



***Consuming livestock:* human health & nutrition, climate change, livelihoods and animal welfare**

Tara Garnett - Food Climate Research Network

7-8 June 2011

# Background and workshop purpose

1. About the Food Climate Research Network
2. Why this workshop? Why livestock?
3. Key issues to explore
  - a. Global food trends
  - b. Environment
  - c. Health
  - d. Animal welfare
  - e. Economic development
4. Workshop aims

# Many thanks to:

- World Society for the Protection of Animals for funding and supporting this event
- Prof. Gao Shangbin & Institute of Agri-Environment Protection of CAAS for hosting and organising meals and logistics
- SAIN for co-organising
- All of you - speakers and participants for contributing!

# 1.

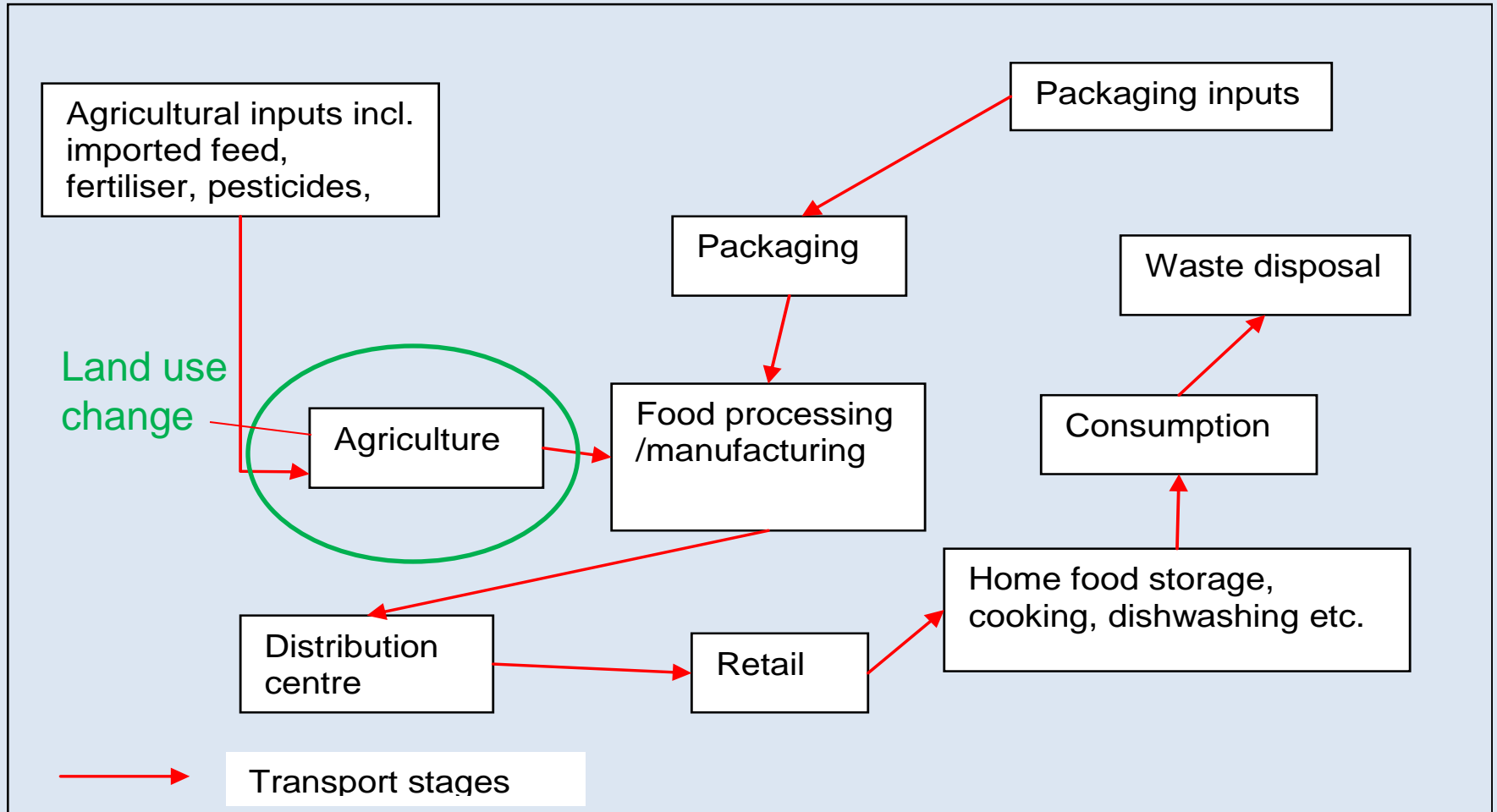
## About the Food Climate Research Network

Based at Surrey University – running since 2005

Focuses on:

- Researching food chain contribution to GHG emissions and options for emissions reduction – technology, behaviour, policy.
  - inter-disciplinary and inter-sectoral approach
- Sharing and communicating information on food & climate change with member network

# The food system and its emissions



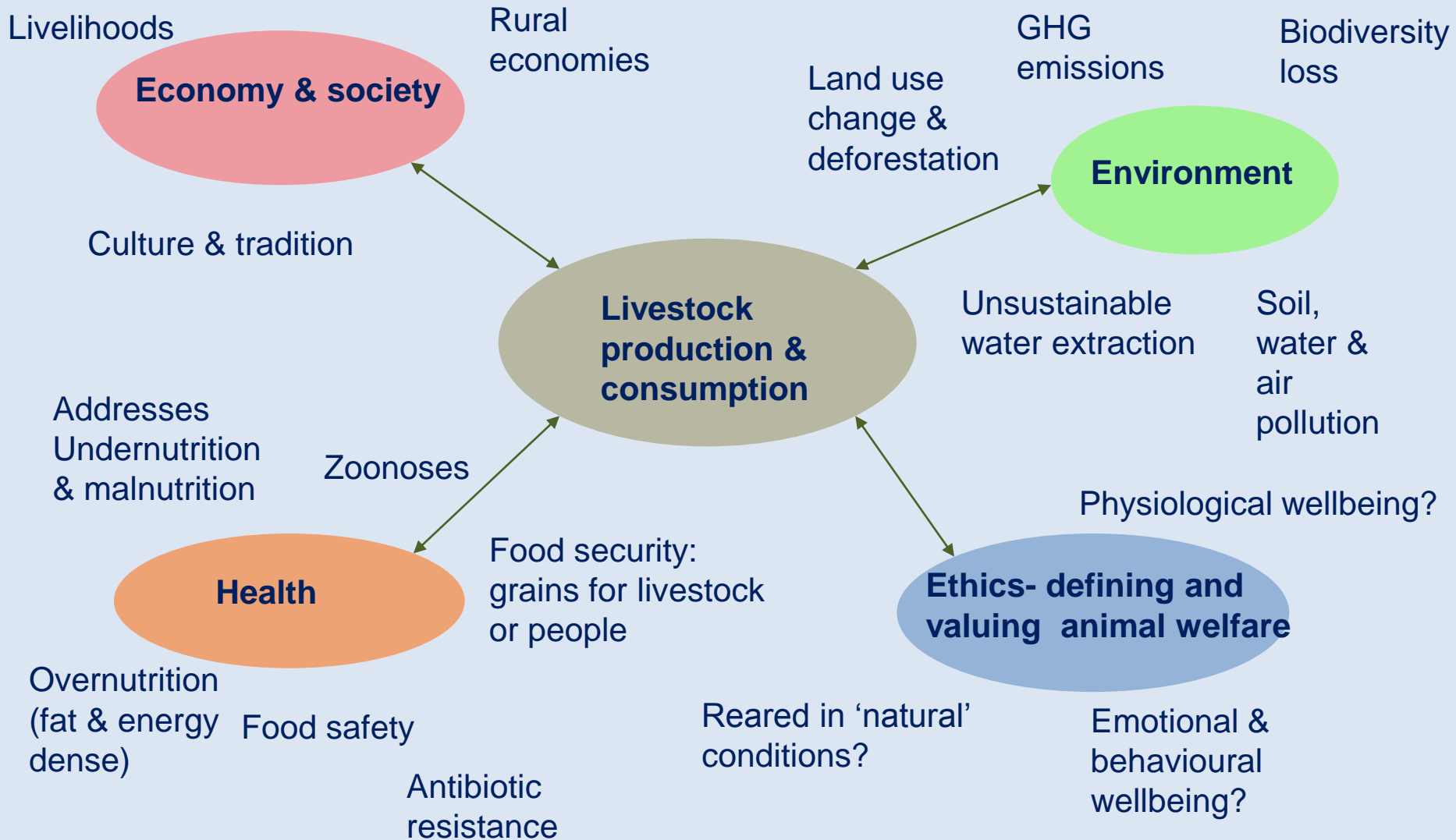
# FCRN outputs

- Numerous **publications**  
<http://www.fcrn.org.uk/fcrn/publications>
- **Workshops & seminars**
- **Commissions** research (one study with WWF)
- Undertakes commissioned research: just completed work for World Health Organisation: health implications and potential health co-benefits of agricultural GHG mitigation policies
- Comprehensive **website**: see [www.fcrn.org.uk](http://www.fcrn.org.uk) – access to information for researchers
- **Mailings**: emails sent weekly to @1850 members (all sectors, all disciplines, UK & abroad): news on food and climate
- Open to all – **please join**
  - contact me at [taragarnett@blueyonder.co.uk](mailto:taragarnett@blueyonder.co.uk)

## 2. Why this workshop?

- Many global problems converge on livestock production and consumption....

# Livestock – Interconnected challenges





# Why UK and why China?

- China: large population, moderate and rapidly rising meat (& dairy) consumption
- UK – small population, very high consumption of meat & dairy foods
- Increasingly common problems (eg. obesity) – but also important differences (economic, attitudes to welfare)
- Addressing climate change is the common bond
- Can we start a discussion about meat and dairy consumption on the basis of this common bond?

# 3. Key issues to explore

# 3.a. Global trends in food demand

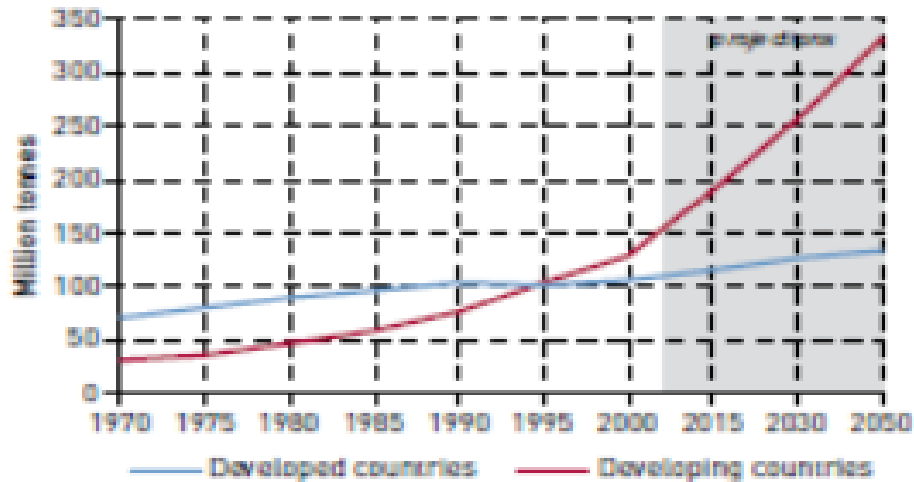
- Projected 70% increase in demand for food by 2050 (FAO 2009)
- Projected doubling in demand for meat and dairy products. Why?
  - more people
  - growth in average per capita consumption
- Climate change will affect our capacity to produce, transport and distribute food – feedback effect
- Biofuels complicate the mix

# Global trends in demand for livestock products

	2000 (6 billion people)	2050 (9 billion people)
Total demand – meat (tonnes)	228	459
Total demand – milk (tonnes)	475	883
	Source: FAO 2006	

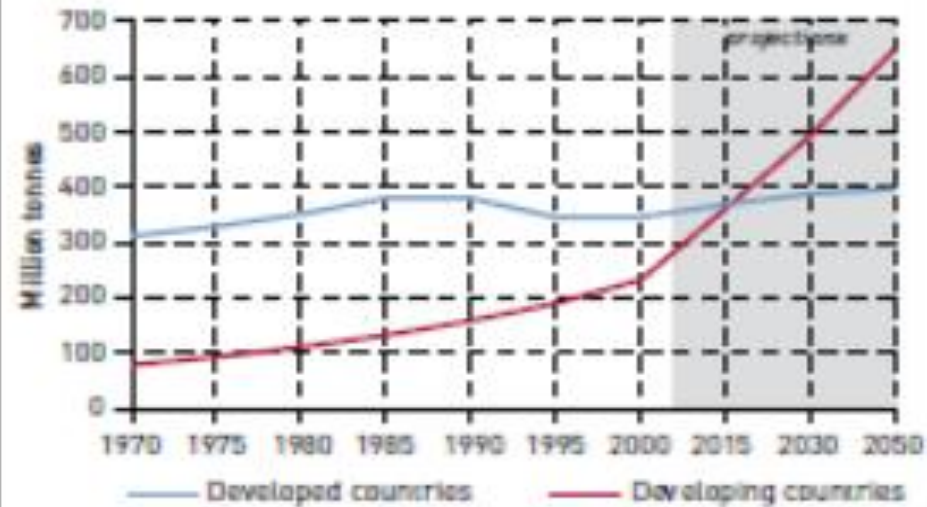
# Meat & dairy demand set to nearly double

**Figure 1.6** Past and projected meat production in developed and developing countries from 1970 to 2050



Source: FAO (2006a) and FAO (2006b).

**Figure 1.7** Past and projected milk production in developed and developing countries from 1970 to 2050

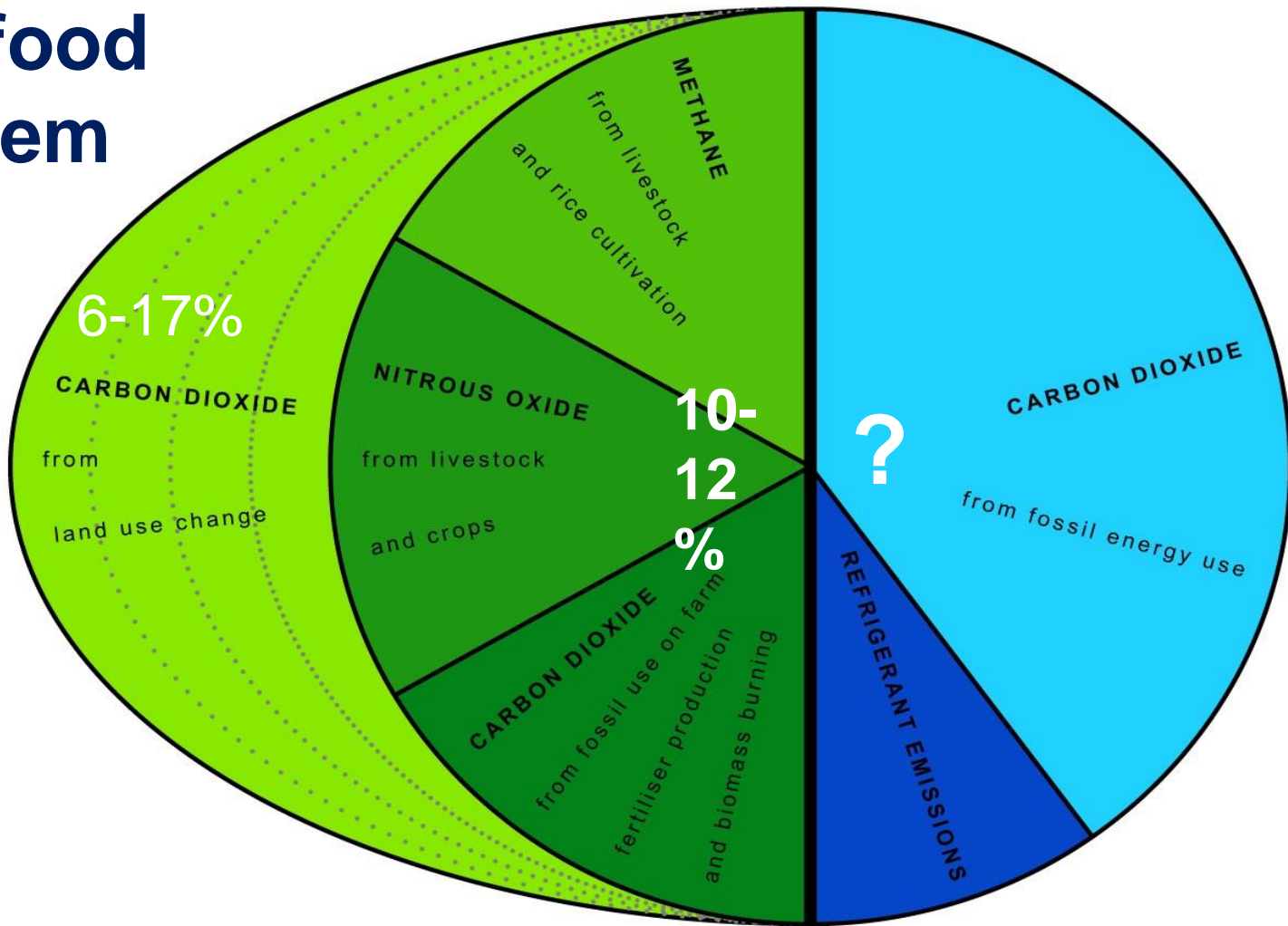


**Production in developing world already higher – most of growth in demand set to come from developing world. Per capita inequalities continue**

Country	Meat g/ per capita / day	Milk g/ per capita / day (all milk products excl. butter)
Bangladesh	9.9	44.3
Brazil	220.5	341.4
Cambodia	44.2	15.3
<b>China</b>	<b>146.43</b>	<b>78.6</b>
India	8.9	188.3
Malawi	16.2	9.7
<b>United Kingdom</b>	<b>234.3</b>	<b>661.6</b>
United States	336.4	695.4

## 3.b. Environmental impacts

# GHGs in food system



- **Agriculture**
- Direct: 10-12% GHG emissions
- Up to 30% including land conversion
- **Post farm gate:**
- Fossil fuel CO<sub>2</sub> & refrigerants

System GHG estimates for European, US & Australia range from 14-30%

\*proportions for illustrative purposes only



# Agricultural emissions set to grow

IPCC estimates agricultural emissions to  
rise by **50% by 2030**

Doesn't include emissions from land use change

# The role of livestock

- Global estimate— 12-18% global emissions (NEAA / FAO)
- EU livestock sector: 9% of EU emissions or 13% if land use change considered
- Variation depends on what's included (eg. land use change) & baseline estimates of GHGs
- China?

# Livestock's other environmental impacts

- Land: livestock use 70% of agricultural land (1/3 of arable land (FAO 2006)
- Water: Major water user especially intensive systems: agricultural water demand may increase by 70%-90% by 2050. Much of it is livestock related *Comprehensive Assessment of Water Management in Agriculture. 2007*
- Biodiversity, deforestation, land degradation – livestock is a major driver ( MEA / FAO 2006/2009)
- Nutrient surpluses – point & non point pollution

# Significant reductions in food system emissions possible

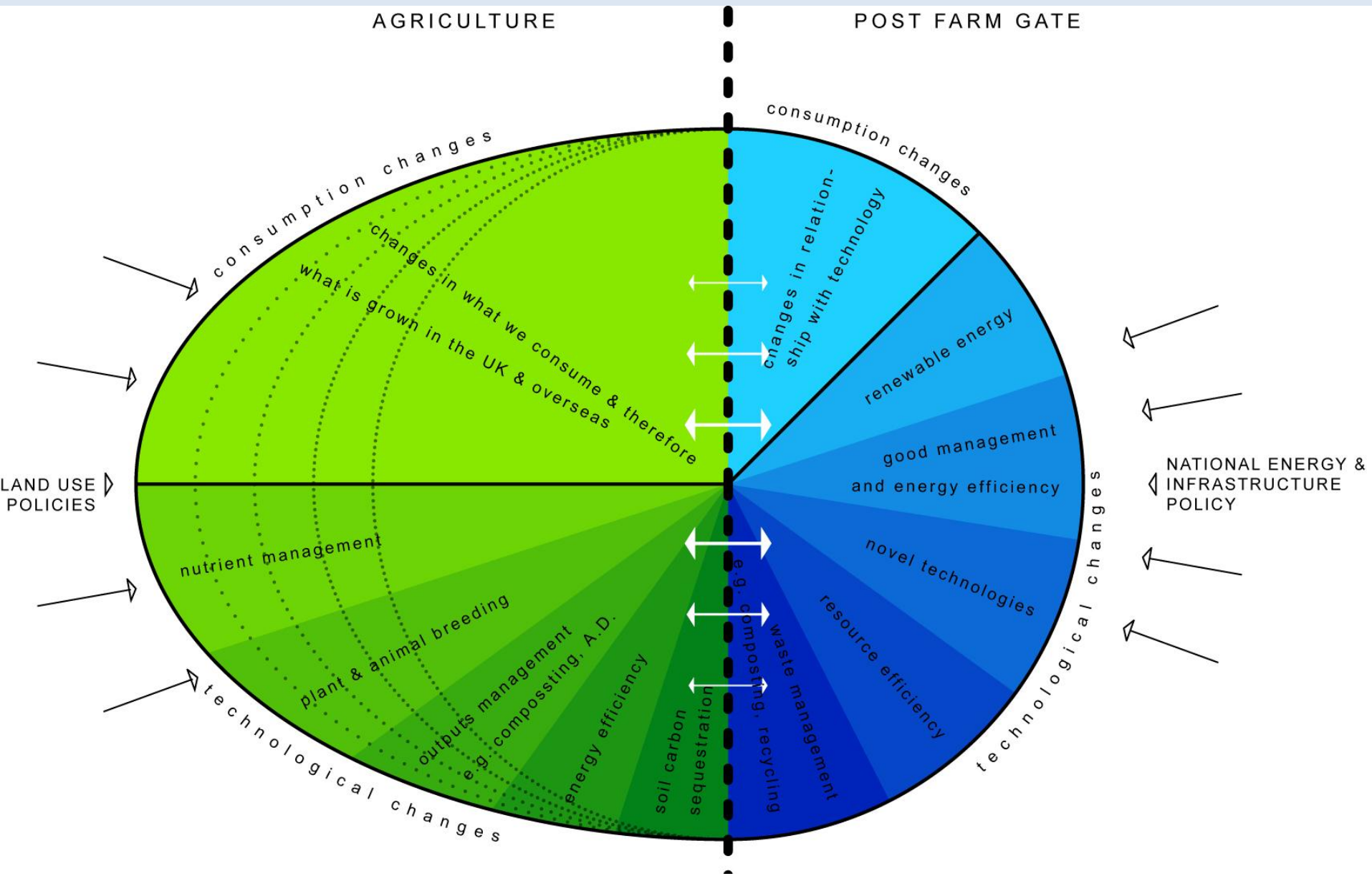
- **Agriculture:**
- Carbon removals (89% IPCC mitigation potential **but** time limited); N use efficiency; plant & animal breeding (more for less); energy efficiency; AD and outputs management; energy efficiency/ renewables
- Other environmental win-wins possible... But also not inevitable - trade offs also a risk (water use, fertiliser use, biodiversity on and off farm)
- Goal is 'sustainable intensification' – grow more, with less land, and fewer negative impacts. Easy to say, hard to do.
- **Post farm gate**
- Manufacturing: CHP / trigeneration / life cycle costing; renewables
- Refrigeration: 20-50% efficiency savings possible; trigeneration (increases efficiency from 38% to 76%); stop refrigerant leakage
- Packaging: Lightweighting, alternative materials, ambient storage packaging; bulk importing
- Transport: Modal shift, efficient supply chains; cleaner fuels
- Retailing: Cleaner lighting and refrigeration; store design; renewables; improved supply chain management to reduce waste
- Domestic: Energy efficient appliances

# Livestock mitigation options

- **Grazing management**: timing of grazing, grass type (time limited)
- Breeding – *for feed cereals*: higher yields, pest resistance, drought tolerance – *for livestock*: higher yields & alteration of gut flora
- For feed crops: precision agriculture
- Nitrification inhibitors (feed production)
- Methane inhibitors (ruminants)
- Dietary supplements (eg. oils)
- rBsT (banned in EU and many other parts)
- Cloning
- Artificial meat
- Anaerobic digestion
- Shift to pig and poultry meat (already happening)

## But – are technological improvements sufficient?

- Mitigation potential may be lower than IPCC suggests (ADAS 2011, EC/JRC 2011, Herrero & Thornton 2010).
- Sequestration main mitigation strategy has many benefits (adaptation to climate change as well as mitigation) BUT is time limited / diminishing returns over time
- Key sources argue that major cuts in emissions and other environmental impacts are not possible without shifts in diet: (Popp et al (2010), Pelletier & Tyedmers (2010); UNEP (2010) ADAS (2011), Stehfest et al 2009), Agrimonde (2011)).
- Foresight (UK Government, 2010) states: “Demand for the most resource-intensive types of food must be contained” Specifically: manage demand for meat and dairy; reduce food waste; improve equity of distribution



**Is this the way forward for achieving substantial reductions in food system GHG emissions?**

\*proportions for illustrative purposes only

## 3.c. Livestock, nutrition & health



# Agriculture affects health in 4 key ways:

- It affects the ecological determinants of health (environmental health)
- It Impacts on food security and nutrition
- It gives rise to infectious diseases and injuries
- It affects the social and economic determinants of health (health equity and access)

# Health and agriculture: the links

Health concern	Agriculture's role
Environmental health risks	Manure and agrochemicals cause water pollution and related diseases; burning and intensive livestock systems cause air pollution & respiratory illnesses; ecosystem damage undermines resilience and ability to adapt to future climate shocks
Food security, nutrition and associated diseases	Inbalances of supply, quality & distribution lead to: Undernutrition (protein energy deficiencies); over nutrition (obesity and associated chronic diseases); mal-nutrition (micronutrient deficiencies)
Infectious diseases and injuries	Zoonotic diseases, food pathogens from livestock production; antimicrobial resistance esp. from intensive livestock systems vector borne diseases from agri-induced land use change and water infrastructure; pesticide and agrochemical poisonings; occupational hazards (heat stress, injuries, UV radiation)
Health equity impacts	Uneven distribution of health risks and benefits among rich and poor, rural and urban, women and men, land owners and the landless

# Meat & dairy foods and nutrition

- Meat and dairy: excellent source of protein, iron, calcium, vit B12, zinc etc.
- Key source of saturated fat: linked to heart disease and strokes.
- Red and processed meat – linked to colon cancer
- High meat diets – linked to obesity → link with heart disease, strokes, diabetes, some cancers, osteoarthritis
- Food security: 35-4% global cereal produced is used for animal feed: more efficiently fed directly to people?

# Key questions for nutrition

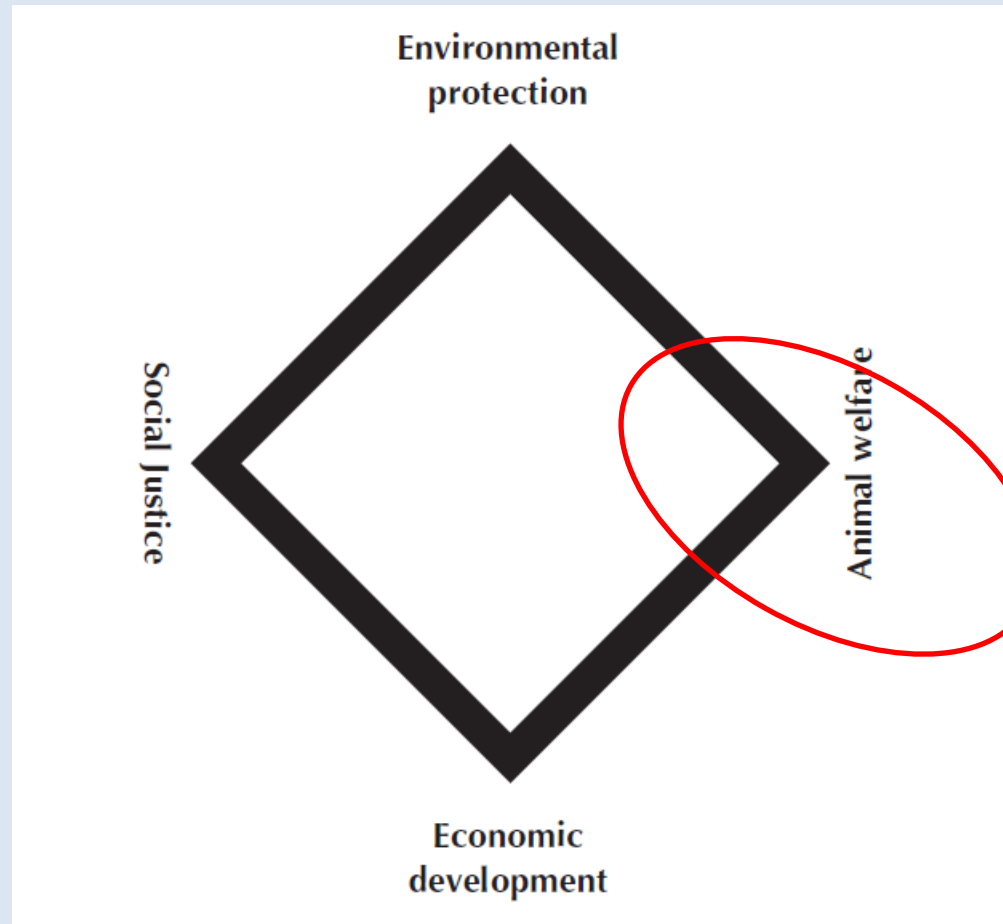
- Is it possible to align environmental and nutritional goals?
- Is it possible to have nutritious diets that are low in meat and dairy products?
- What can we 'build upon' in UK and Chinese food cultures to achieve more healthy and sustainable goals?

## 3.d. Animal welfare – What is it? How do we define it?

- Physiological? Basic health and functioning
- Affective state? What animals feel (hunger, pain, fear, desire to perform instinctive behaviours)
- Natural environment? live in the manner to which they are adapted eg. Outdoors vs in confined facilities.
- How is animal sentience and welfare viewed in different societies?

# Question:

## Can we 'afford' animal welfare in a world of poor and hungry people?



Can we afford  
*not* to  
incorporate  
ethics into our  
visions of  
development?

## 3.e. Economic development & livelihoods

- 70% of world's extreme poor rely in livestock for a living— direct food security and indirect income generation / insurance (FAO 2009).
- But major differences depending on country:
  - **In UK:** Agriculture only 0.56% GDP (agrifood as a whole = 7%) and employs 2% workforce (14% in agri-food industry) (Defra 2010).
  - In China: agriculture = 12% GDP and 39% national employment ([ec.europa.eu/agriculture/publi/map/01\\_08\\_sum.pdf](http://ec.europa.eu/agriculture/publi/map/01_08_sum.pdf))

# Key questions:

- How do different livestock systems affect livelihoods and jobs? Which systems support livelihoods best?
- Could a scenario of reduced livestock consumption/production be developed that would still provide jobs and livelihoods for poor people?



# Aims for this workshop

- **Main purpose:** to stimulate discussion, disagreement, new ideas. Please participate fully!
- **Focus** is on the **links between different issues** – environment, health, ethics, economic development
- What are the areas of **agreement and disagreement** in relation to livestock consumption?
- Where are the **similarities & differences** in the UK and Chinese contexts?
- Where are the main uncertainties & **research needs**?
- **After the workshop: Is it a good idea for us – the UK and Chinese research communities - to work together to explore these issues further?**
- Workshop report will be written – presentations on FCRN website

# Thank you

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## Food Climate Research Network