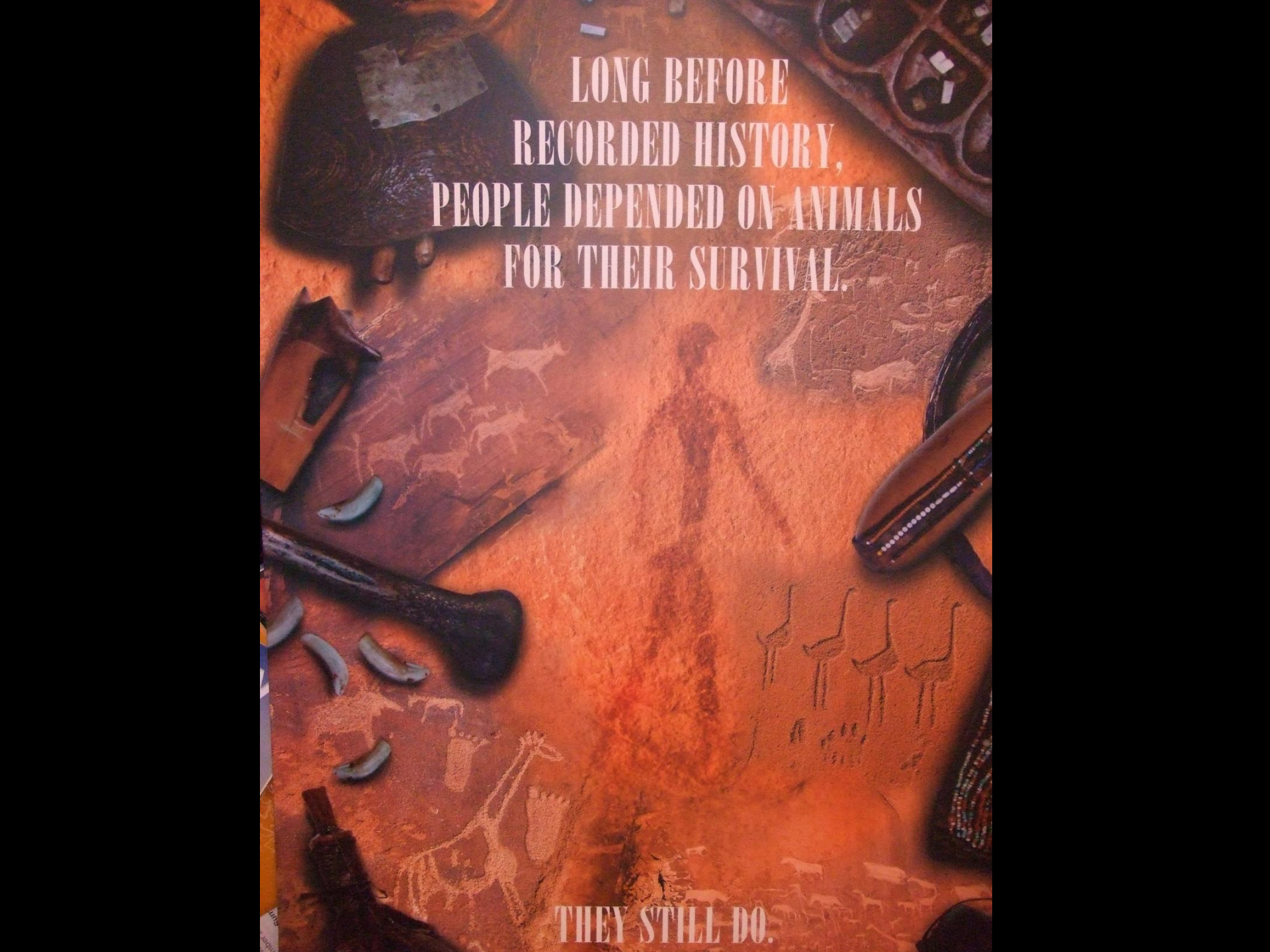


**Opportunities and issues associated  
with the contribution of dairying to  
meeting the zero hunger  
challenge, with a particular focus  
on Asia**

Margaret Gill

Aberdeen Centre for Environmental Sustainability  
University of Aberdeen

A collection of primitive tools and artifacts is scattered across a textured, reddish-brown surface. In the top left, there is a dark, curved object, possibly a horn or a piece of wood. To its right, a wooden tray holds several small, dark, rectangular objects. In the center, a large, dark, curved object, possibly a horn or a piece of wood, is visible. Below it, a wooden board with a curved shape is present. To the right of the board, a dark, curved object, possibly a horn or a piece of wood, is visible. In the bottom left, a dark, curved object, possibly a horn or a piece of wood, is visible. In the bottom right, a dark, curved object, possibly a horn or a piece of wood, is visible. The background is a textured, reddish-brown surface with faint, light-colored markings, including a large, irregular shape in the center and several smaller, curved shapes in the bottom right.

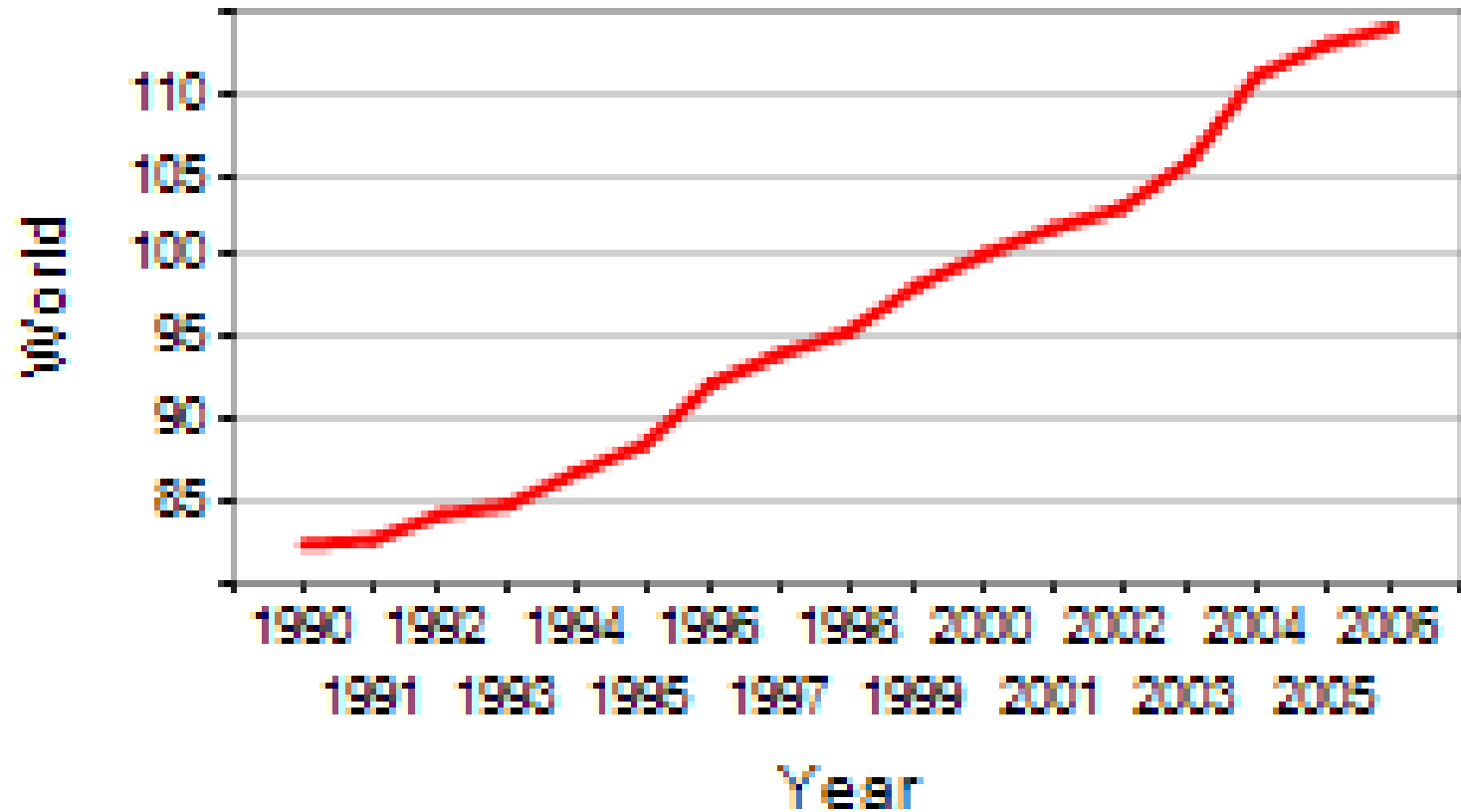
LONG BEFORE  
RECORDED HISTORY,  
PEOPLE DEPENDED ON ANIMALS  
FOR THEIR SURVIVAL.

THEY STILL DO.

# Structure of talk

- Agricultural growth and its consequences
- Growth in milk supply
- Rapid change and potential consequences
- Planning for the future – Case Study of feed
- Take-away messages

## Agricultural Production



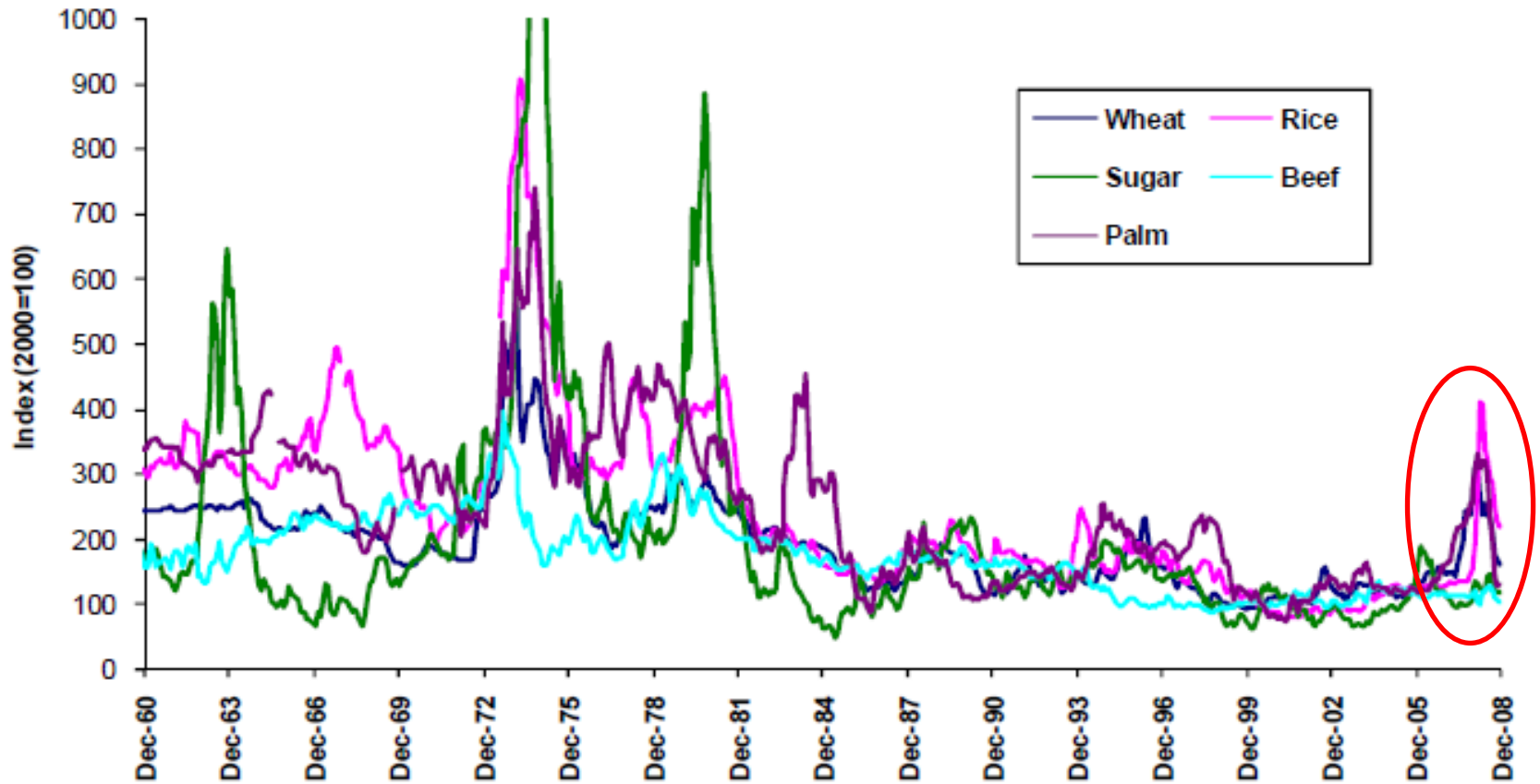
# Increase in global food supply per person

	1969-1971	2005-2007
Global food supply kJ/capita	9.93	11.63
Global food supply g protein/capita	64.3	76.6

**Plus production increase matching population growth**

# Food prices 1960-2008

Figure 2: Real price indices January 1960 – December 2008



# Science contributed through:

- Crop breeding
- Animal breeding
- Growth of chemical industries e.g. fertilisers and pesticides
- Growth of pharmaceutical industries e.g. vaccines and antibiotics
- Crop and animal husbandry
- Increasing precision of mechanisation



Source: © 2005 PETER MENZEL PHOTOGRAPHY

avalés chaque année... Plus de la moitié des Allemands sont en surpoids ou obèses.



# Did this solve global hunger?

- One in 3 adults (~1.5 billion) are obese or overweight

BUT

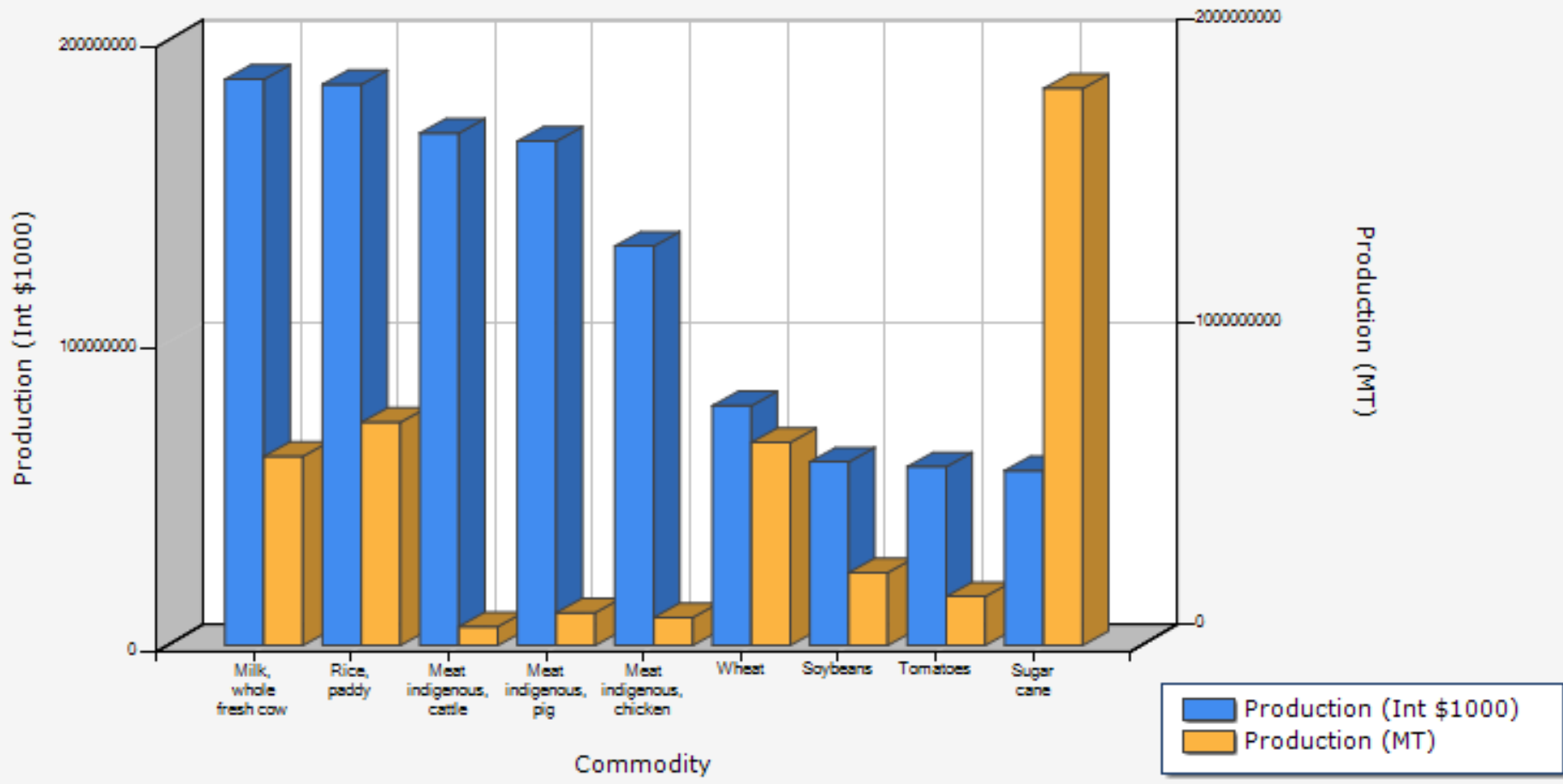
- ~ 870 million people are still hungry on a regular basis
- > 1 billion suffer from micronutrient deficiency

# Evidence of agricultural benefits on nutrition indicators

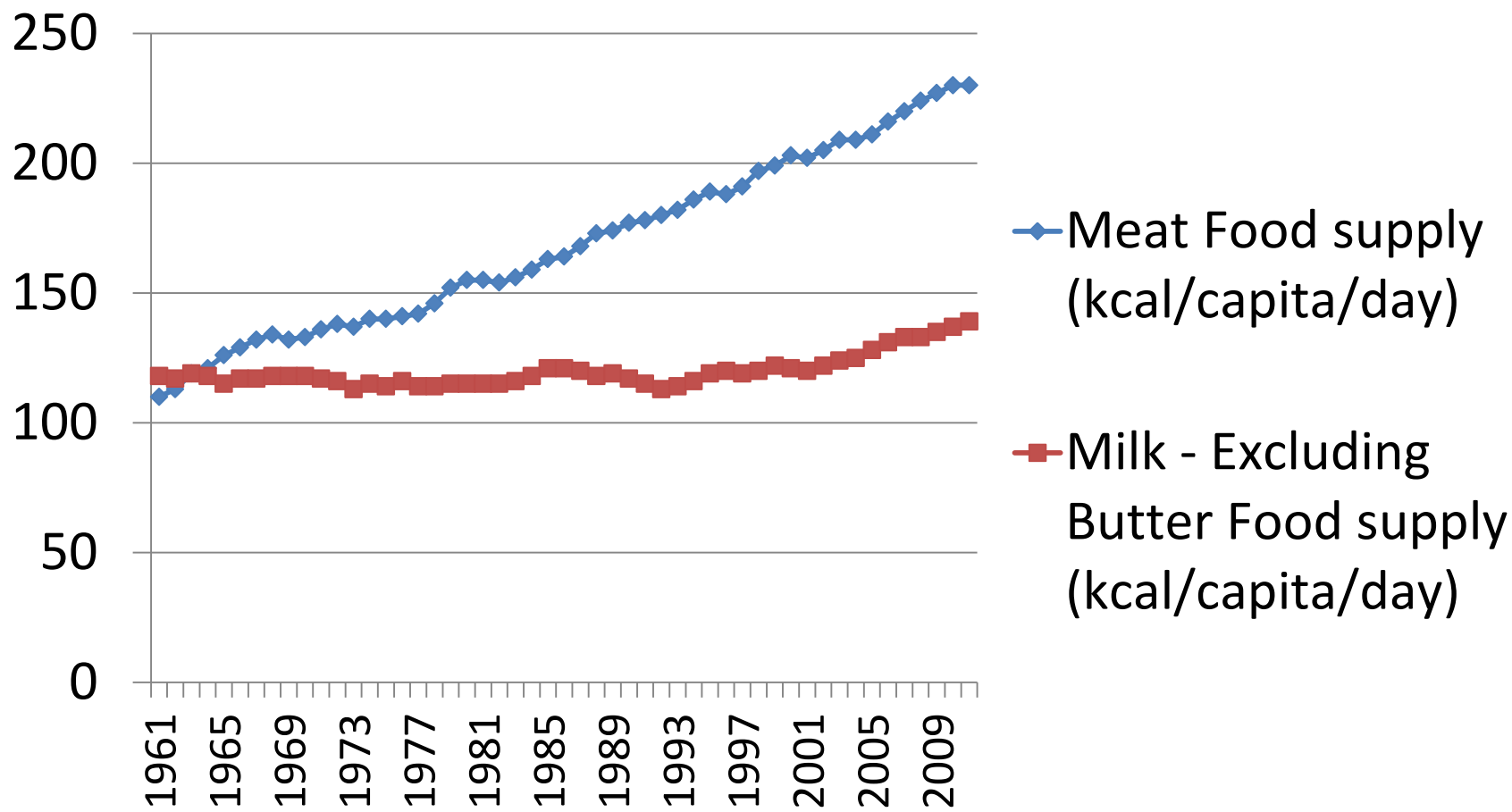
- Low evidence (Masset et al 2012)
- Positive evidence for animal source feeds including milk and meat (University of California Davis e.g. Dror and Allen (2011))

# **MILK SUPPLY**

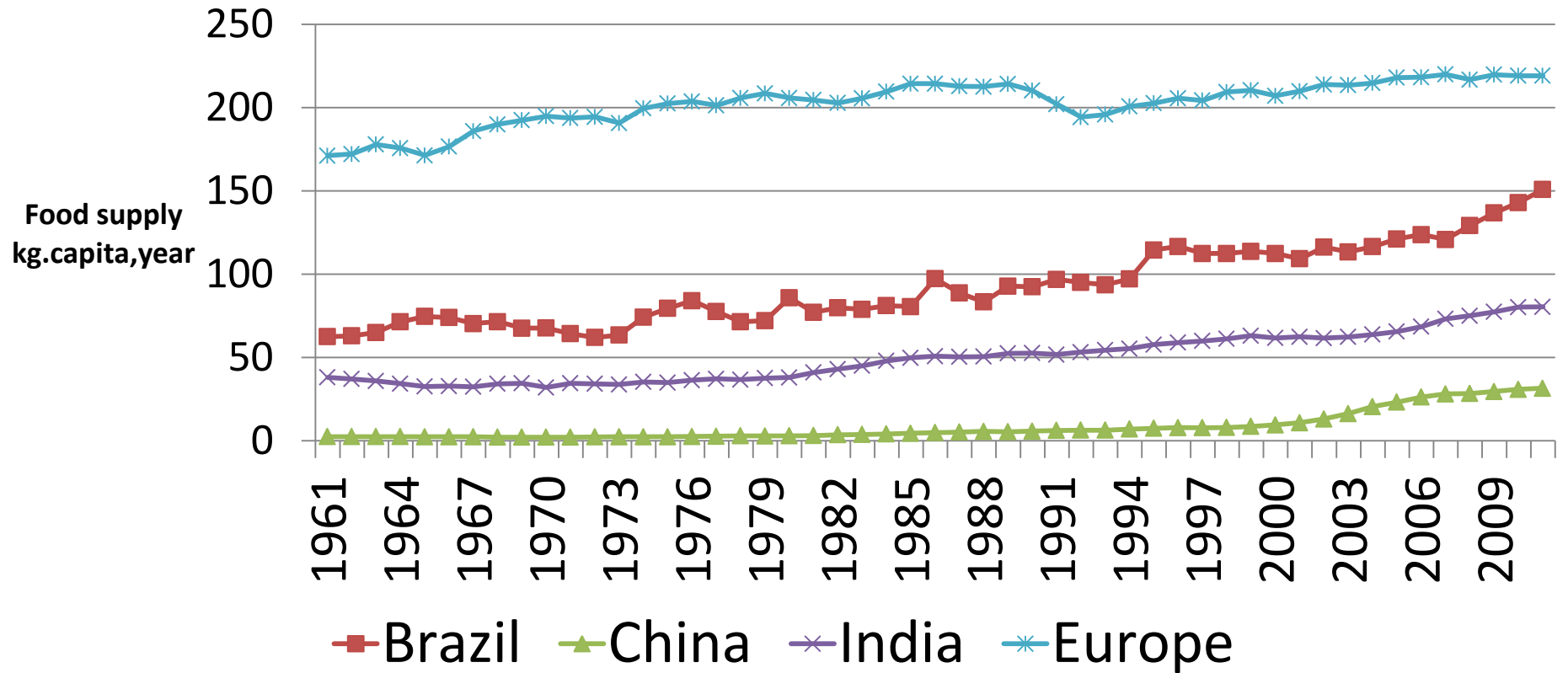
### Top production - World (Total) - 2012



# World average supply of meat and milk (kcal/capita/day)



## Milk - excluding butter



# Science and the dairy industry

## **Traditional**

- Breeding for higher yield and composition of milk
- Dairy cow nutrition for yield and composition of milk – total solids
- Vaccines and antibiotics to treat dairy cows
- Design of milking parlours

# Science and the dairy industry

## **Current and future**

- Genomics to match cross-breeds to farming systems
- Breeding and diet to manipulate milk fat to be healthier
- Supplements to reduce intensity of methane emissions
- How to decrease environmental impact of dairying



# **RAPID CHANGE AND POTENTIAL CONSEQUENCES**

# The context is increasingly dynamic

- Climate change – trends and uncertainty
- Political change – the rise of the BRICs
- Social change – the ‘nutrition transition’
- Economic change – global growth, interconnectedness and uncertainty
- Access to information – increasingly informed public who want a voice

# Top 3 world economies

## GDP in purchasing power parity terms

Country	2011	2030	2050
US	15,094	23,376	37,998
China	11,347	30,634	53,856
India	4,531	13,716	34,704







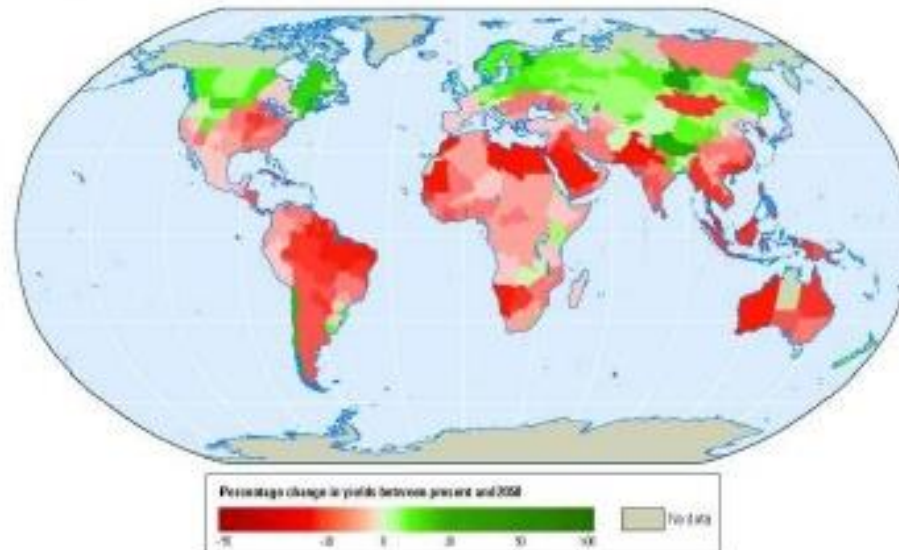
# 9 Planetary boundaries – natural limits that we stray over at our peril

- **Climate change**
- Ocean acidification
- Stratospheric ozone depletion
- **Disruption of nitrogen cycle**
  - Disruption of phosphorus cycle
- Global freshwater use
- Change in land use
- **Biodiversity loss**
- Atmospheric aerosol loading
- Chemical pollution

# Projections of crop impacts



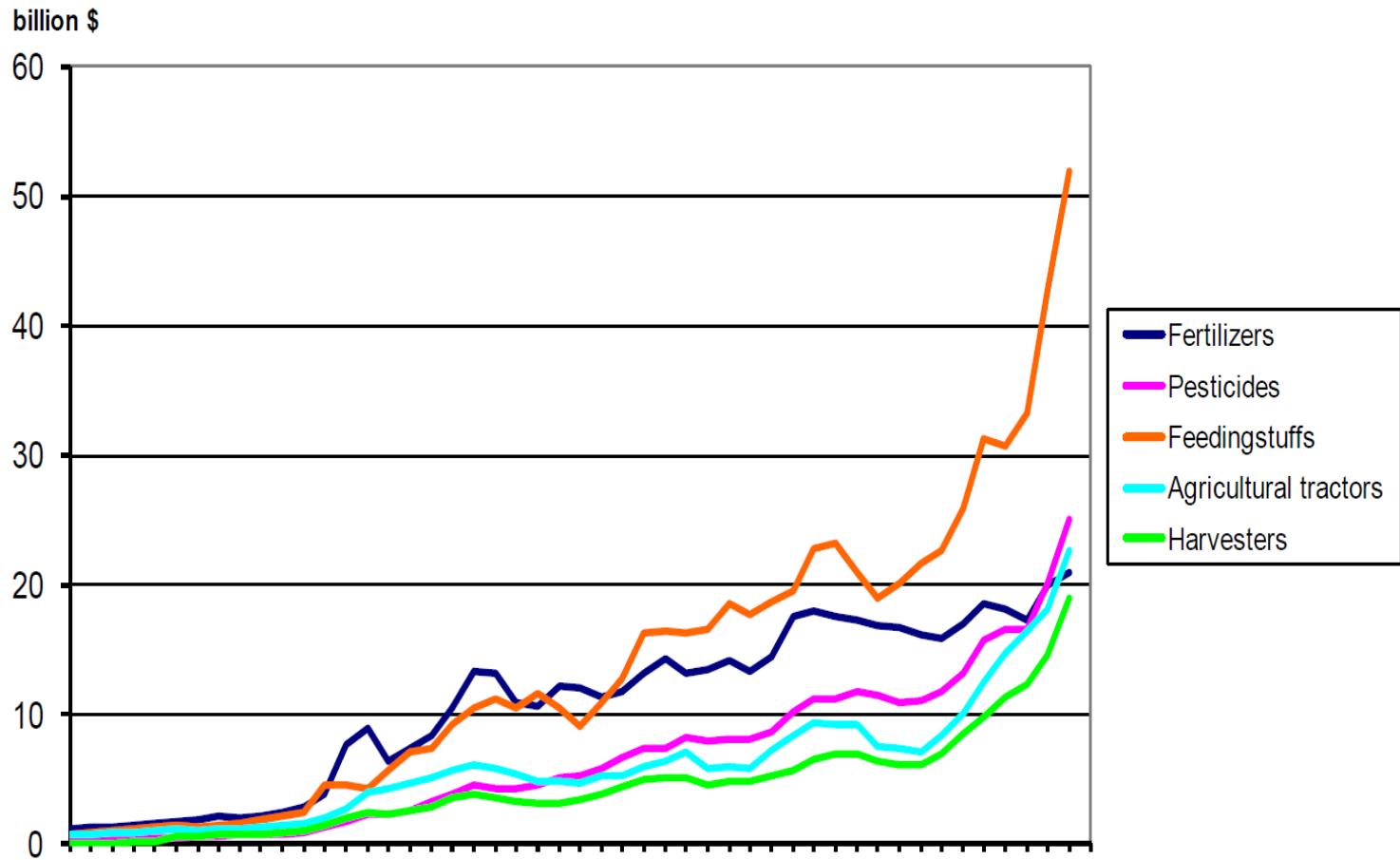
Parry et al 2004



World Bank Development Review 2010



# **PLANNING FOR THE FUTURE – CASE STUDY OF FEED**



Trends in global trade of agricultural inputs  
1961 to 2009 Niemi and Niemi (2012)

# Global feed tonnage (million tonnes)

excludes forage and home-produced feeds

Region	Ruminants	Pigs and poultry
North America	45.5	122.3
Europe	55.8	129.9
Asia	80.1	197.0

From Alltech Global Feed Summary 2012

# **Additional grain required by 2050**

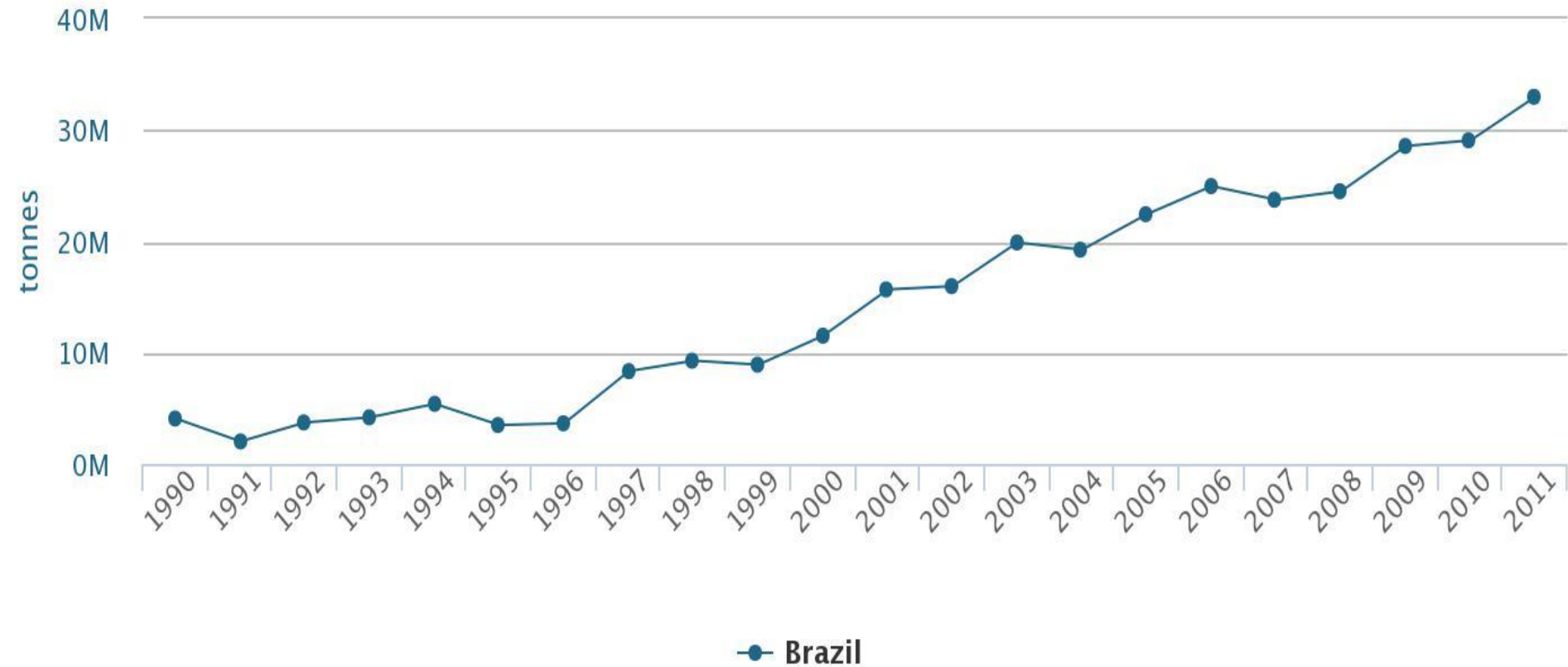
**1305 million tonnes of which:**

**– 553 million tonnes for livestock**

**– 752 million tonnes for humans**

*IAASTD 2009 using IFPRI economic models to generate predictions*

# Trend in Soyabean meal exports from Brazil 1990 to 2011



M = Million, k = Thousand

# Increased feed requirement

- Can it be met? Should it be met?
- In 2011 58% of global biomass was used for feed
- Can this continue if the world moves from a fossil fuel based economy to a biomass based one?
- Europe has a Bioeconomy strategy so do a number of other countries/regions – what impact will they have when implemented?

- **Lateral thinking** is solving problems through an indirect and creative approach, using reasoning that is not immediately obvious and involving ideas that may not be obtainable by using only traditional step-by-step logic. The term was coined in 1967 by Edward de Bono.

# Ranking of efficiency of conversion of human edible feed protein to animal product

Country	System	g product protein/g feed protein
South Korea	Dairy	14.30
South Korea	Beef	6.57
Argentina	Beef	6.12
USA	Dairy	2.08
Argentina	Dairy	1.64
USA	Beef	1.19
South Korea	Poultry meat	1.04
USA & Argentina	Poultry meat	<0.7
All 3 countries	Pigs	<0.51



# Alternative feeds

- More use of by-products?
- Algae?
- Insects?

***- think innovatively in terms of feed!***

# Take-away message

- Dairying provides an economic opportunity for many
- Rapid changes and consequences
- Application of scientific advances can help
- Pressure groups against livestock
- Having a strategy helps

*BUT*

***Monitoring key changes and lateral thinking/innovation in all parts of the dairy industry could be key to success***