Global Warning!
The Impact of Meat Production and Consumption on Climate Change

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London
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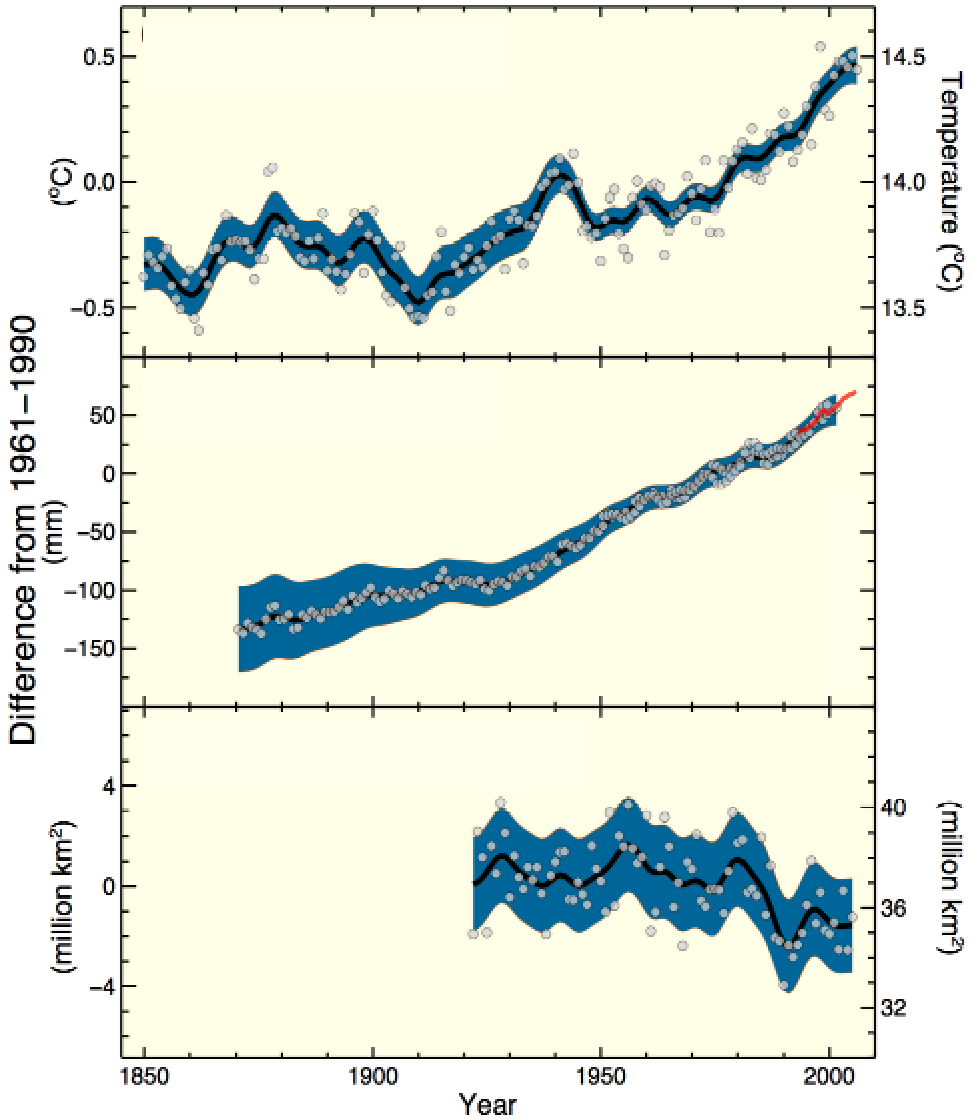
Observed changes

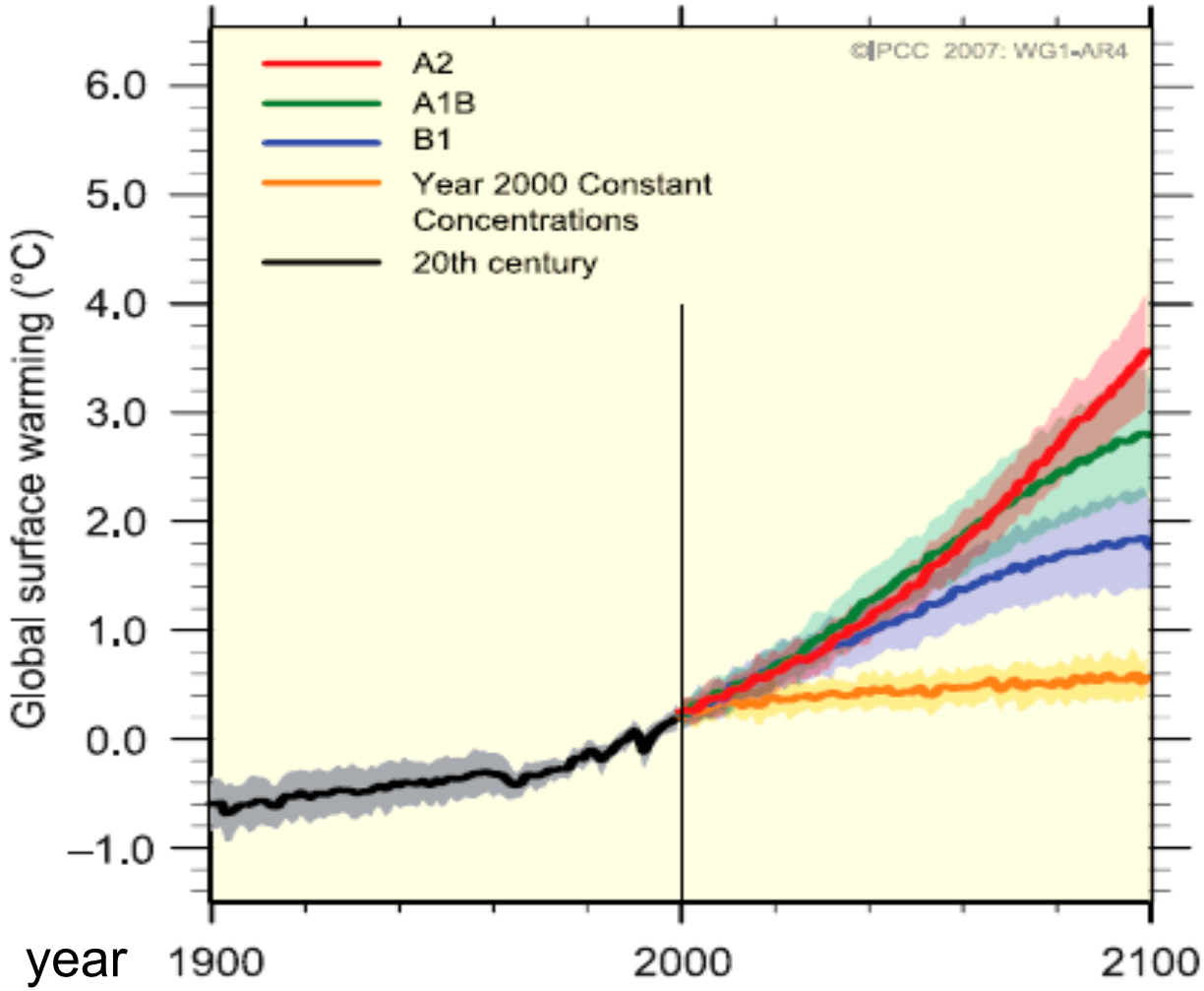
Global average temperature →

Global average sea level →

Northern hemisphere snow cover →



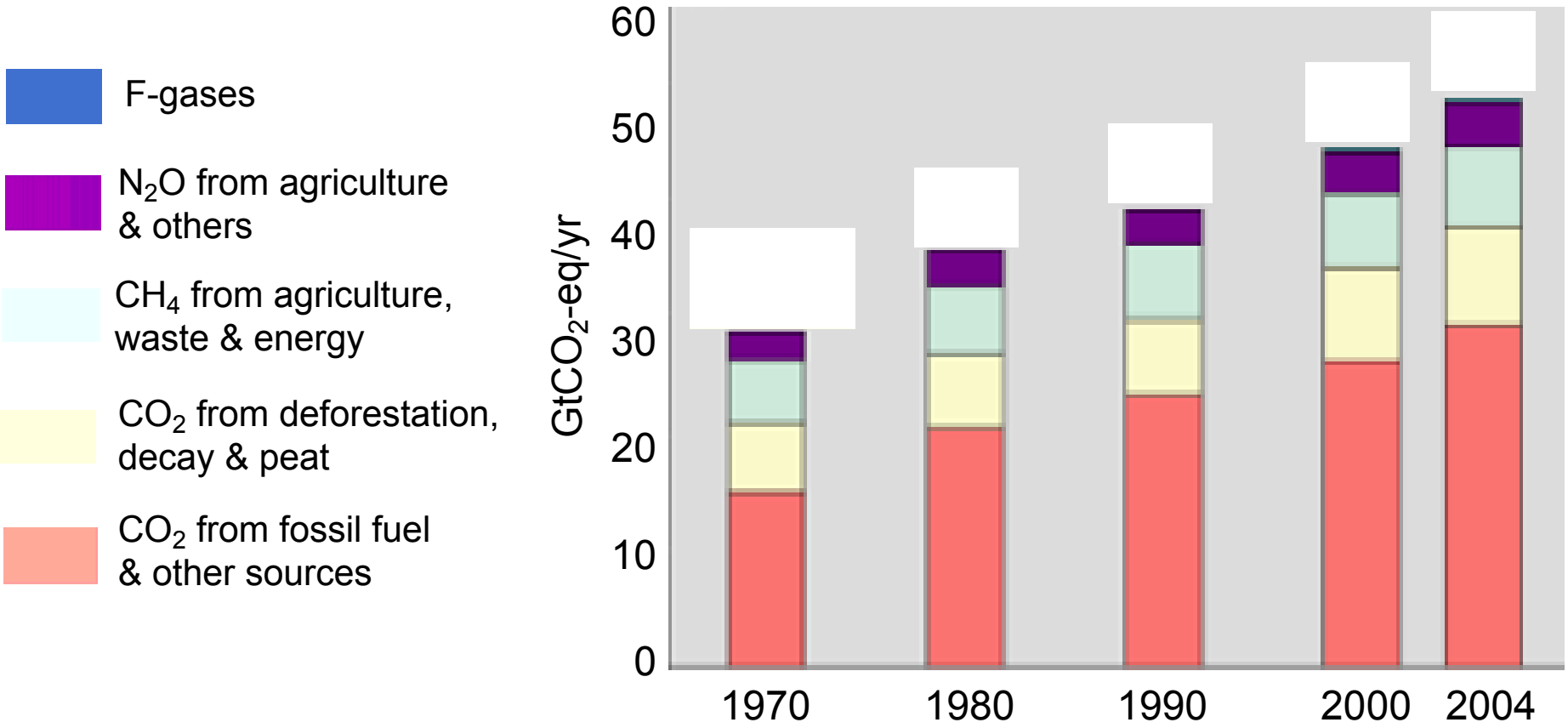
Ranges for predicted surface warming



Continued emissions would lead to further warming of 1.1ºC to 6.4ºC over the 21st century

Global anthropogenic GHG emissions

Global atmospheric concentrations of greenhouse gases have increased markedly as a result of human activities, with an increase of 70% in 1970-2004



Challenges for agriculture

The **growth** in global daily availability of calories per capita:

- has not resolved food insecurity and malnutrition in poor countries
- has increased pressure on the environment

During the last four decades, agricultural land gained almost **500 Mha** from forests and other land uses

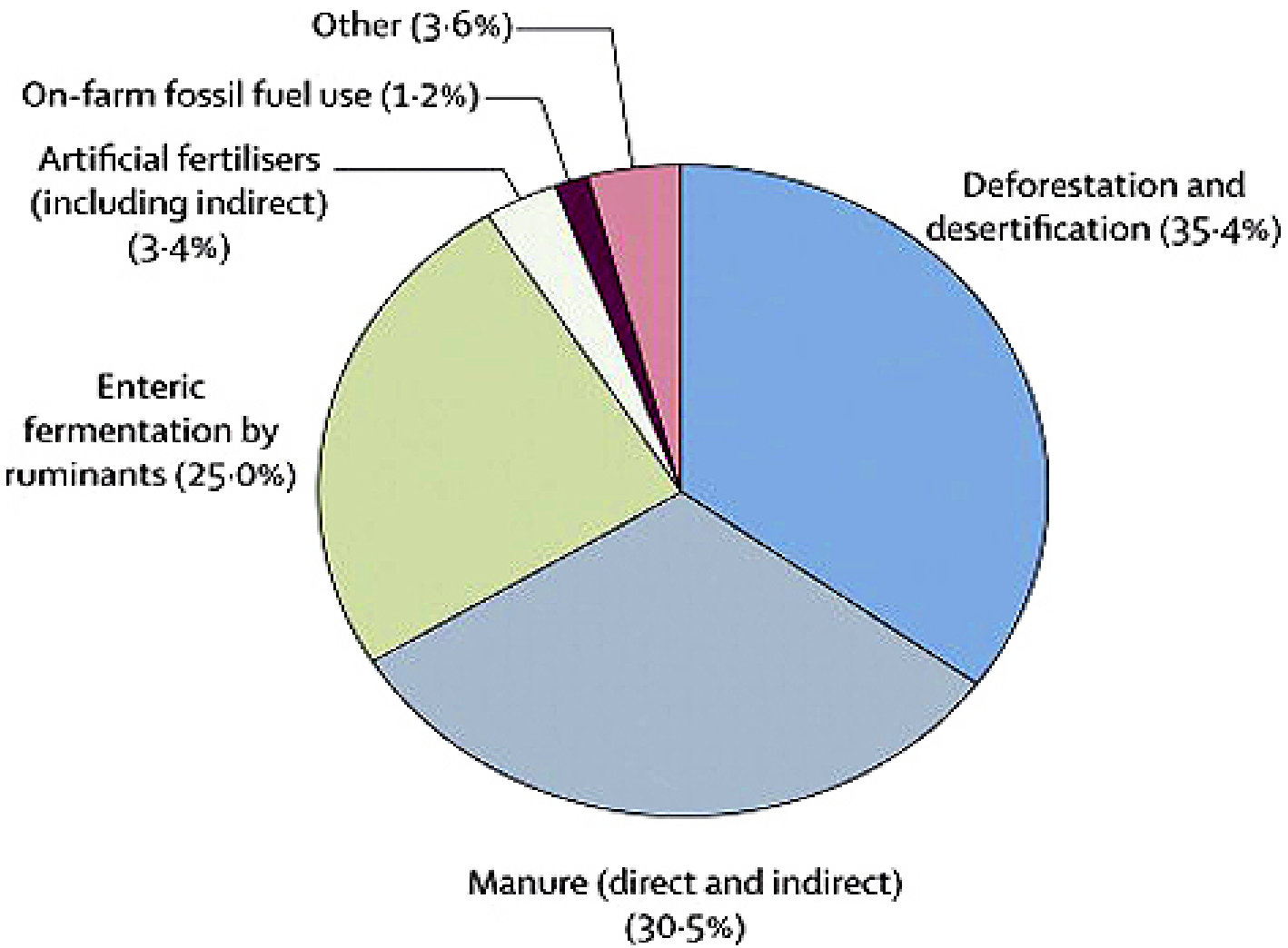
- An additional **500 Mha** is projected to be converted to agriculture in 1997-2020, mostly in Latin America and Sub-Saharan Africa

GHG emissions from livestock production

- **80%** of emissions from agriculture
- **18%** of all greenhouse-gas emissions from human activities, including:
  - 9% of CO_2
  - 37% of CH_4 - 23 times the Global Warming Potential of CO_2 over 100 years, 62 over 20 years
  - 65% of N_2O - 296 times the GWP of CO2 over 100 yrs, 275 over 20 yrs

Source: FAO, 2006

Proportion of GHG emissions from different parts of livestock production



Source: The Lancet, 2007

Producing 1kg beef:

- Leads to leads to the emission of greenhouse gases with a warming potential equivalent to **36.4 kg of CO2**
- Releases fertilising compounds equivalent to **340 g. of sulphur dioxide and 59 g. of phosphate**
- Consumes **169 megajoules of energy**

➡ 1 kg of beef is responsible for the equivalent of the amount of CO_2 emitted by the average European car every 250 km, and burns enough energy to light a 100-watt bulb for 20 days

➡ Over two-thirds of the energy goes towards producing and transporting the animals' feed

Source: Animal Science Journal, 2007

Additional sources of GHGs from meat consumption

Meat requires **refrigerated** transportation and storage

Packaging for livestock products is typically much more extensive than for alternatives to livestock products

Meat typically requires **cooking** at high temperatures for long periods

A large proportion of meat become **waste** products (bones, fat, past-the date spoiled products), which are likely to end up on landfills and incinerated

Energy cost of meat production

THE DISHES

1 cup broccoli, 1 cup eggplant, 4 oz. cauliflower, 8 oz. rice

=

FOSSIL FUEL ENERGY NEEDED TO PRODUCE EACH DISH

0.0098 gallons of gasoline equivalent

→ **0.4 pounds of CO_2-eq**

6 oz. of beef steak

=

0.1587 gallons of gasoline, 16 times as much

→ **10 pounds of CO_2-eq, 25 times as much**

Source: Bittman M., *NY Times*, 27/01/08

Impacts of livestock on land use

The livestock sector is by far the single **largest anthropogenic user of land**

- Livestock production accounts for 70% of all agricultural land and 30% of the world's surface land area

70% of previous forested land in the Amazon is occupied by cattle pastures, and crops for animal feed cover a large part of the remainder

20% pasture land is degraded because of overgrazing, compaction and erosion

Source: FAO, 2006; Goodland R. et al,1999

Other environmental impacts of livestock

Amount of water needed to produce 1 kg of:

- Maize…….. 900 L
- Rice……. 3 000 L
- Chicken……. 3 900 L
- Pork…… 4 900 L
- Beef…… 15 500 L

Livestock is responsible for 64% of **ammonia** emissions, which contribute to acid rain

Livestock is among the largest sectoral source of **land & water pollution** with nitrates and phosphorus from slurry and silage run-off and from the use of nitrogen fertilizer

Source: FAO, 2006; A.K. Chapagain and A.Y. Hoekstra 2004

Impacts of livestock on food availability

1/3 of the world's cereal harvest and over **90%** of soya is used for animal feed, despite inherent inefficiencies:

- It takes <10 kg of animal feed to produce 1 kg of beef
- 4 to 5.5 kg of grain to produce 1 kg of pork
- 2.1 to 3 kg of grain to produce 1 kg of poultry meat

A farmer can feed up to **30 persons** throughout the year on 1 hectare with vegetables, fruits, cereals and vegetable fats

- If the same area is used for the production of eggs, milk or meat, the number of persons fed varies from **5 to 10**

Source: FAO, 2006; CAST 1999; B. Parmentier, 2007

Health effects of meat consumption

Consumption of red meat presents health risks, largely due to its **saturated fat and high-protein content**:

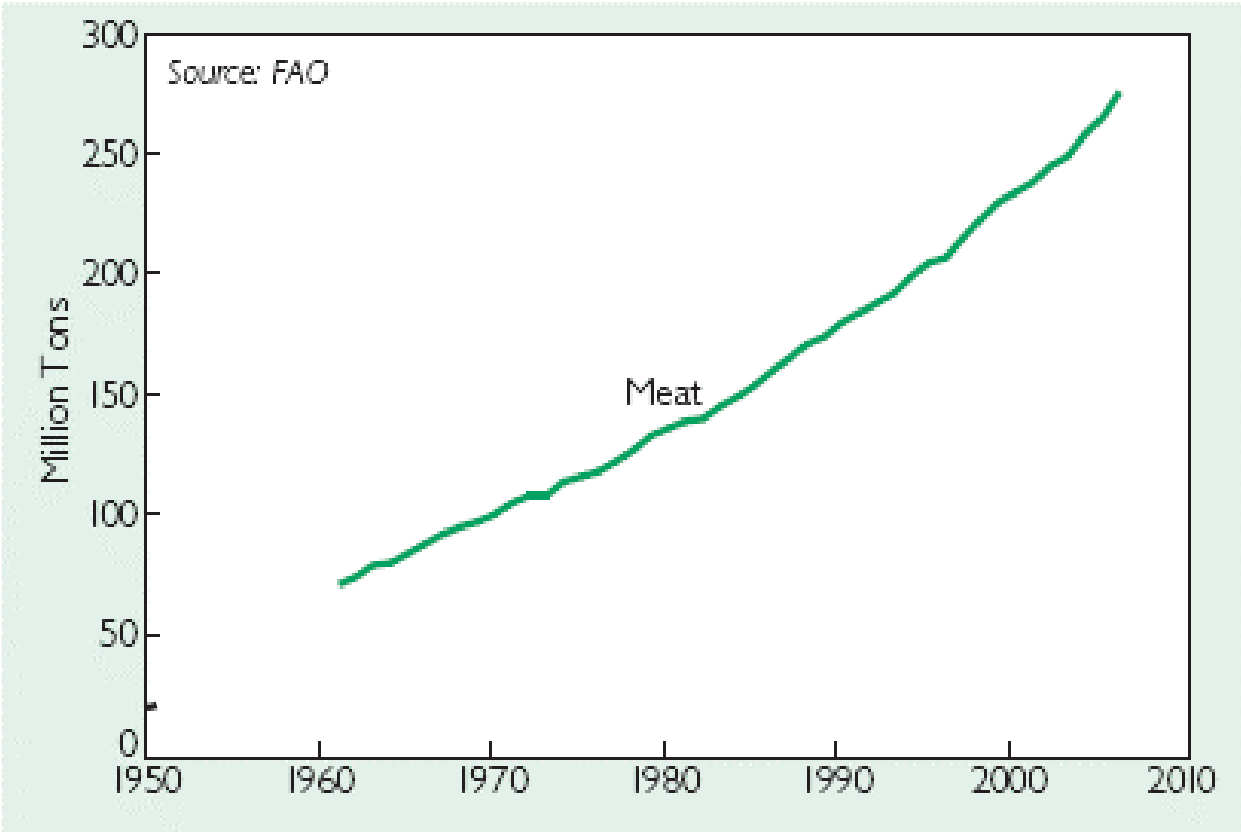
- Some type of cancer
- Heart disease
- Type 2 diabetes
- Obesity

Animals tend to concentrate **pesticides** and other chemicals in their meat and milk.

The World Cancer Research Fund says:
"Eat mostly foods of plant origin."

Source: The Lancet, 2007; World Cancer Research Fund, 2007

World meat production (1950-2006)

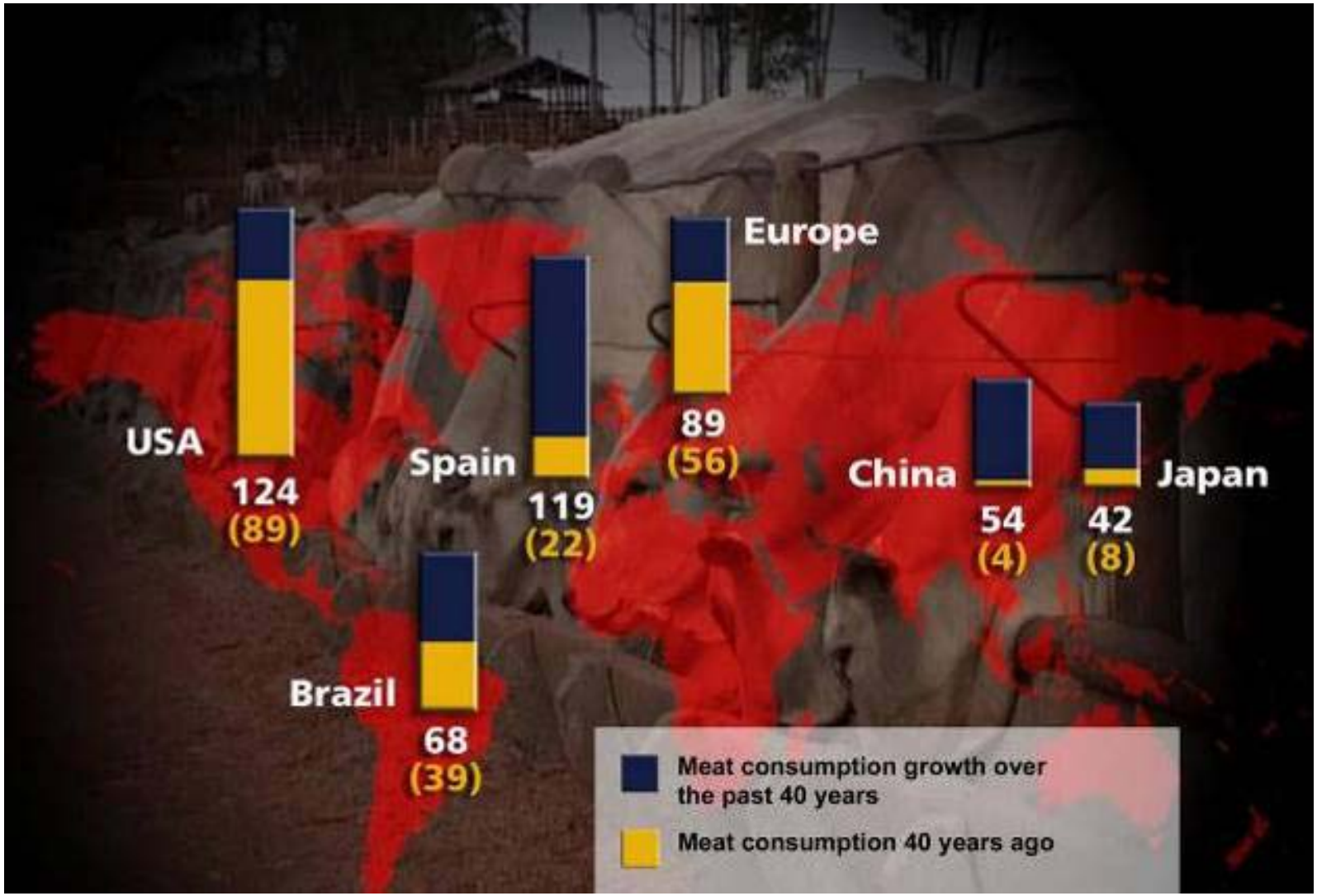


In 2006, farmers produced **276 million tons** of meat

- **Five times** as much as in the 1950s

Source: World Watch Institute, 2008

Meat consumption per capita in kg per annum



Source: FAO, 2004

Expected trends in the livestock industry

Estimated doubling of global production of meat:

- **229 million tons** in 2001 → **465 Mt** in 2050

Estimated near doubling of global dairy output:

- **580 Mt** in 2001 → **1043 Mt** in 2050

Estimated growth in the number of farm animals used per year:

- **60 billion** in 2008 → **120 billion** in 2050

Growth in meat consumption leads to growth in **factory farming**

- Over 50% pigs and around 75% poultry are produced in industrial factory farms

Source: FAO, 2006, Compassion in World Farming, 2008

Is Intensive farming the solution?

Pros	Cons
Breed animals for greater productivity, so fewer animals needed	Can result in physiological stress and shortened lifespan
More concentrated cereal feeds, less grass, fed to cattle to reduce methane emissions	Can result in acidosis and lameness. Shortages in grain supply. More nitrogen fertilizer Needed. Poor farmers can't afford
Add chemicals to diets to reduce methane emissions	Query health effects on animals. Could result in residues in meat. Poor farmers can't afford
Genetic engineering and cloning of animals to produce less methane	Many GE and cloning experiments lead to suffering

The need for change in consumption patterns

A reduction in the size of the livestock industry through **reduced consumption** is the most effective way of cutting GHGs from animal production

- A person who lives 70 years as a vegan will prevent over 100 tons of CO_2-eq

UK and US households **waste** around 1/3 of the food they buy

Change in consumption patterns will be required to achieve a **low-carbon & sustainable society**

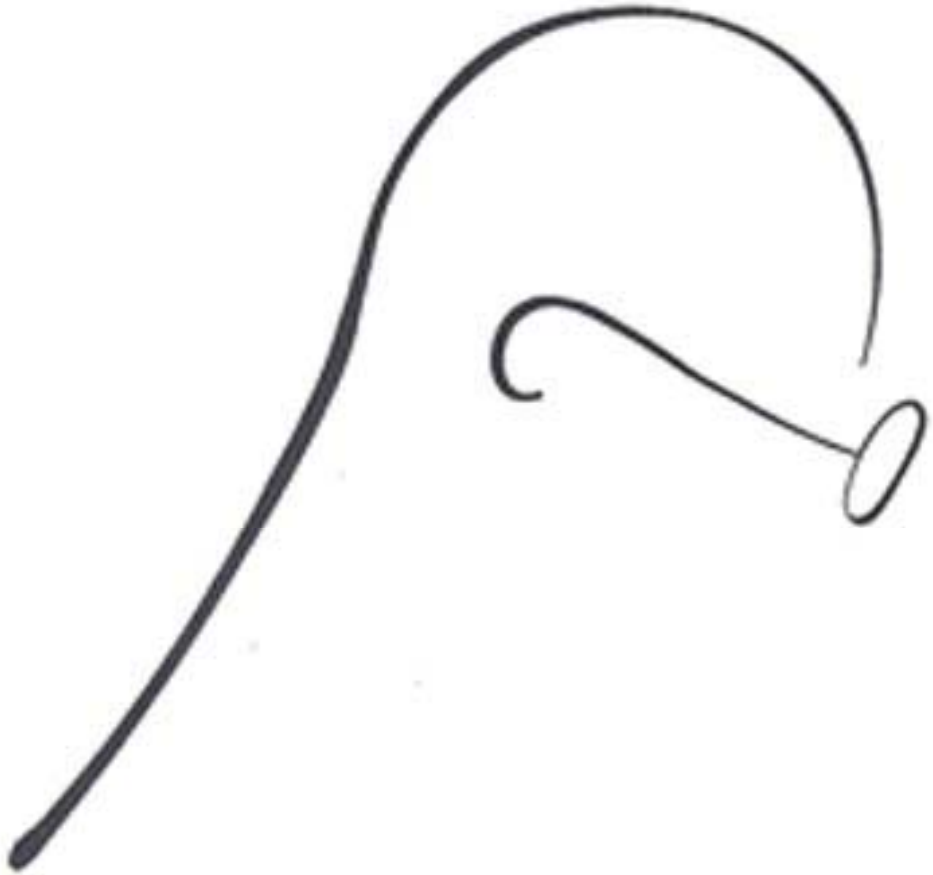
Sources: Eshel & Martin, 2006; Waste & Resources Action Programme, 2008

How can change be achieved?

- Through the power of **consumers and citizens**
  - ➡ Reducing meat consumption
  - ➡ Choosing organic or free-range products
  - ➡ Campaigning and raising awareness
- Through the decisions of **policy-makers**
  - ➡ Promoting food policies that are healthier, more sustainable and more humane

Some of the gravest threats to the long term sustainability of humankind remain all but ignored.
I would put the excessive consumption of meat right up there in that category

Jonathon Porritt,
Chair, UK Sustainable Development Commission,
Director, Forum for the Future



Be the change you want to see in the world