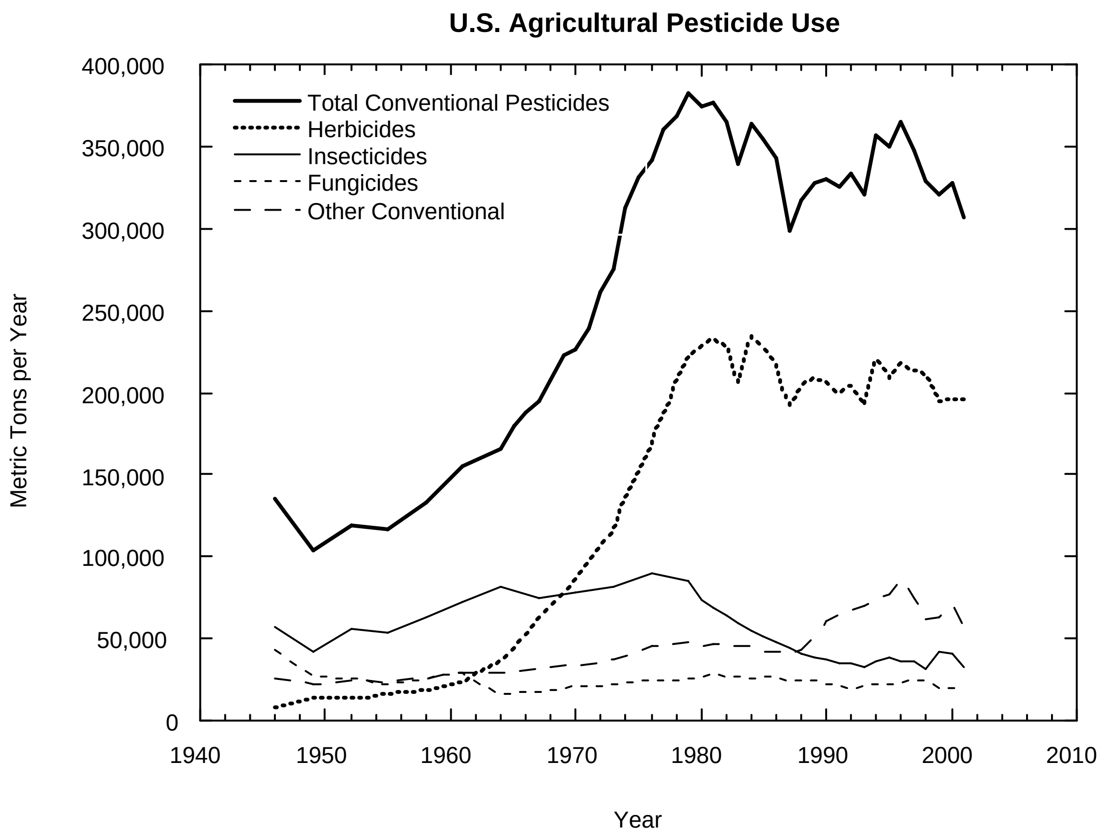


Figure 2-21. Geographic changes in hog and pig production in the U.S. Animal production in North America has become more geographically concentrated with pork production moving from the Midwestern U.S. to the South and Southeast. Dairy production has intensified and moved from the Northeast to the West Coast. Similar trends have been noted in Canada where animal production has moved westward. Source: McBride, 1997 – arrows added

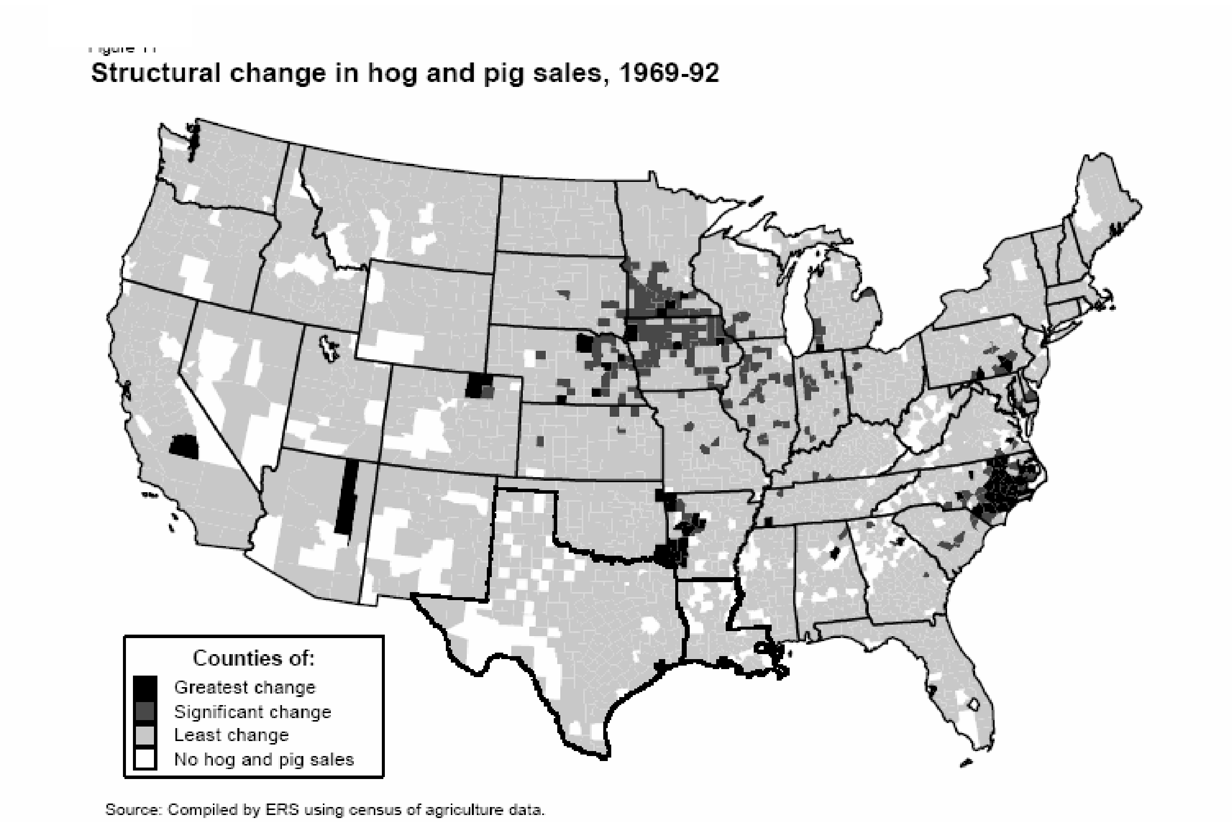


Figure 2.24 Trends in productivity per cow in U.S. from 1996-2005. Source: USDA-NASS, 2006 Available at http://www.nass.usda.gov/Charts_and_Maps/Milk_Production_and_Milk_Cows/.)

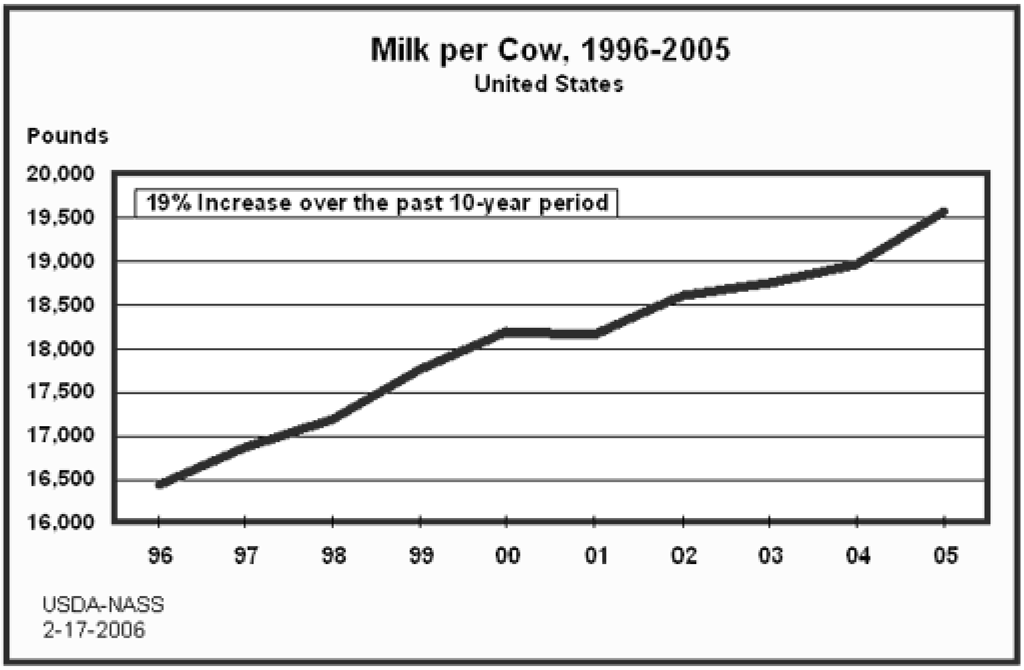


Figure 2.27 Changes in NAE forest areas (natural and plantation) 1993 to 2004. Source: TBFRA-2000: Executive Summary. http://www.unece.org/trade/timber/fra/screen/summary.pdf

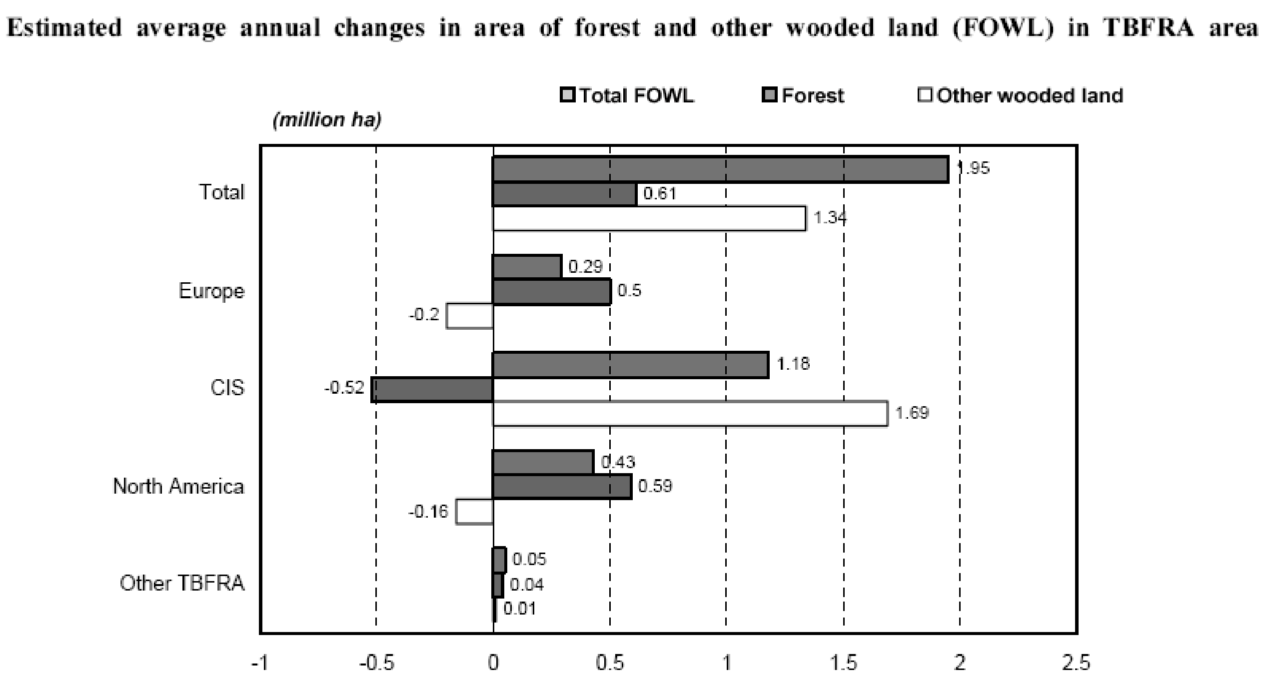


Figure 2.30 Production of major aquaculture species in the U.S. Note different scale for catfish.

Figure 2.31 Production of major salt water aquaculture species in the U.S.

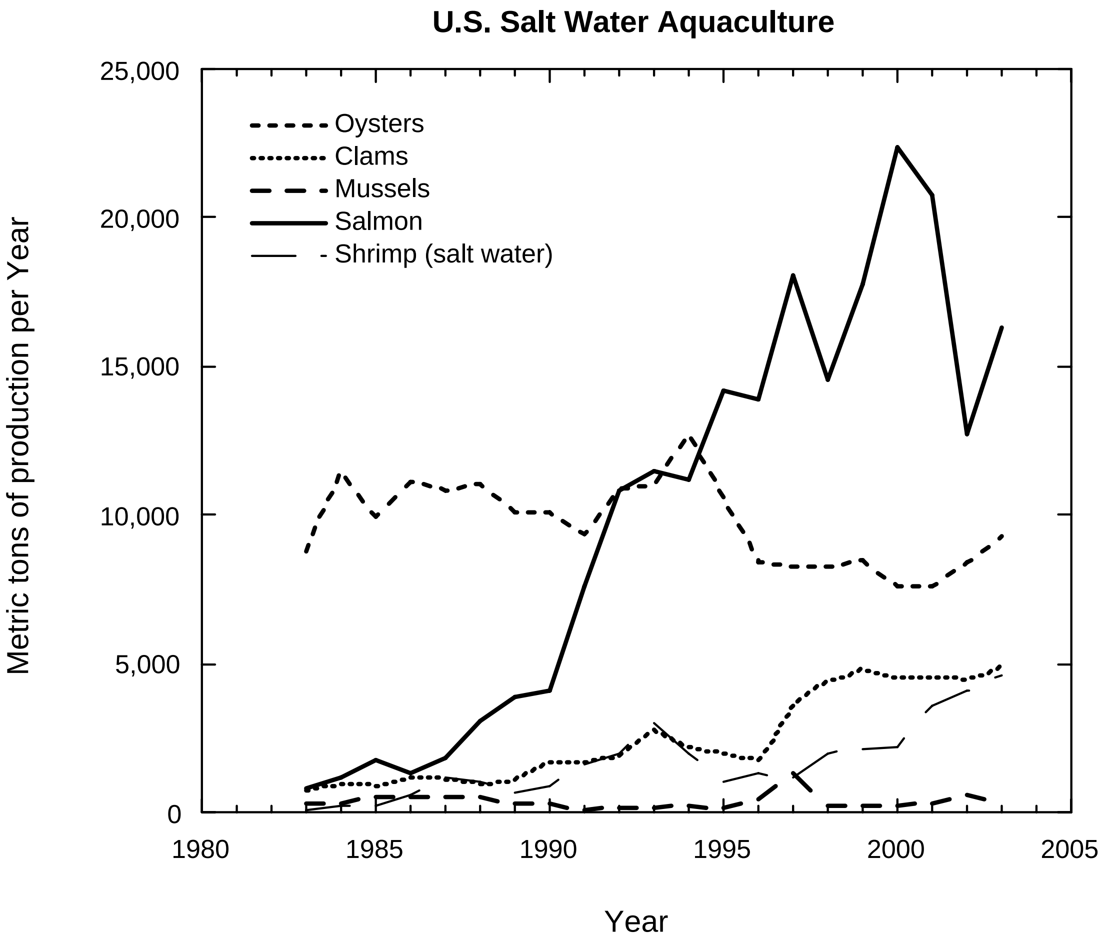


Figure 2.32 Canadian saltwater finfish aquaculture production. (Also see note in Figure [Hinga3]). Source: Fisheries and Oceans Canada, Statistical Services 1986 to 2004 (http://www.dfo-mpo.gc.ca/communic/statistics/aqua/index_e.htm)

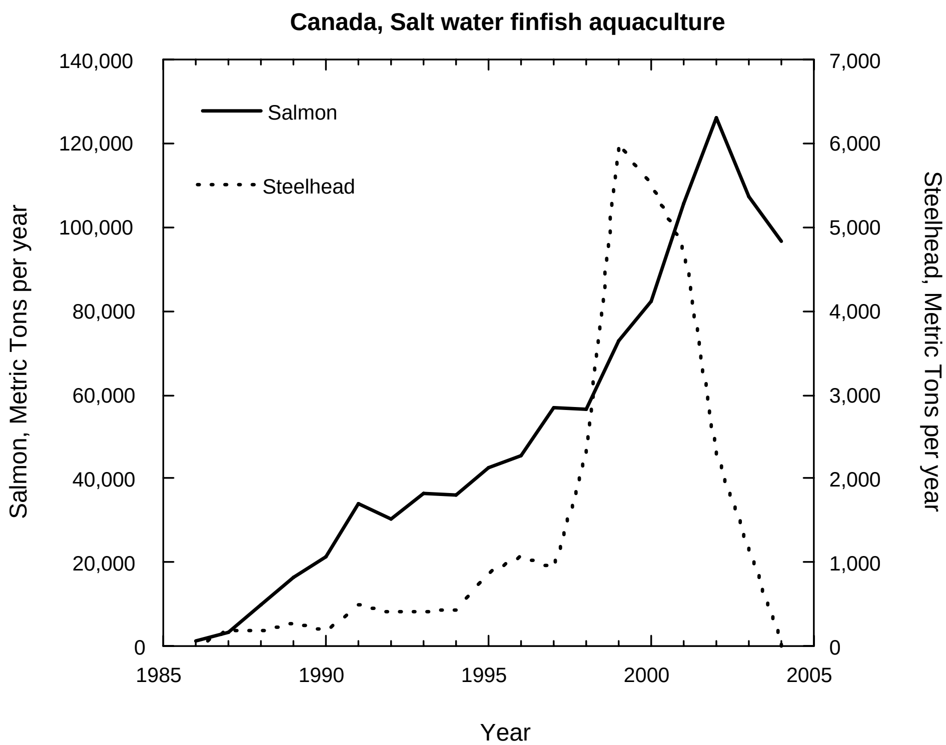


Figure 2.33 Canadian shellfish aquaculture. Source Fisheries and Oceans Canada, Statistical Services 1986 to 2004 (http://www.dfo-mpo.gc.ca/communic/statistics/aqua/index_e.htm)

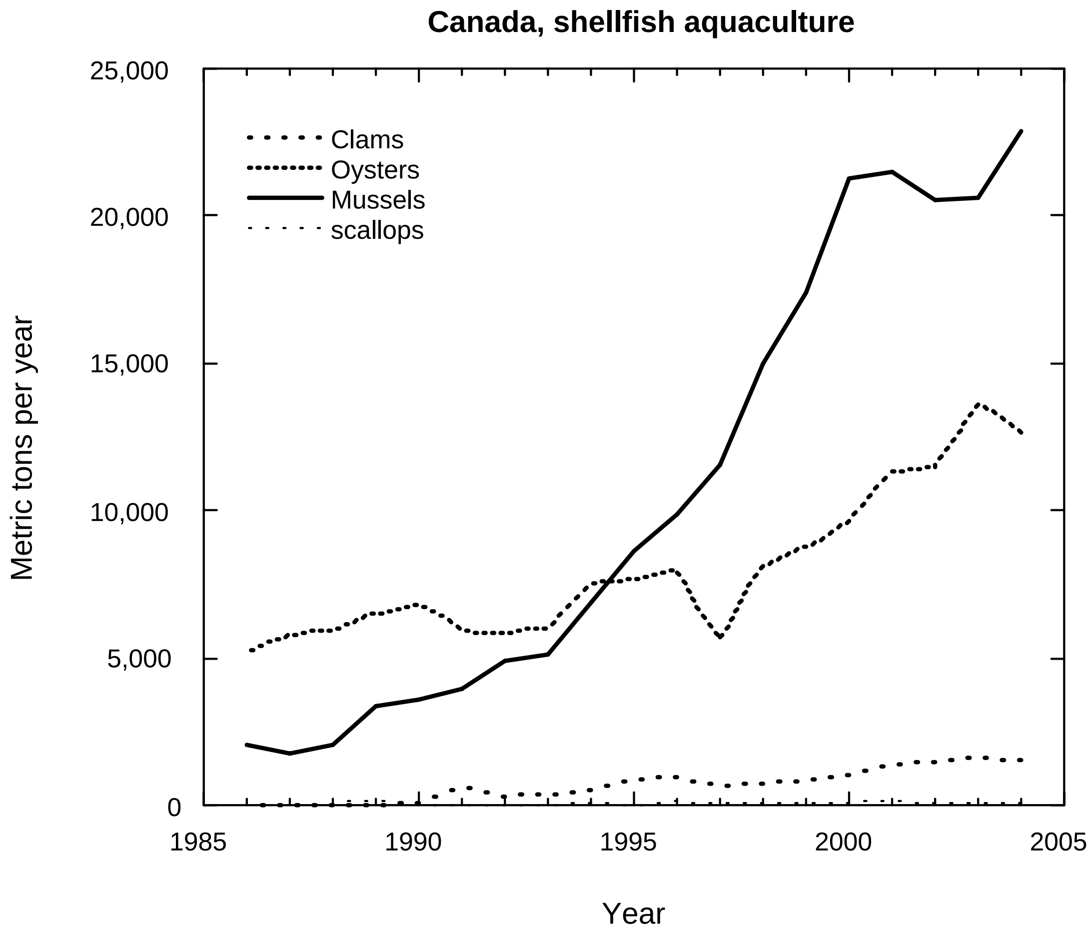


Figure 2.35 Large supermarket penetration vs GDP per capita

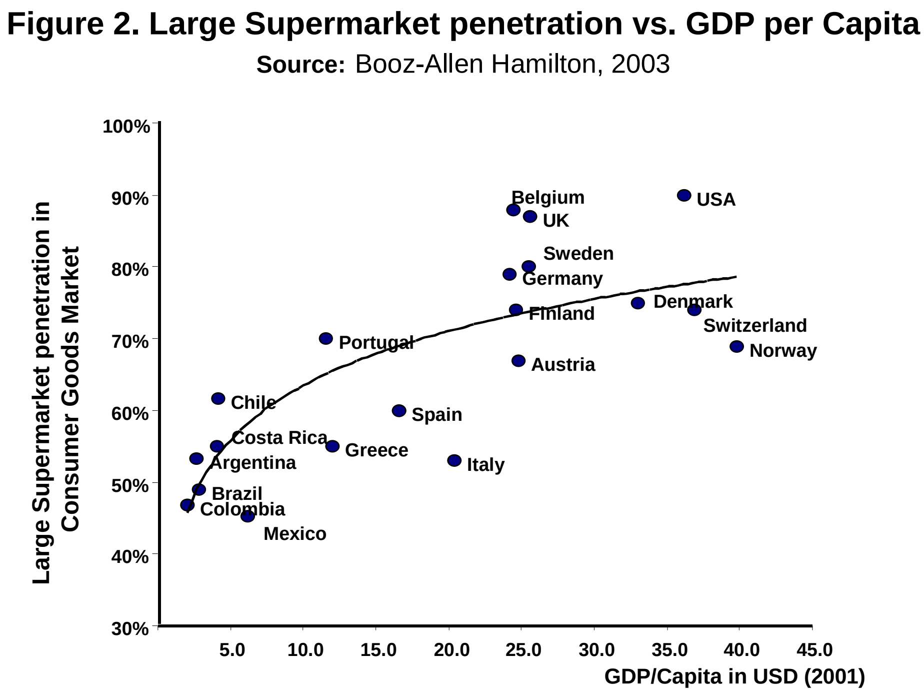


FIgure 2.37 The supply chain funnel in Europe. Source: J-PGrievink, Cap Gemini, OECD 2003

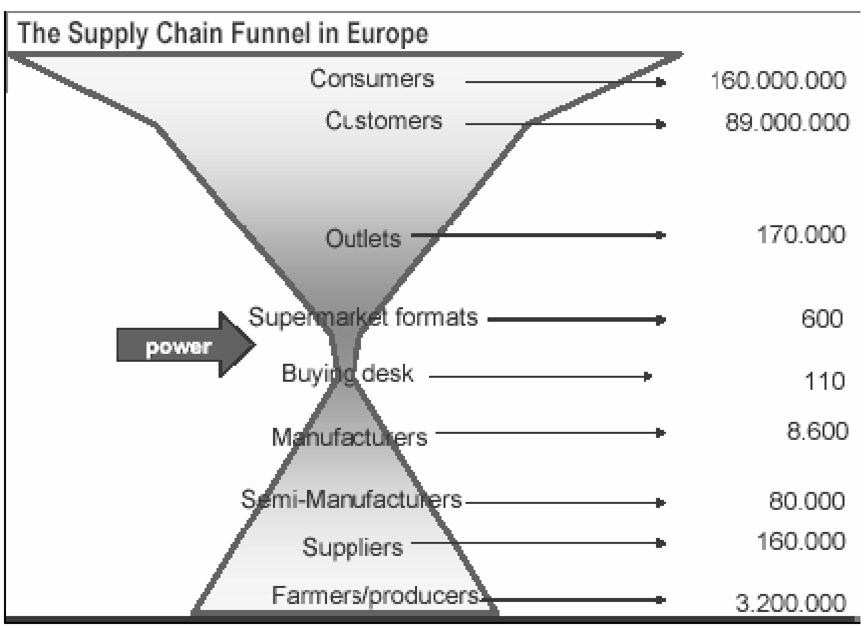


Table 2.1 100 years of structural change in U.S. agriculture. Source: Dimitri and Effland, 2005.

	1945	1970	2000/02
Number of farms (millions)	5.9	2.9	2.1
Average farm size (acres)	195	376	441
Average number of commodities			
Produced per farm	4.6	2.7	1.3
Farm share of population (percent)	17	5	1
Rural share of population (percent)	36 (1950)	26	21
		percent	
Off-farm labor*	27	54	93

*1945, percent of farmers working off-farm; 1970 and 2000/02, percent of households with off-farm income.

Table 2.2 Agricultural output by product and enterprise in Russia. Source: *Rossiia v tsifrakh 2004*(Moscow: Goskomstat, 2004), 207; *Rossiia v tsifrakh 2005* (Moscow: FSGS, 2005), 210. As quoted in (O'Brien and Patsiorkovsky, 2006)

Structure of agricultural output by type of product and type of enterprise in Russia 1990-2004(%)

	Type of enterprise								
	Large enterprise			Private farmer			Household		
Type of agricultural product	*1990*	*1995*	*2004*	*1990*	*1995*	*2004*	*1990*	*1995*	*2004*
Grain	99.7	94.4	81.2	0.01	4.7	17.4	0.3	0.9	1.4
Sugar Beets	99.9	95.9	88.6	0.01	3.5	10.3	0.0	0.6	1.1
Sunflower	98.6	86.3	74.4	0.0	12.3	24.5	1.4	1.4	1.1
Potatoes	33.9	9.2	6.2	0.0	0.9	2.0	66.1	89.9	91.8
Vegetables	69.9	25.3	14.9	0.0	1.3	4.9	30.1	70.4	80.2
Meat	75.2	49.9	45.1	0.0	1.5	2.4	24.8	48.6	52.5
Milk	76.2	57.1	45.0	0.0	1.5	2.8	23.8	41.4	52.2
Eggs	78.4	69.4	72.8	0.0	0.4	0.5	21.6	30.2	26.7
Share of total agricultural output			43.1			5.9			51.0

Table 2.5 Poverty rates per household group as a percentage of national poverty rates (poverty line: 50 percent of national average equivalent expenditure), EU 12

Socio-economic classifications	BE	DK	GE	GR	FR	IR	IT	NL	PO	SP	UK
Headship											
Male head	95	98	92	98	88	90		101	94	94	82
Female head	131	104	122	113	143	151		96	123	135	163
Economic activity head											
Agriculture	-	277	-	156		110	-	142	141	-	144
Manufacturing	-	51	-	71		64	-	138	65	-	63
Construction	-	57	-	113		124	-	119	101	-	105
Gov't. Services	-	35	-	-		48	-	28	57	-	55
Other services	-	36	-	53		55	-	72	49	-	63
None	-	193	-	131		174	-	116	134	-	168

Source: Eurostat (1990) Poverty in Figures. Europe in the Early 1980s. Table 5.2, p. 42-43. Luxembourg: Office for Official Publications of the European Communities in Howard-Borjas & S. de Rooij "Rural women and food security: Current situation and perspectives" FAO 1998.

Table 2.6 Concentration in the U.S. and Canadian food industry. Source: Hendrickson and Heffernan, 2006, 2007.

Commodity Market and Top Firms	2007 Concentration Ratio*	Historical CR4
Beef packing (Tyson, Cargill Excel, Swift & Co, National Beef)	CR4=83.5%	CR4=72% (1990)
Pork packing (Smithfield, Tyson, Swift & Co, Hormel)	CR4=66%	CR4=37% (1987)
Broilers (Pilgrims' Pride, Tyson, Perdue, Sanderson Farms)	CR4=58.5%	CR4=35% (1986)
Turkeys (Smithfield/Maxwell Foods, Hormel, Cargill, Sara Lee)	CR4=55%	CR4=31% (1988)
Flour milling (Cargill/CHS,ADM, ConAgra)	CR3=55%	CR4=40% (1982)
Soybean crushing (ADM, Bunge, Cargill)	CR3=71%	CR4=54% (1977)
Food retailing (Wal-Mart, Kroger, Albertson's, Safeway, Ahold USA)	CR5=48%	CR5=24% (1997)

Selected information about concentration in the Canadian agriculture and food industry

Commodity market and top firms	Concentration Ratio 2006
Beef packing (Cargill, Lakeside Packers [owned by Tyson], XL Foods)	CR3=75%
Durum milling (ADM, Robin Hood Foods [owned by J.M. Smucker Co)	CR2=57%
Flour milling (ADM, Robin Hood Foods [owned by J.M. Smucker Co)	CR2=66%

* Concentration Ratio refers to the market share that the top four firms (or three as in the case of soybean crushing, and five in the case of food retailing) control. Concentration Ratios are calculated using statistics reported in trade journals.

Table 2.7 Global seed sales by NAE based companies. Source: UNCTAD, 2006

Company	2004 Seed Sales (million US $)	Market Share (in per cent)
DuPont/Pioneer	2,624	10
Monsanto	2,277	9
Syngenta	1,239	5
Limagrain	*1,239	5
Others (both NAE based and others	17,821	71
World**	25,200	100

Table 2.8 Top European food manufacturers, ranked by turnover in 2002. Source: CIAA

Manufacturer	Country	Sales (EUR bn)	
Nestlé	Switzerland	52.6	Cereal, dairy, beverages, Confectionery
Unilever	NL/UK	32.1	Dairy, beverages, dressings, frozen foods, cooking products
Diageo	UK	19.0	Alcoholic beverages, dough products
Danone	France	14.5	Dairy, beverages, biscuits and cereals
Cadbury Schweppes	UK	8.9	Beverages, confectionary
Heineken	NL	8.1	Alcoholic beverages
Parmalat	Italy	7.8	Dairy, gourmet, biscuits, beverages
Interbrew	Belgium	7.3	Alcoholic beverages
ABF	UK	7.1	Sugar, starches, baking products, meat, dairy
Tate & Lyle	UK	6.4	Sweeteners, starches
Lactalis	France	5.5	Dairy
Arla Foods	Denmark	5.0	Dairy
Sudzucher	Germany	4.8	Sugar

Table 2.11 Changes in livestock farming operations. Source: Farm Foundation, 2004

Animal Production on Farms, U.S. and Canada					
Year	**Number of Farms**	**Percent of Farms Producing**			
		Beef	**Dairy**	**Swine**	**Chicken**
United States					
2002	2,128,982	37.4%	4.3%	3.7%	1.5%
1974	2,314,013	**44.3%**	17.4%	20.3%	1.5%
1920	6,118,956	29.7%	**74.60%**	**79.3%**	
Canada					
2001	230,540	52.9%	9.5%	6.7%	11.5%
1971	258,716	**96.1%**	56.2%	47.3%	46.2%
1921	711,090	84.2%		**63.4%**	**82.4%**

Farms with beef operations reached their peak in the 1970s while dairy and swine production are concentrated on less than 5 percent of US farms and less than 10 percent of Canadian farms.

Table 2.15 Market structure of retail in Western Europe, based on market shares of top 5 retailers, based on 1999 data. Source: Dobson et al., 2001

Country	Market structure
Austria	Asymmetric oligopoly
Belgium/Lux	Asymmetric oligopoly
Denmark	Duopoly
Finland	Duopoly
France	Asymmetric oligopoly
Germany	Symmetric oligopoly
Ireland	Asymmetric oligopoly
Italy	Unconcentrated
The Netherlands	Dominant firm
Portugal	Duopoly
Spain	Asymmetric oligopoly
Sweden	Dominant firm
UK	Asymmetric oligopoly

Table 2.16 Top retailers across Europe—summary. Source: M+M PlanetRetail, AC Nielsen, USDA-FAS.

Country	CR3	CR4	Top 3-4 firms
Austria			
Belgium/Lux			Carrefour, Delhaize Group, Colruyt, Aldi
Czech rep	30.1		Metro, Ahold, Schwartz
Denmark	78		FDB, Dansk Supermarkt, Supergros
Finland	79		Kesko, S Group
France	50.8	63.2	Carrefour, Intermarché, Leclerc, Casino
Germany	44.3	56.1 - 66.7	Metro, Rewe, Edeka/AVA, Aldi
Hungary	48.2	51	CBA, Tesco, Co-op Hungary, Metro, Reál Hungária
Ireland	54.7		Tesco, Dunnes Stores, Superquinn,
Italy	29.1	36.0	Coop Italia, Auchan, Carrefour, Conad
The Netherlands	62.6	82.6	Ahold, Casino, Sperwer, Makro
Norway	83		Norgesgruppen, Coop, Hakon
Poland	17.3		Metro, Jerónimo Martins, Tesco, Auchan
Portugal			
Romania		27.0	Metro, Rewe, Carrefour, Delhaize
Slovakia	24.4		Tesco, Metro, Rewe
Spain	53.8	62.5	El Corte Inglés, Carrefour, Marcadona Eroski,
Sweden	95		ICA/Ahold, Coop, Axfood
UK	42.3	49.3 - 76.5	Tesco, Asda-Wal-Mart, Sainsbury's, Morrisons

Table 2.17 Outlook for private label in Europe (% sales). Source: M+M PlanetRetail--based partly on AC Nielsen.

	2000	2005	2010
Western Europe	20	26	30
of which			
Northern	25	29	32
Southern	12	18	25
Nordic	15	20	25
Central & Eastern Europe	1	4	7
World	15	19	23

Table 2.18 Food retailing in USA. Source: Progressive Grocer's Super 50 (5/1/04).

Food retailing in USA CR5 = 46%*

Supermarket	Grocery Sales
1. Wal-Mart Stores	$66.5 Billion
2. Kroger Co.	46.3 Billion
3. Albertsons, Inc.	32.0 Billion
4. Safeway, Inc.	30.0 Billion
5. Ahold USA, Inc.	25.1 Billion

Historical CR5

1997	2001
24%	38%

Progressive Grocer reports only grocery sales from supermarkets, and does not report general merchandise, drug or convenience sales. In the 4/15/04 issue, it reported that total 2003 supermarket sales were $432.8 billion in the US.

Table 2.20 Top European food manufacturers, ranked by turnover in 2002 Source: CIAA

Manufacturer	Country	Sales (EUR billion)	
Nestlé	Switz	52.6	Cereal, dairy, beverages, Confectionery
Unilever	NL/UK	32.1	Dairy, beverages, dressings, frozen foods, cooking products
Diageo	UK	19.0	Alcoholic beverages, dough products
Danone	France	14.5	Dairy, beverages, biscuits and cereals
Cadbury Schweppes	UK	8.9	Beverages, confectionary
Heineken	NL	8.1	Alcoholic beverages
Parmalat	Italy	7.8	Dairy, gourmet, biscuits, beverages
Interbrew	Belgium	7.3	Alcoholic beverages
ABF	UK	7.1	Sugar, starches, baking products, meat, dairy
Tate & Lyle	UK	6.4	Sweeteners, starches
Lactilis	France	5.5	Dairy
Arla Foods	Denmark	5.0	Dairy
Sudzucher	Germany	4.8	Sugar

Table 2.23 Top ten countries for ISO 14001 certificates. Source: ISO, 2003.

Japan	13,416
UK	5,460
China	5,064
Spain	4,860
Germany	4,144
USA	3,553
Sweden	3,404
Italy	3,006
France	2,344
Korea, Rep. of	1,495

Table 2. 26 EU market countries clustered by stage of organic market development, 2001. Source: OMIaRD, 2004 in CBI, 2005

Mature market Countries	Growth market countries	Emerging market countries
Austria	Finland	Czech Republic
Denmark	Italy	Greece
Germany	The Netherlands	Germany
Switzerland	Sweden	Ireland
	France	Slovenia
	Belgium	Spain
	United Kingdom	Norway
		Portugal

Table 2.28 Fair trade in Europe – data 2003-2004. Source: FINE, 2006.

Importing Organizations (n.)	**200**
Sales Outlets (n.)	
World shops	2,845
Supermarkets	56,700
Others	19,300
Total Sales Outlets	**78,900**
Paid Staff (n.)	
Importing organizations	851
World shop associations	107
Labeling organizations	113
Total Paid Staff	**1,071**
Turnover (in 000 €)	
Importing organizations	243,300
World shops, net retail value	103,100
Labeling organizations, net retail value	597,000
Education/PR/Marketing (in 000 €)	
Importing Organizations	11,400
World shops associations	1,700
Labeling organization	5,100
All World shops, net retail value, estimate (in 000 €)	**120,000**
All Fair Trade products net retail value, estimate (in 000 €)	**660,000**

Table 2.31 Total gross sales in North America (US and Mexico) 2001- 2003. Source: The Fair Trade Foundation, 2005

Year	Total gross sales Fair Trade million US$
2001	125.2
2002	180
2003	276.1

Table 2.38 Household consumption expenditure in the EU-25 in 2003. Source: Eurostat, 2005

Expenditures	%
Food and non-alcoholic beverages	13.1
Alcoholic beverages, tobacco and narcotics	3.8
Clothing and footwear	6.1
Housing, water, electricity, gas and other fuels	21.5
Furnishing, household equipment and routine maintenance of the house	6.6
Health	3.5
Transport	13.5
Communications	2.8
Recreation and culture	9.4
Education	1
Restaurants and hotels	9
Miscellaneous goods and services	9.9

Table 2.40 Proportions of expenditures in real values (average of 1995 and 1999). Source: Schenkel at al., 2005

	Housing	Food	Furnishings	Education and leisure	Transport and communications	Clothing	Health
Western EU	19.24	18.45	6.81	12.03	12.73	5.45	8.54
Central and Eastern EU	24.66	22.06	3.43	17.42	8.61	3.46	10.89
Total	21.02	19.66	5.69	13.83	11.36	4.79	9.32

Table 2.41 Index of relative price (GDP index for each country, 100). Source: Schenkel at al., 2005

	Food	Clothing	Housing	Furnishings	Transport and communications	Education and leisure	Health
Western EU	86.94	107.9	97.5	93.06	109.6	107.6	99.28
Central and Eastern EU	139.6	183.2	75.38	157.1	175.5	51.85	66.62

Table 2.42 NAE food supply: energy, protein and fats per capita per day. Source: FAOSTAT data 2006 and ERS-USDA, Food consumption data system 2005

	Western Europe			Eastern Europe			USA		
	Calories	Protein (g)	Fats (g)	Calories	Protein (g)	Fats (g)	Calories	Protein (g)	Fats (g)
1961	3001	87	106	3118	91	79	3100	92	138
2003	3535	109	149	3227	95	109	3900	112	178

Table 2.44 NAE food supply: % of energy, protein and fats from animal *vs* plant origin. Source: FAOSTAT data 2006

	Western Europe			Eastern Europe		
	Calories	Protein	Fats	Calories	Protein	Fats
	Percent from animal sources					
1961	29	51	64	23	36	73
2003	31	60	55	26	50	59