

“May You Live in Interesting Times”

Presentation to the AIC Conference

Making Choices:

Consumers and their Impact on Canada's Agriculture and Food

November 5, 2007

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Ted Bilyea and Associates

Which consumers are having the greatest impact on Canadian Agriculture?

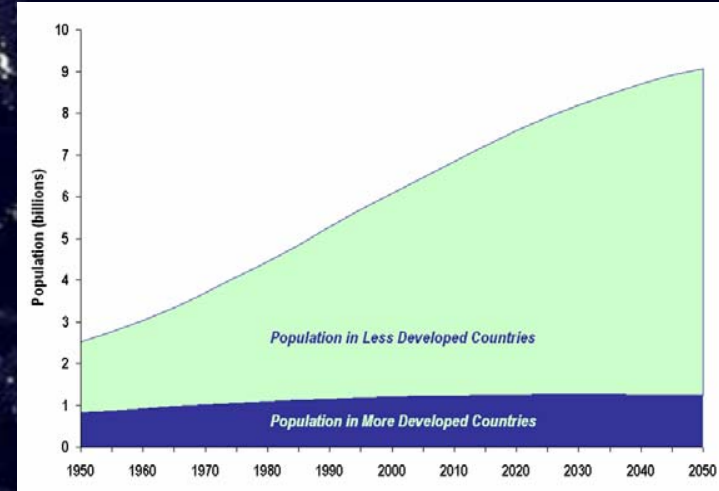
Globalization and the “flattening world” has resulted in a global food system that is completely interdependent



Globalization and the rise of Asia

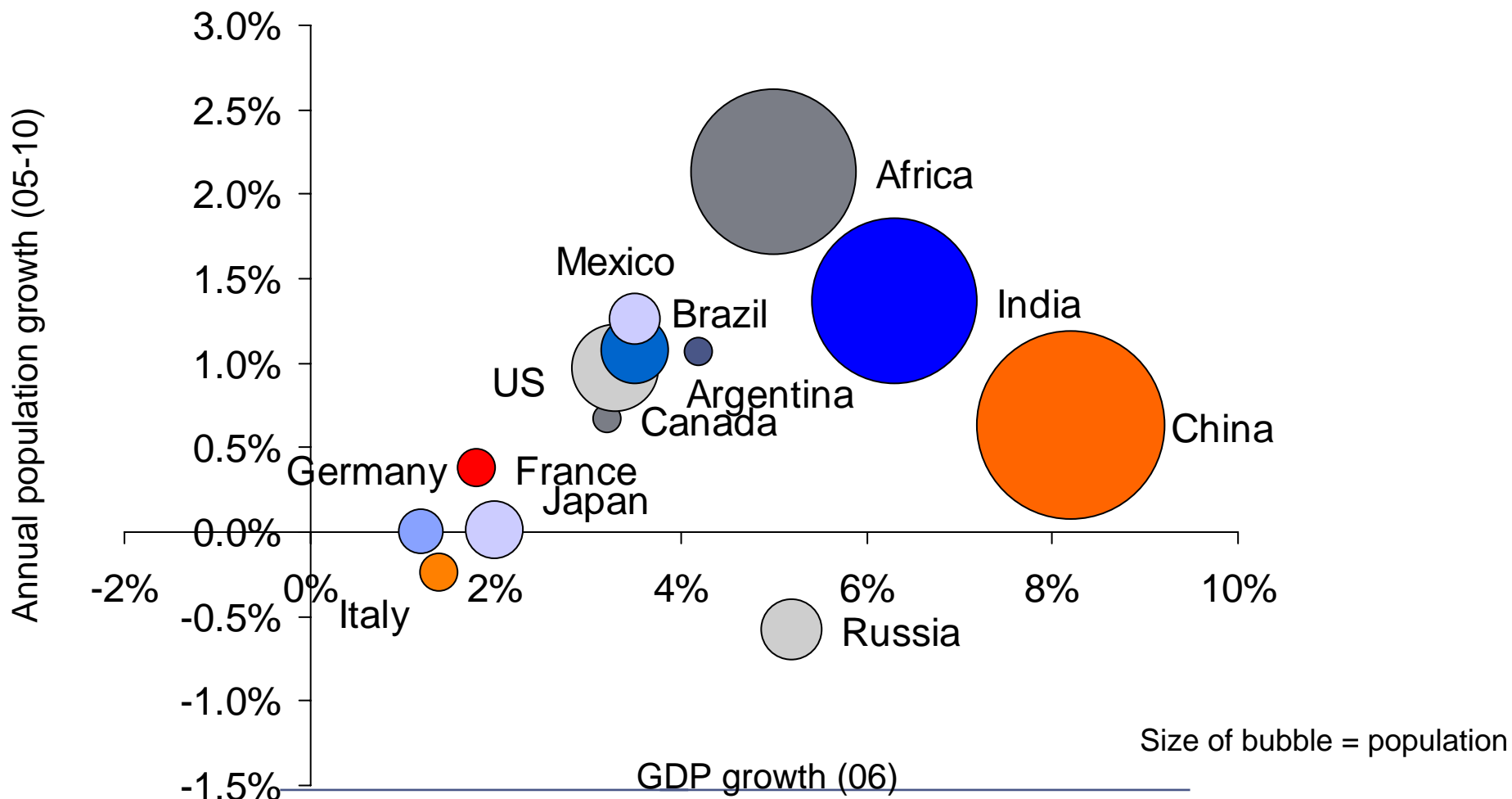
picture provided by NASA

World population will grow from 6.4 billion to 9 billion with all the growth coming from the developing world. China will add the equivalent of 1 country the size of Chile per year



Income & population provide the basis for consumption growth

Income & population growth in selected countries



Huge market growth potential from poverty reduction

| Country | Population | % < \$1/day | % < \$2/day |
|------------|------------|-------------|-------------|
| China | 1298.8 | 16.6 | 46.7 |
| India | 1065.1 | 34.7 | 79.9 |
| Indonesia | 238.5 | 7.5 | 52.4 |
| Brazil | 184.1 | 8.2 | 22.4 |
| Pakistan | 159.2 | 13.4 | 65.6 |
| Russia | 144 | 6.1 | 23.8 |
| Bangladesh | 141.3 | 36 | 82.8 |
| Nigeria | 125.8 | 70.2 | 90.8 |
| Mexico | 105 | 9.9 | 26.3 |

Source: World Bank: World Development Indicators Database

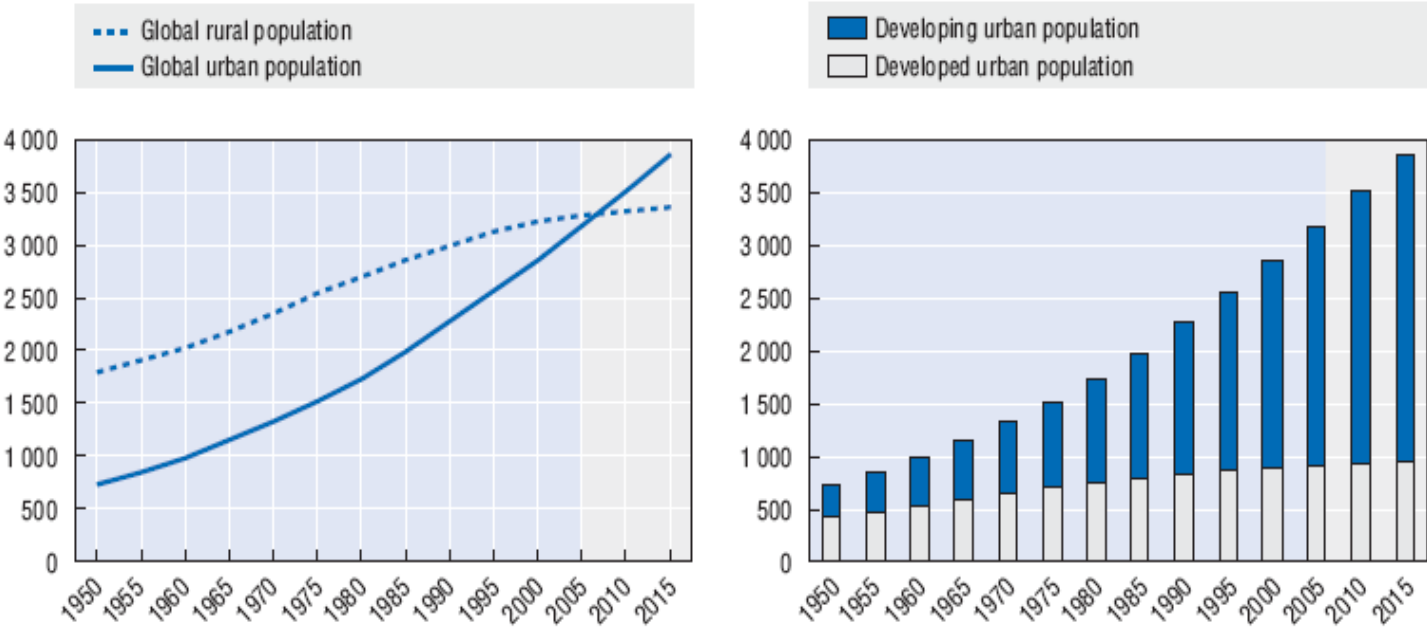
How world food demand doubles by 2050

- 1.25 billion people live on less than \$1 per day
- 3 billion (half of the world's population) live on less than \$2
- By \$2 per day, most hunger (calorie) problem is solved
- Between \$2 and \$9 per day people eat more animal protein, fruits, vegetables & edible oils, causing rapid growth in raw ag demand
- After \$10 per day, people buy more processed but not more raw ag products

Source: Robert L. Thompson, University of Illinois, July 2005

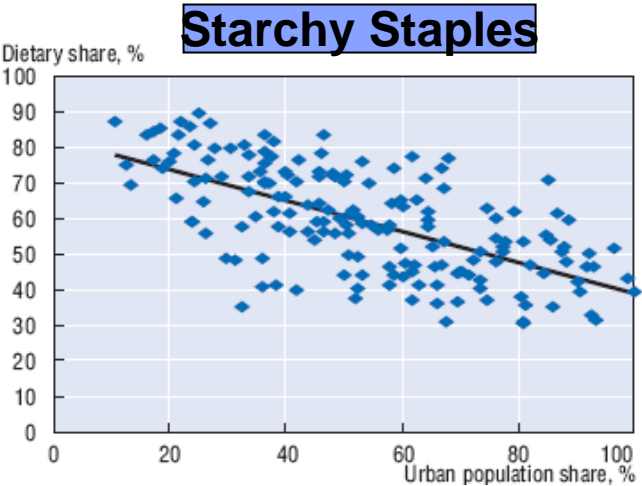
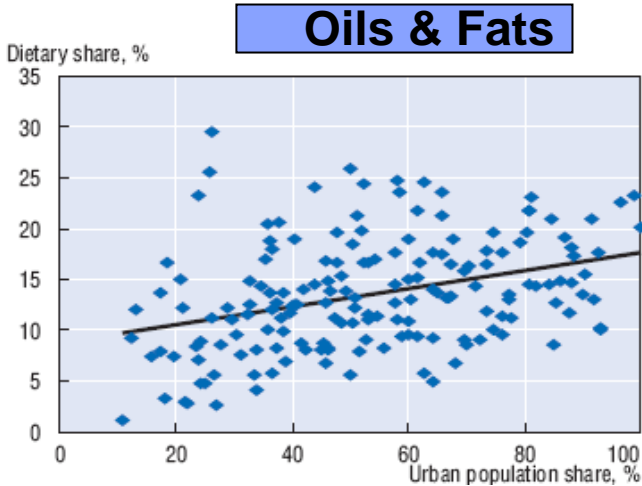
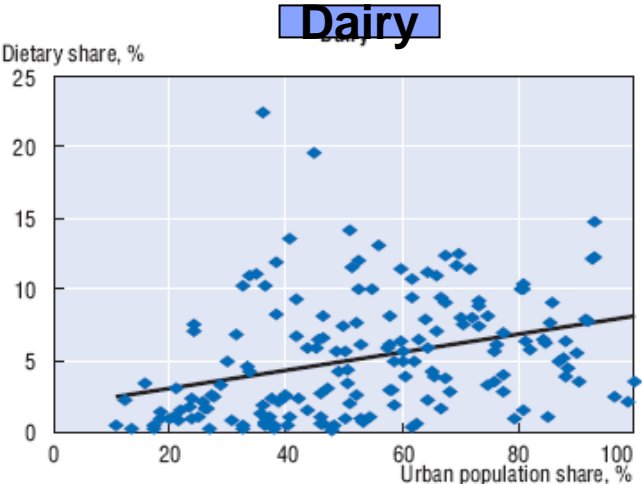
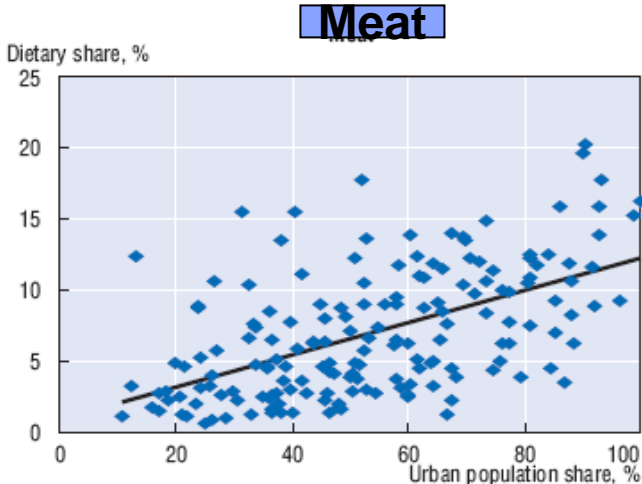
More than half the world's population will live in large cities

Figure 1.4. Rural and urban population structures: 1950-2015



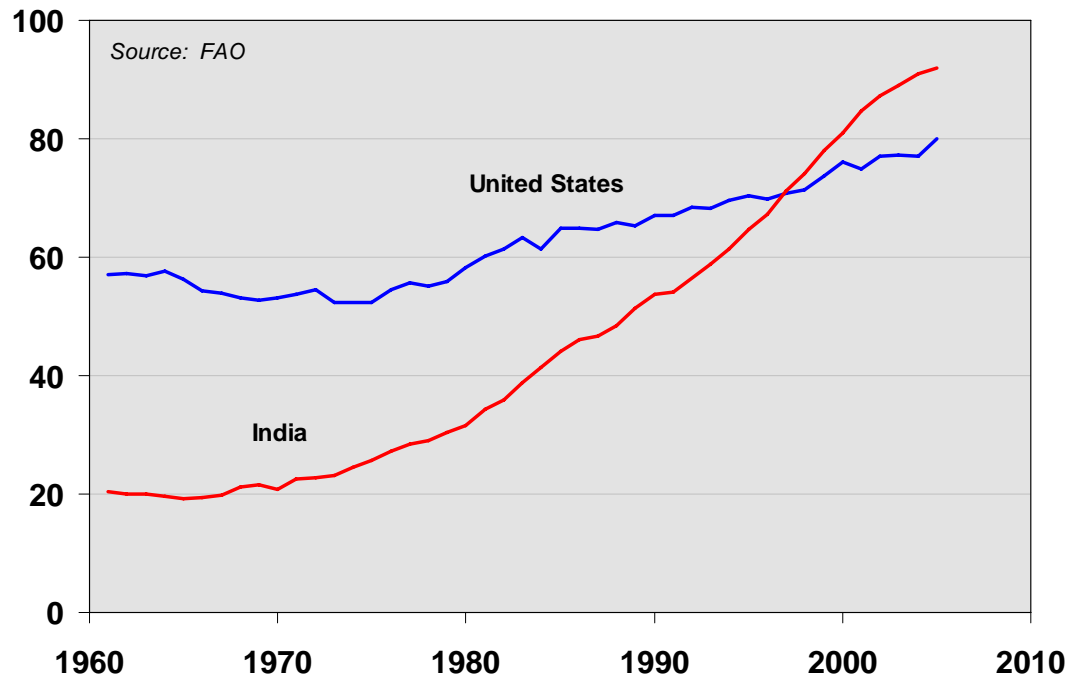
Source: UN Population Division (World Population Prospects: 2004 revision).

Urbanization and dietary consumption shares in 180 countries



**Demand for milk products is soaring at the rate of one New Zealand dairy industry per year due to urbanization and rising disposable incomes
Production growth has so far been skewed to the developing world**

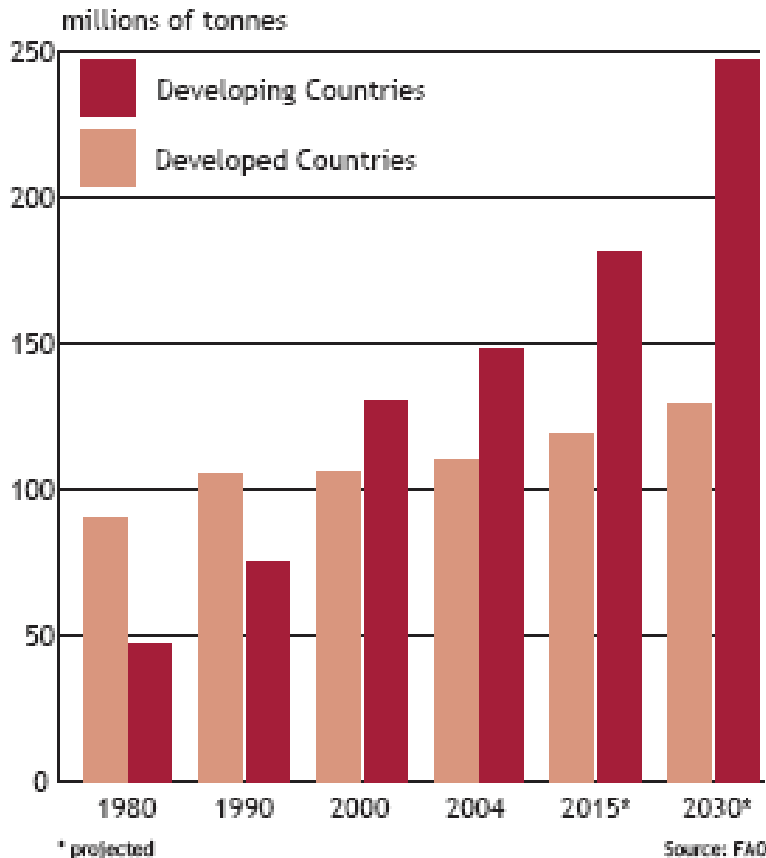
Milk Production in the United States and India, 1961–2005



- **In California's Central Valley 891,000 dairy cows in highly concentrated feedlots produce up to 30 million tons of manure**
- **About 90 percent of India's cattle subsist on natural grasslands that are at risk from both overgrazing and drought.**

Globalization and new wealth creation has created unprecedented growth in meat production in the developing world

1 - Meat production, 1980-2030



- **Livestock accounts for 40% of agricultural GDP**
- **Employs 1.3 billion people, (1 billion of the world's poor)**
- **Provide 1/3 of humanity's protein intake**

With rapid intensification comes huge challenges:

- **Animal disease, zoonoses, and human health risks**
- **Environmental degradation and misuse of water**
- **Climate change**

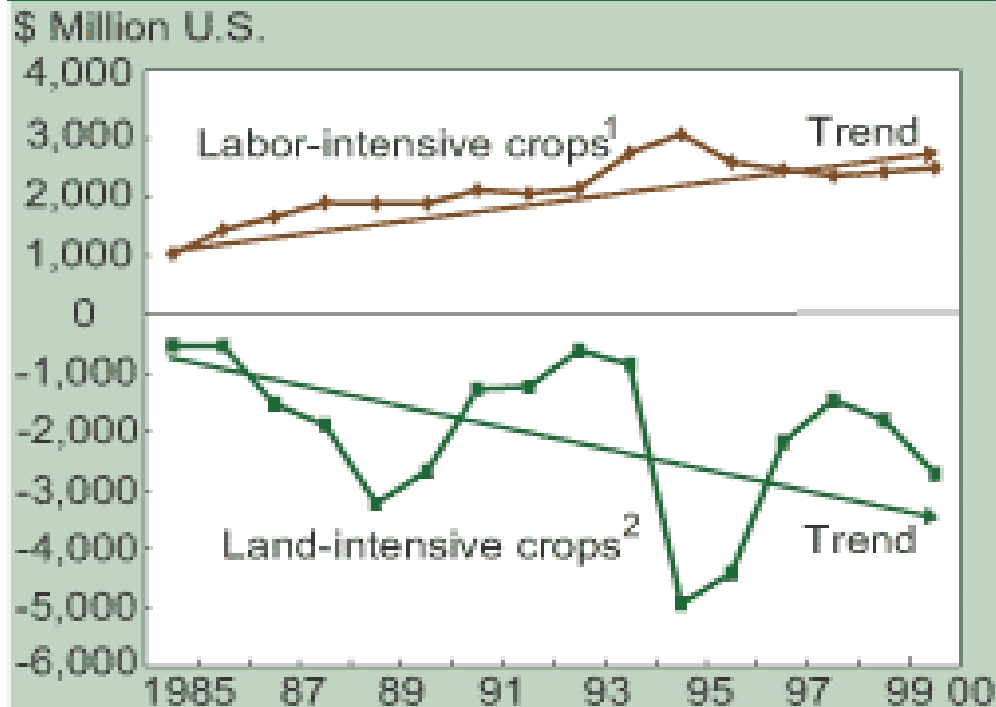
Livestock's long shadow as described by the FAO

- Largest anthropogenic user of land, total area occupied by grazing is equivalent to 26% of the ice-free terrestrial surface of the planet
- Expansion is a key factor in deforestation, especially in Latin America. 70% of the previous forested land in the Amazon is occupied by pastures and feed crops cover a large part of the rest
- Accounts for 9% of anthropogenic CO₂ emission –land use changes
- Emits 37% of anthropogenic methane, 65% of anthropogenic nitrous oxide

Source: FAO

China's shift out of land intensive crops is creating new opportunities but is posing food security issues for the Chinese authorities

Net exports of labor- and land-intensive crops increasingly reflect China's comparative advantage



¹Fruits and vegetables. ²Cereals and oilseeds.

Source: Food and Agriculture Organization, United Nations (January 2003).

Chinese consumer demand for horticulture created rapid export growth. China produces half the world's vegetables and 16% of the worlds fruit

Figure 1
China's fruit and vegetable exports grew substantially in most categories



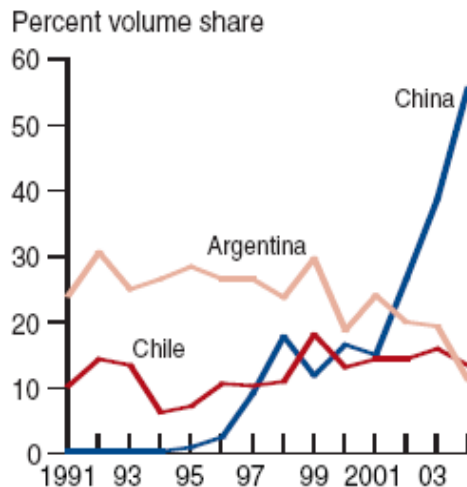
Source: ERS calculations based on data from USDA, Foreign Agricultural Service, Global Agricultural Trade System.

As China captures the majority share of traditional foods in world markets the issue of pathogen and residue contamination has arisen

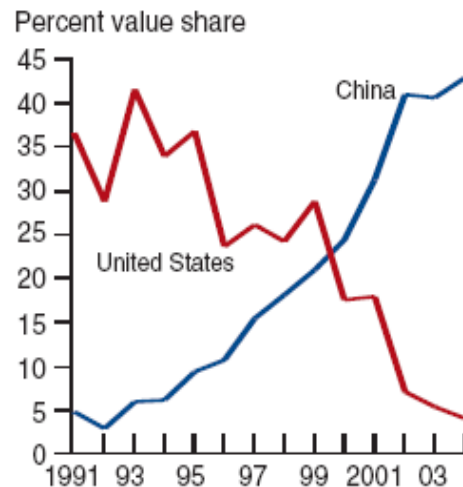
Figure 8

The share of Chinese apple juice rose in the U.S., Japanese, and Canadian import markets

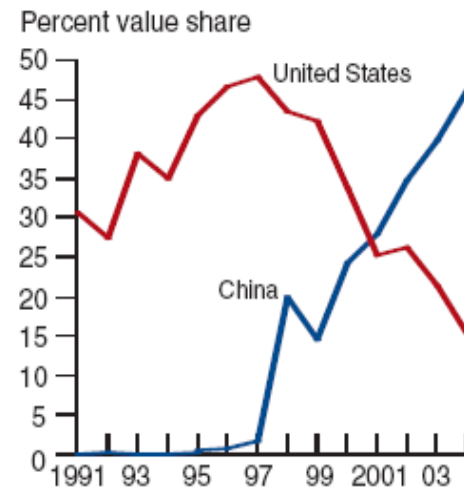
Panel A: China became the leading supplier to the United States, over Chile and Argentina



Panel B: China's share in the Japanese import market rose steadily throughout the period, while the U.S. share fell

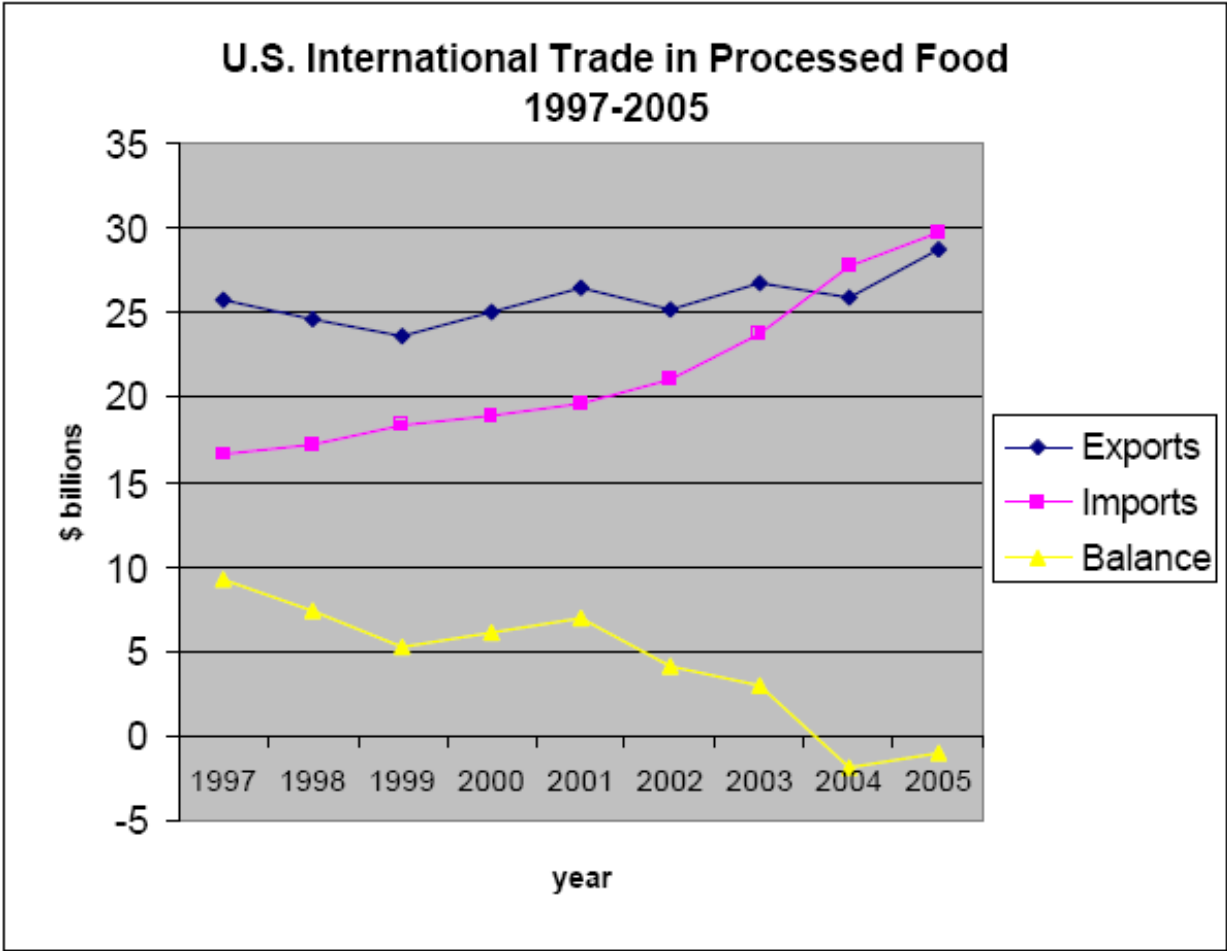


Panel C: China's share in the Canadian import market surged, while the U.S. share declined



Source: ERS calculations based on data from USDA, Foreign Agricultural Service, Global Agricultural Trade System.

U.S. becoming more reliant on imported processed foods

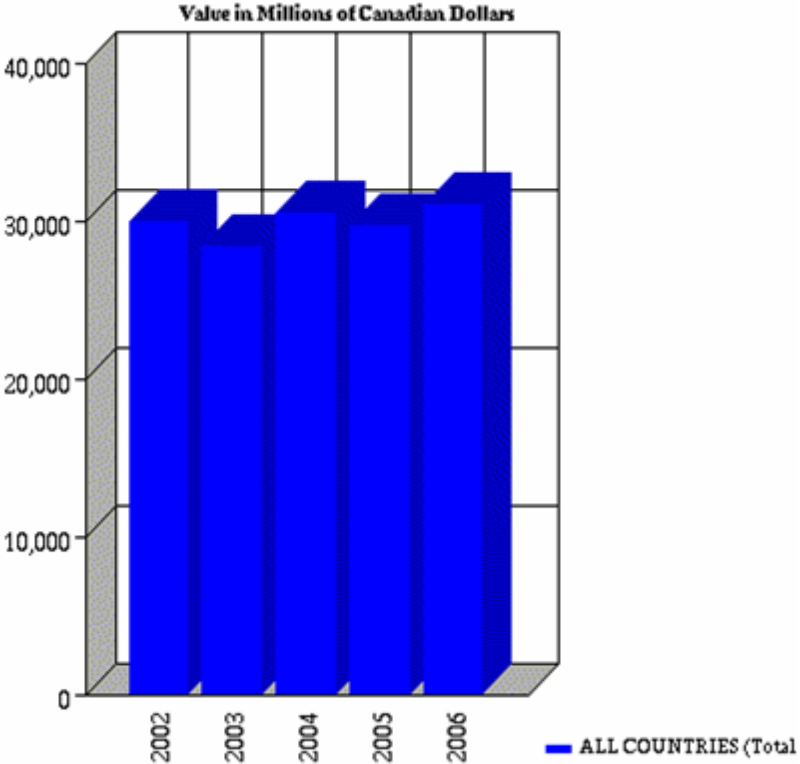


Source: USDA

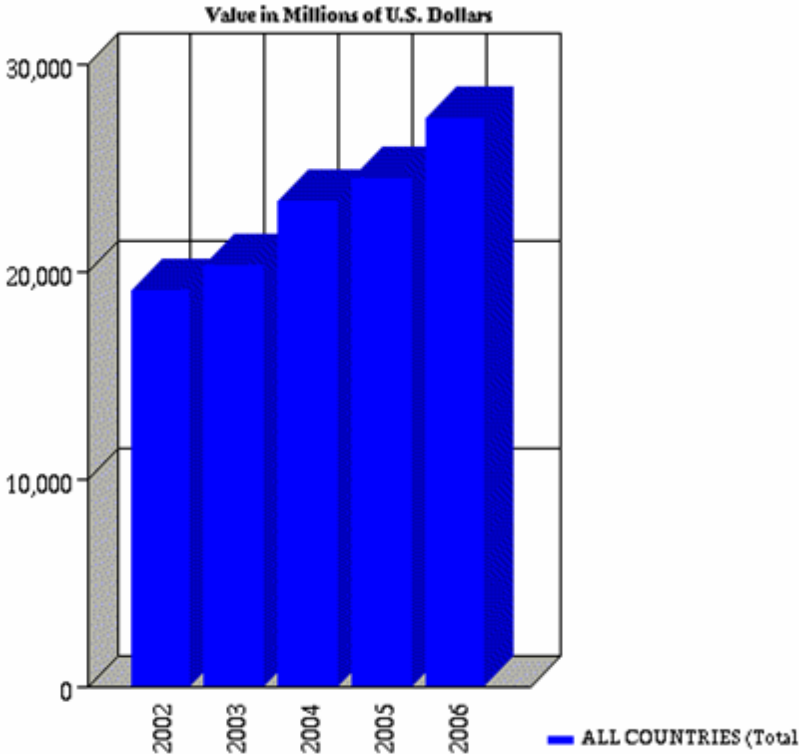
Canadian agriculture and food imports growing faster than exports

Can we trust the food we import and can we guarantee the food we export?

Canada's food exports



Canada's food imports

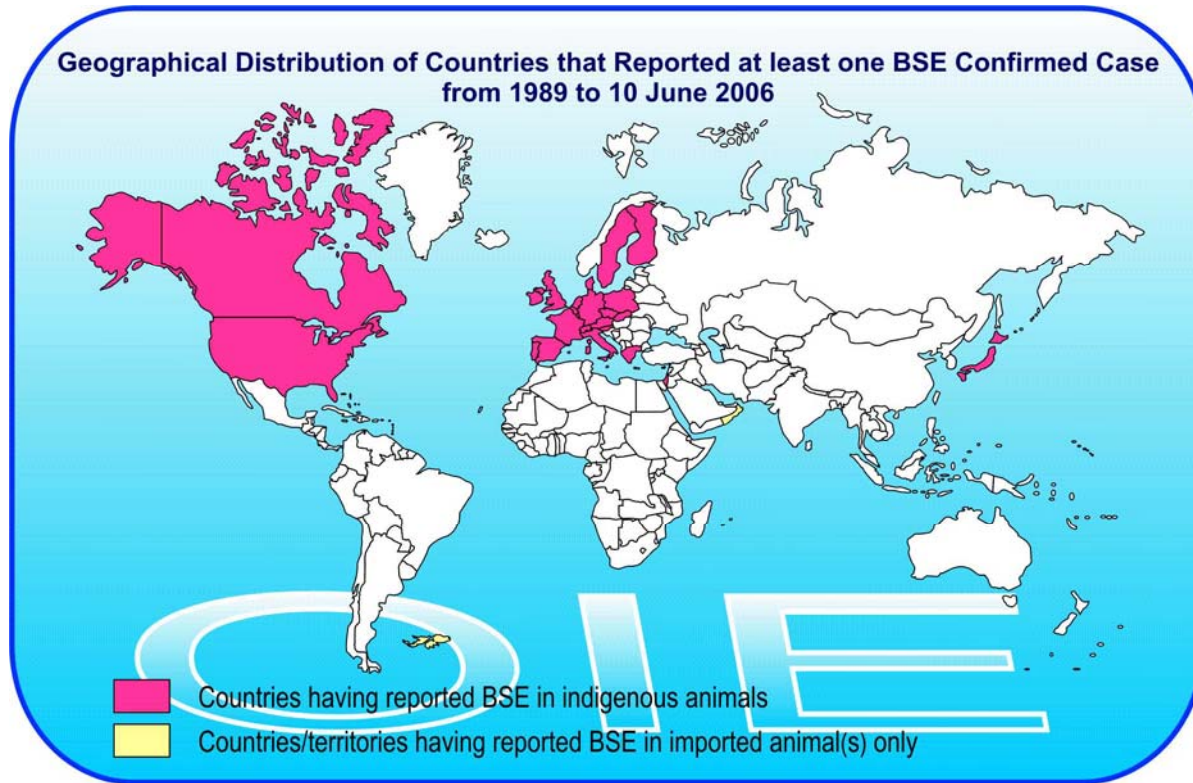


KavaChart Servlets from VE.com

- I - LIVE ANIMALS AND ANIMAL PRODUCTS
- II - VEGETABLE PRODUCTS
- III - FATS, OILS, THEIR CLEAVAGE PRODUCTS AND WAXES
- IV - FOOD PRODUCTS, BEVERAGES, SPIRITS, VINEGAR AND TOBACCO PRODUCTS

Source: Statistics Canada

BSE removed Canada's competitive advantage on beef



**Countries recognised as:
free from BSE - Australia, Argentina, New Zealand and Uruguay.
Canada and the U.S. A. are designated as “controlled risk”**

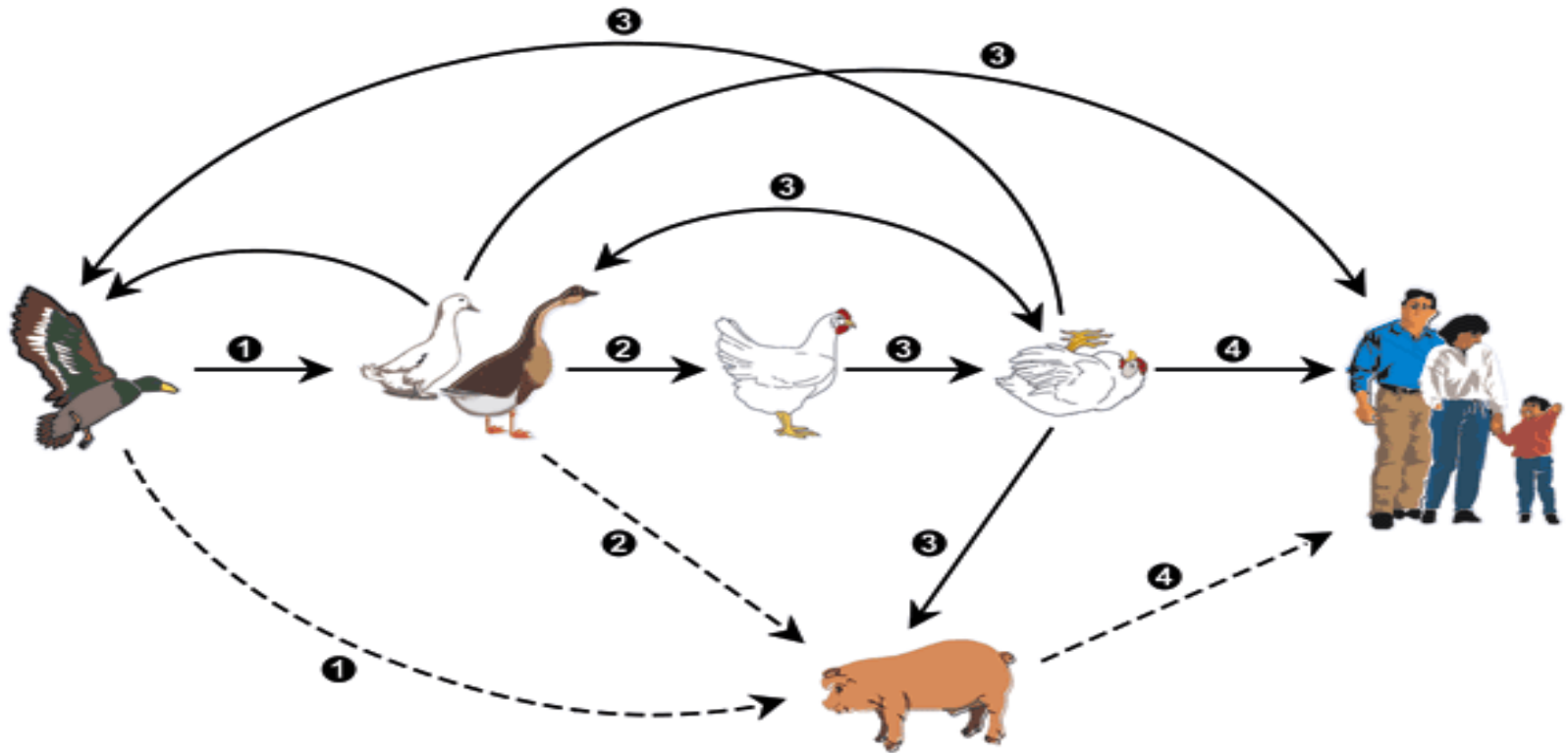
Emerging zoonoses infections are becoming more pathogenic

- **Viruses**
 - ◆ HIV/AIDS*
 - ◆ SARS*
 - ◆ Avian influenza
 - ◆ Dengue Fever
 - ◆ Nipah virus
 - ◆ West Nile virus
 - ◆ Encephalitis
 - ◆ Hantavirus pulmonary syndrome
- **Bacteria**
 - ◆ E. coli O157:H7
 - ◆ Streptococcus suis
- **Prion**
 - ◆ VCJD (new variant Creutzfeldt-Jakob)



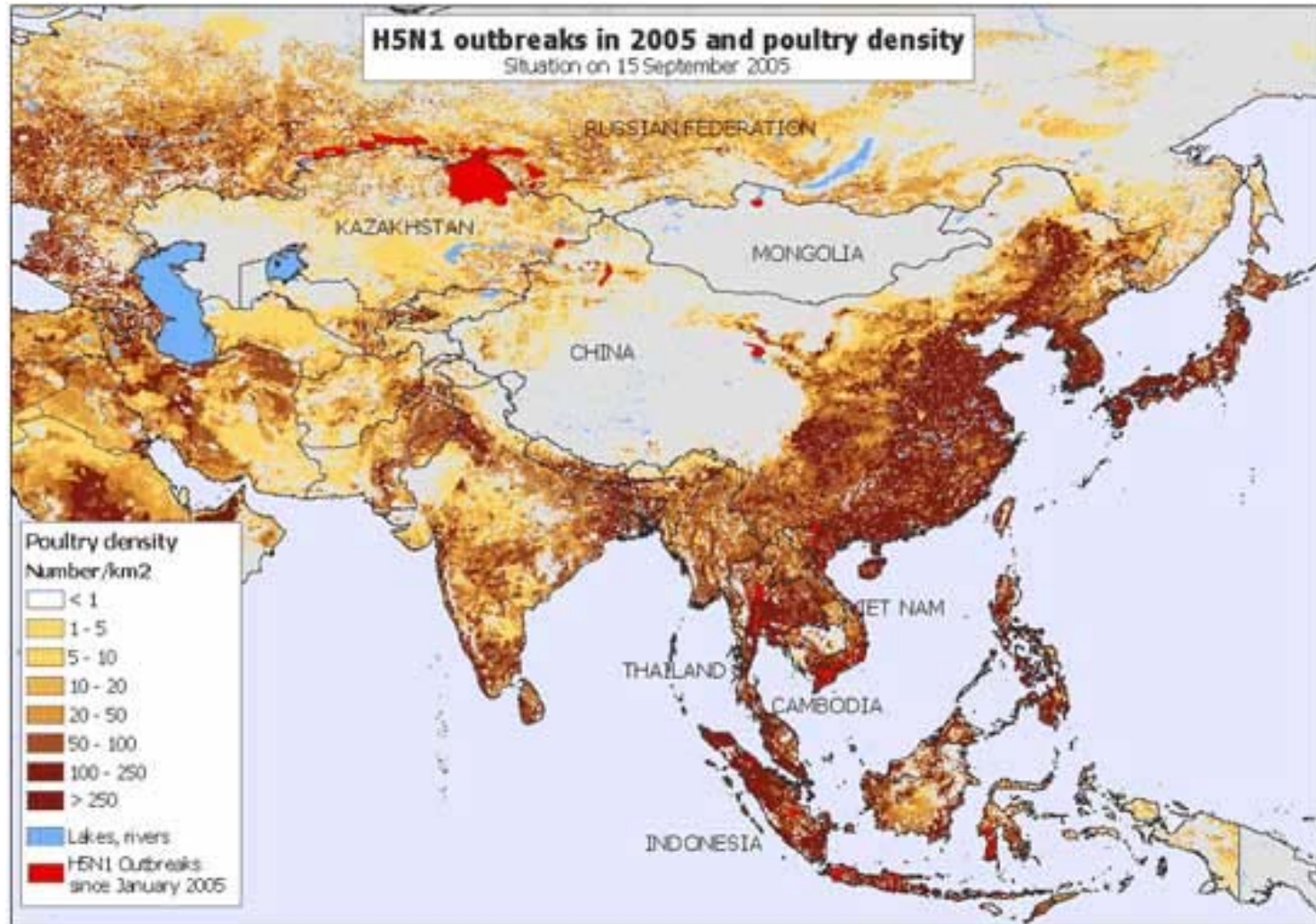
*progressed to human to human transfer

Pathways of AI infection



(Source : Webster, R.G. et al., H5N1 Outbreaks and Enzootic Influenza in CDC, Emerging Infectious Diseases, Volume 12, Number 1, January 2006)

Intensification of agriculture without biosecurity is not working



Density of animals and humans for selected countries

| Ratio of Animals to Humans (2003) | | | | | | | |
|-----------------------------------|-------------------|------------|-------------|------------|---------------|-----------------------|------------------------------|
| Zoonoses Risk | Low | Moderate | Extreme | | | | |
| Country | Population ('000) | Pigs | Cattle | Sheep | Chicken | Arable Land ('000 Ha) | Human + Animals/ Arable Land |
| China | 1302307 | 469804008 | 103469500 | 143793407 | 3980546000 | 143625 | 14 |
| India | 1,049,549 | 18,500,000 | 226,100,000 | 59,000,000 | 842,000,000 | 161,750 | 8 |
| Brazil | 176,257 | 32,605,000 | 189,512,992 | 14,182,000 | 1,050,500,000 | 58,865 | 7 |
| United States | 291,038 | 59,512,600 | 96,100,000 | 6,300,000 | 1,950,000,000 | 175,209 | 3 |
| United Kingdom | 59287 | 5050000 | 10458900 | 35729092 | 167100000 | 5652 | 20 |
| New Zealand | 3846 | 380000 | 9656267 | 39250400 | 18049000 | 1500 | 35 |
| France | 59850 | 15057829 | 19516664 | 9203826 | 220000000 | 18447 | 6 |
| Germany | 82414 | 26251490 | 13731958 | 2658000 | 110000000 | 11813 | 11 |
| Colombia | 43526 | 2300000 | 25000000 | 2100000 | 118000000 | 2516 | 29 |
| Viet Nam | 80278 | 24884644 | 4394468 | | 185222000 | 6500 | 17 |
| Canada | 31,271 | 14,667,000 | 13,454,000 | 975,600 | 160,000,000 | 45,740 | 1 |
| Netherlands | 16067 | 11154000 | 3780000 | 1300000 | 98000000 | 905 | 36 |
| Philippines | 78580 | 12364300 | 2557040 | 30000 | 128194000 | 5650 | 17 |
| Japan | 127478 | 9725000 | 4523000 | 11000 | 283955000 | 4445 | 32 |
| Ireland | 3911 | 1781500 | 6924100 | 4828500 | 11342000 | 1047 | 17 |
| Chile | 15613 | 3200000 | 3932000 | 4100000 | 80000000 | 1982 | 14 |
| Korea, Repub | 47430 | 8912000 | 1935000 | 700 | 98000000 | 1696 | 34 |

Environmental Risks

- Expansion of Cropland onto Sensitive Areas
- Overstressed Water Supplies
- Soil Degradation



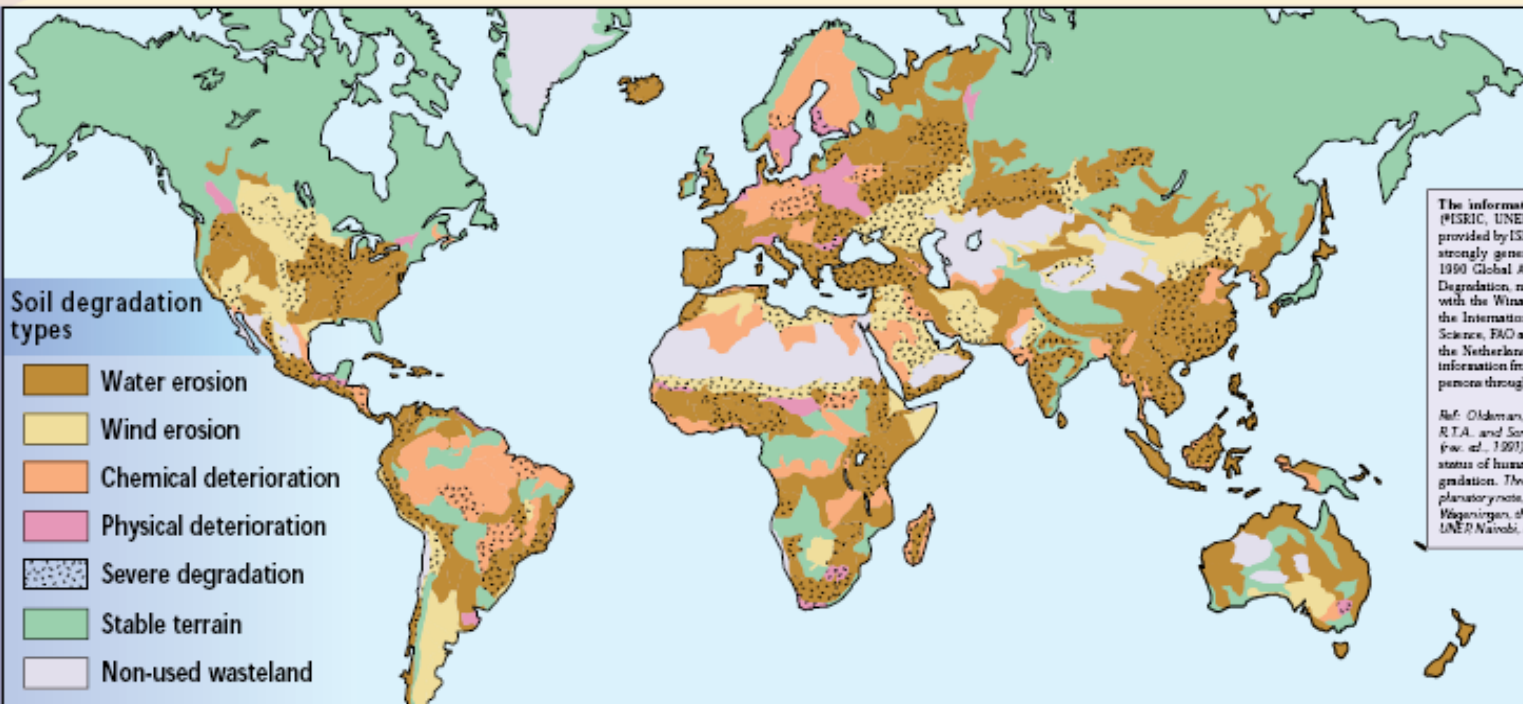
Environmental degradation



WORLD FOOD
SUMMIT
Rome
13-17 November 1996

Human-induced soil degradation

12



Soil degradation types

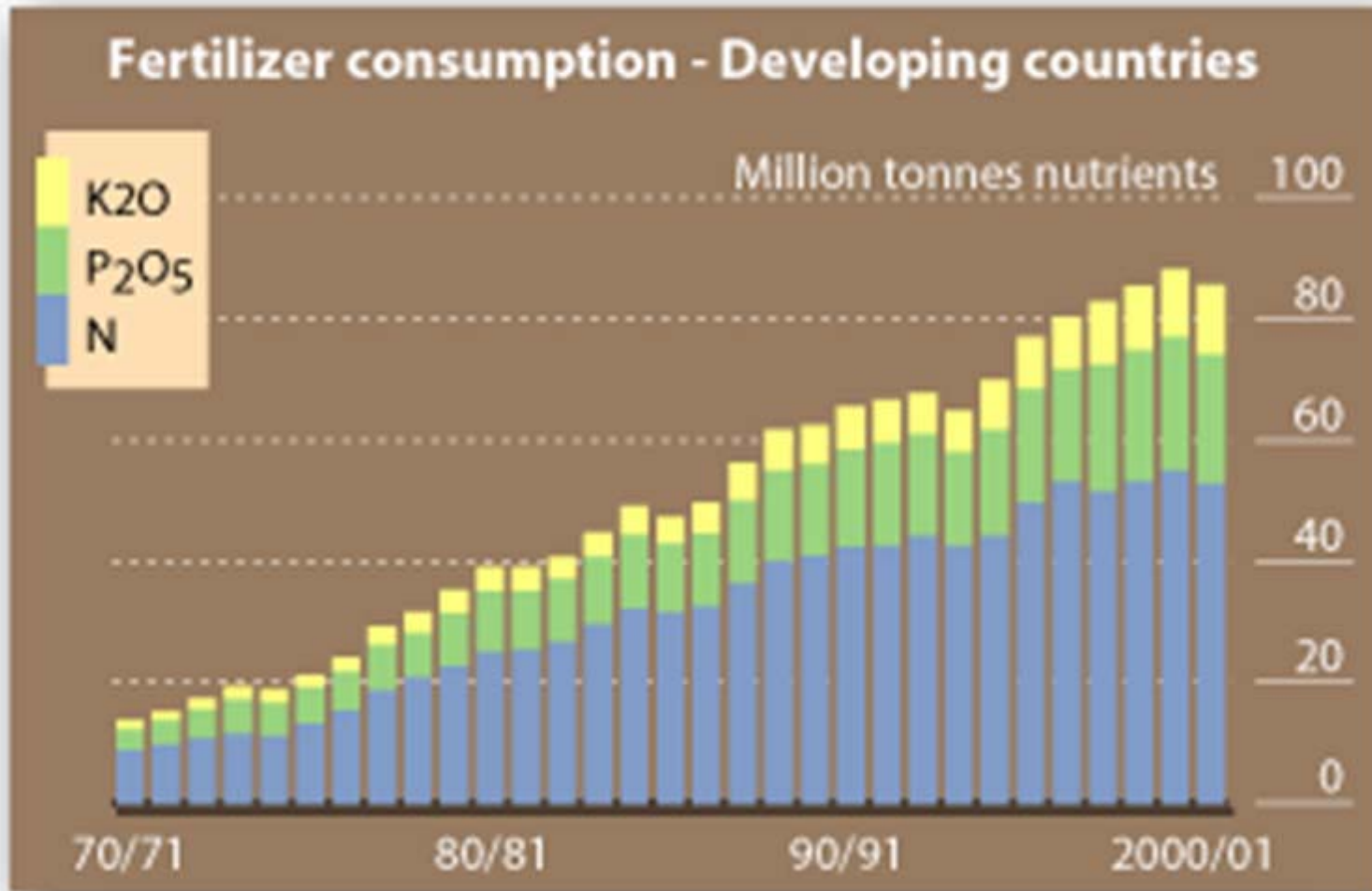
- Water erosion
- Wind erosion
- Chemical deterioration
- Physical deterioration
- Severe degradation
- Stable terrain
- Non-used wasteland

The information for this map (ISRIC, UNEP, FAO 1998) was provided by ISRIC and UNEP. It is strongly generalized from their 1990 Global Assessment of Soil Degradation, made in cooperation with the Winand Staring Centre, the International Society of Soil Science, FAO and ITC (Enschede, the Netherlands), with help and information from several hundred persons throughout the world.

Ref. Okteman, L.R., Abkhalting, R.T.A., and Sombroek, W.G. 1990 (ed. 1991). World map of the status of human-induced soil degradation. Three maps and an explanatory note. iii + 34 pp. ISRIC, Wageningen, the Netherlands, and UNEP Nairobi, Kenya.



Intensification of agriculture has led to soil degradation requiring increased use of fertilizers particularly in developing countries seeking self-sufficiency

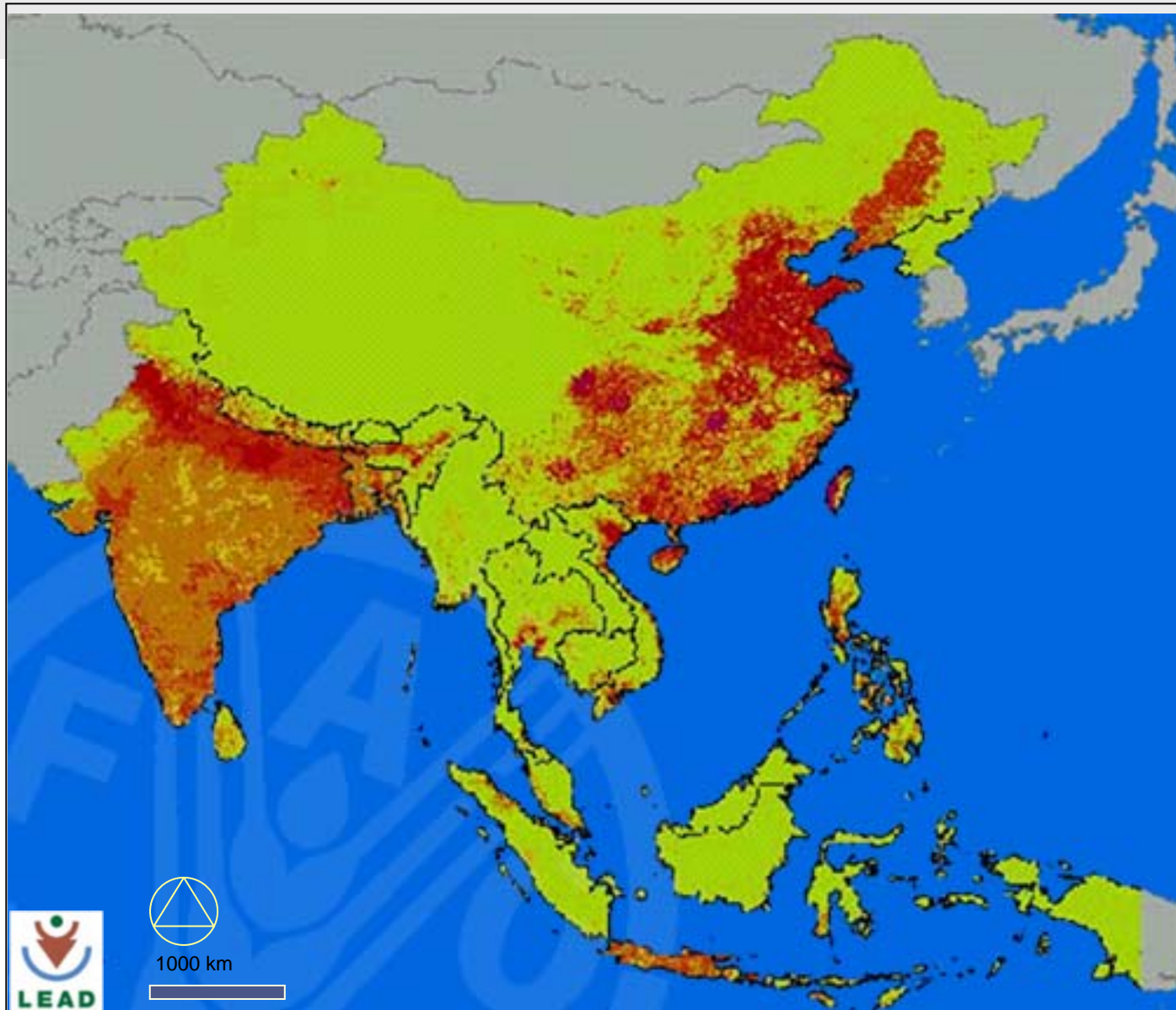


International Fertilizer Industry Association (IFA)

Biofuels can contribute more to global warming than they save

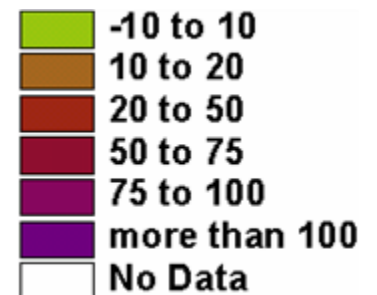
- **VANCOUVER, October 2, 2007 (GLOBE-Net) - "When the extra N₂O emission from biofuel production is calculated in "CO₂-equivalent" global warming terms, and compared with the quasi-cooling effect of "saving" emissions of fossil fuel derived CO₂, the outcome is that the production of commonly used biofuels, such as biodiesel from rapeseed and bioethanol from corn (maize), can contribute as much or more to global warming by N₂O emissions than cooling by fossil fuel savings."**
- by Nobel prize winning chemist Paul J. Crutzen published in the Atmospheric Chemistry and Physics, An Interactive Open Access Journal of the European Geosciences Union, dedicated to the publication and public discussion of high quality studies investigating the Earth's atmosphere and the underlying chemical and physical processes.

ESTIMATED PHOSPHATE CONTENT OF ALL LIVESTOCK EXCRETION



Legend

Kilograms of P_2O_5 per hectare of total land



Source : LEAD FAO
Year :2002
Map prepared by LEAD - FAO

More than 10% of arable land polluted in China

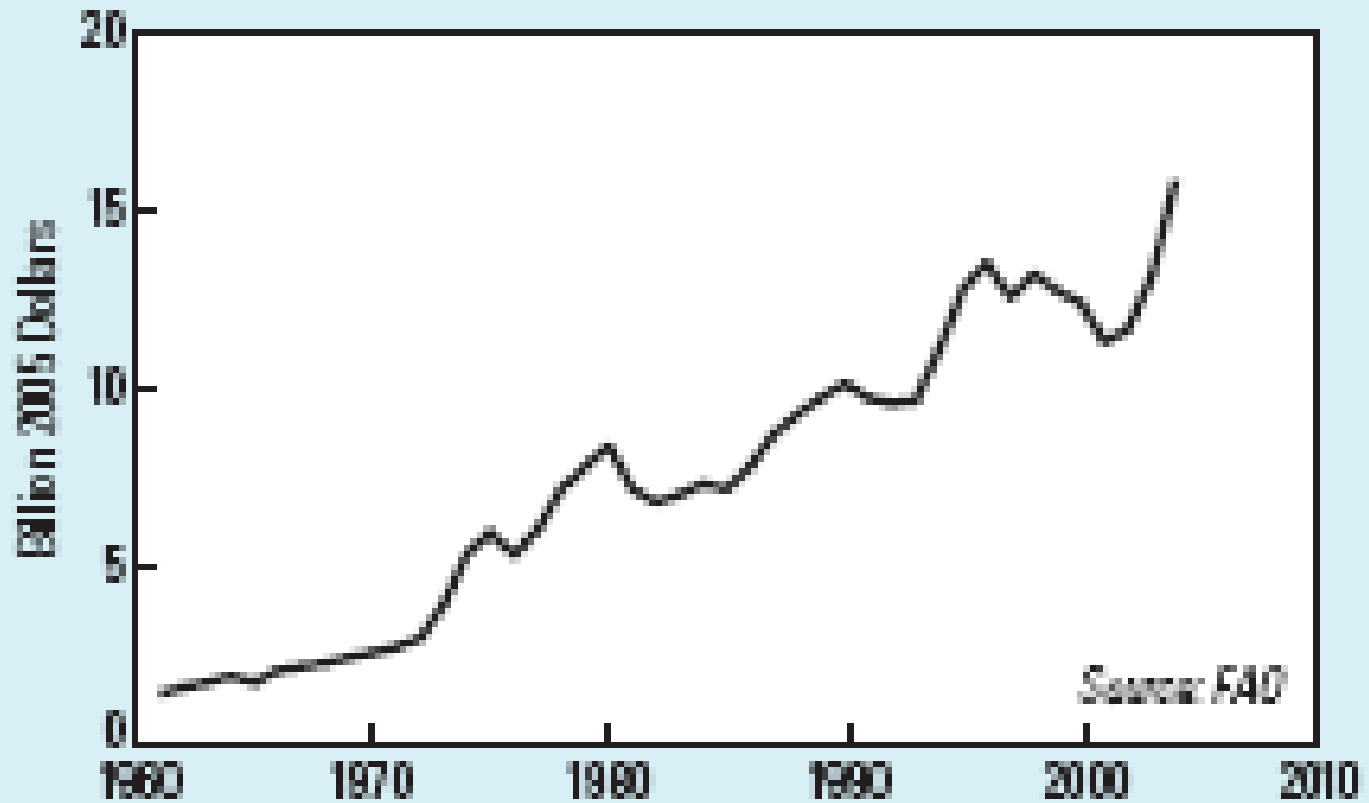
By Li Fangchao (China Daily/Xinhua)

Updated: 2007-04-23 07:10

- About 12.3 million hectares, or more than 10 percent of China's arable land, (equivalent to the arable land in Germany) is contaminated by pollution and the situation is getting worse, the Ministry of Land and Resources said. Arable land pollution, together with declining farm areas, posed a severe threat to the nation's food production, the Xinhua News Agency quoted an official from the ministry as saying yesterday.
- The ministry announced this month that the country's arable land area had shrunk to 121.8 million hectares by the end of last October, with the loss of 306,800 hectares in the first 10 months of 2006. Contaminated land suffered from polluted water, excessive fertilizer, heavy metals and solid wastes.
- The ministry acknowledged that heavy metals alone had contaminated 12 million tons of grain and caused losses of 20 billion yuan (\$2.6 billion) each year, adding that polluted grain would ultimately be a health hazard.
- Sun reiterated that China must ensure that its arable land never shrinks to less than 120 million hectares.

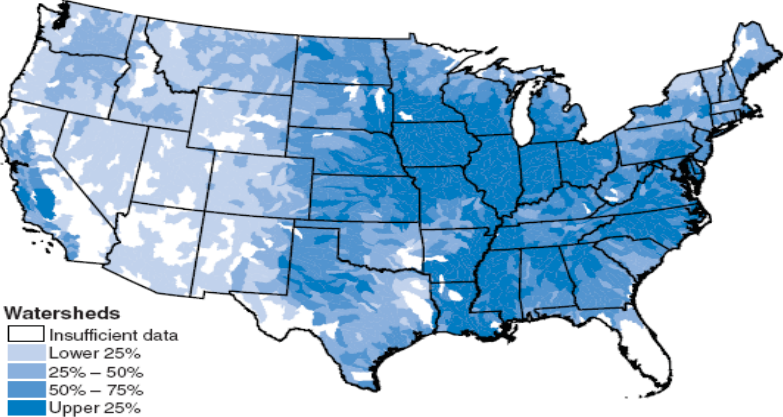
How do we provide twice the food by 2050 without doubling inputs?

Figure 1. World Exports of Pesticides, 1961–2004



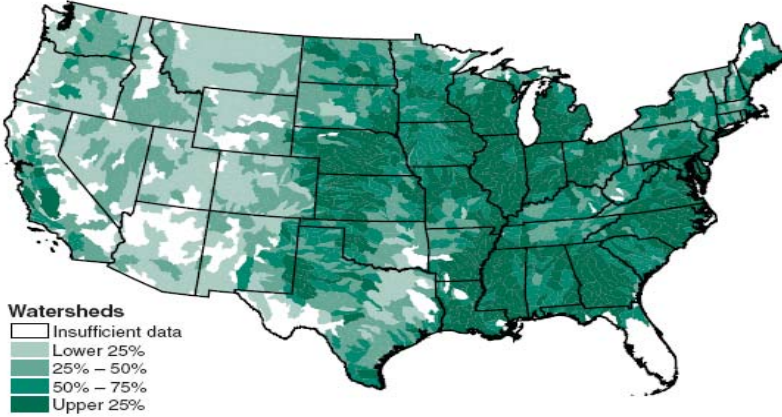
Potential pesticide contamination of water

Figure 2.2.5
Potential pesticide runoff from cropland



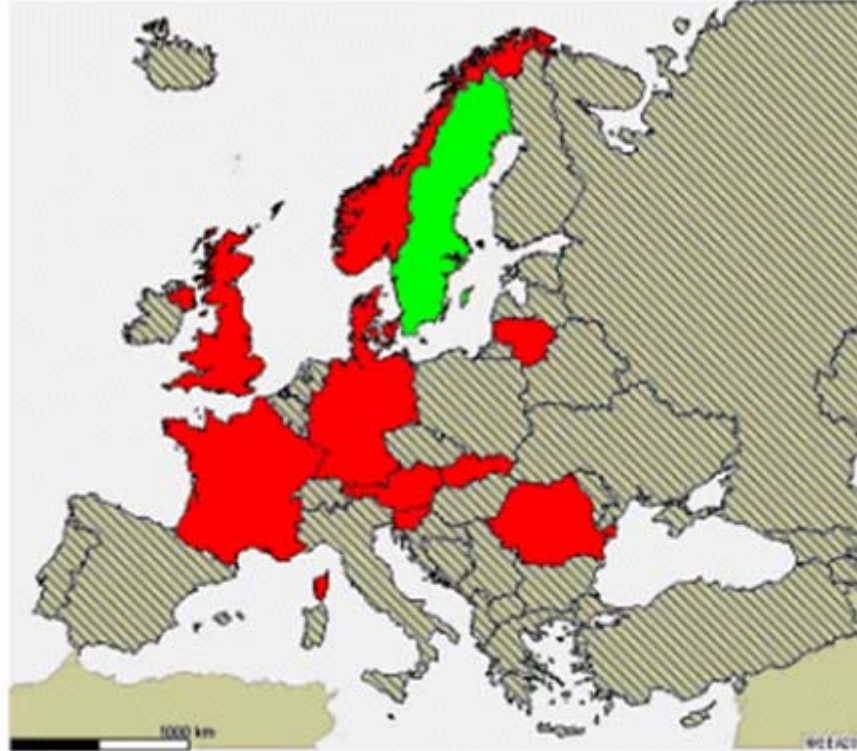
Source: Economic Research Service, USDA, based on pesticide data from USDA surveys.

Figure 2.2.6
Potential pesticide leading from cropland



Source: Economic Research Service, USDA, based on pesticide data from USDA surveys.

The danger of groundwater pollution by pesticides



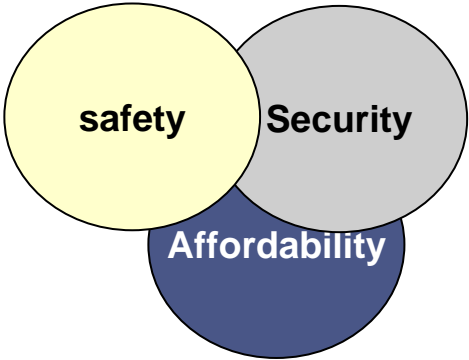
Red : danger of pesticide pollution in GW reported by countries

Green: no danger of pesticide pollution in GW reported by countries

Other: no statements (A number of the EU countries did not report results)

Consumer interests in food change with income but there is a growing priority on health and safety

Developing Economies



Developed Economies

