



Government  
Office for

**Science**

 **Foresight**

# Foresight Land Use Futures

Making the most of land in the 21<sup>st</sup> century

**Agriculture : a suitable case  
for treatment**

**Prof Joe Morris**

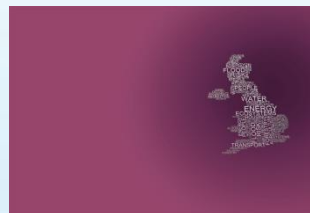
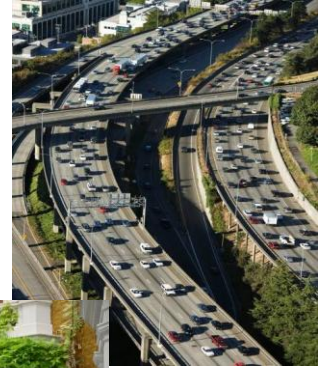
Cranfield University,

Member of the Foresight Lead Expert Group



# Long term challenges for land use

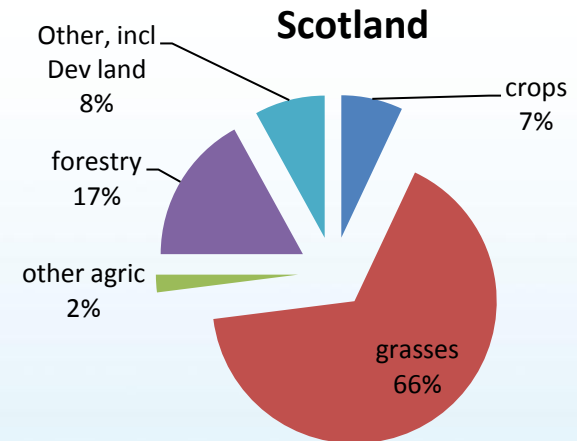
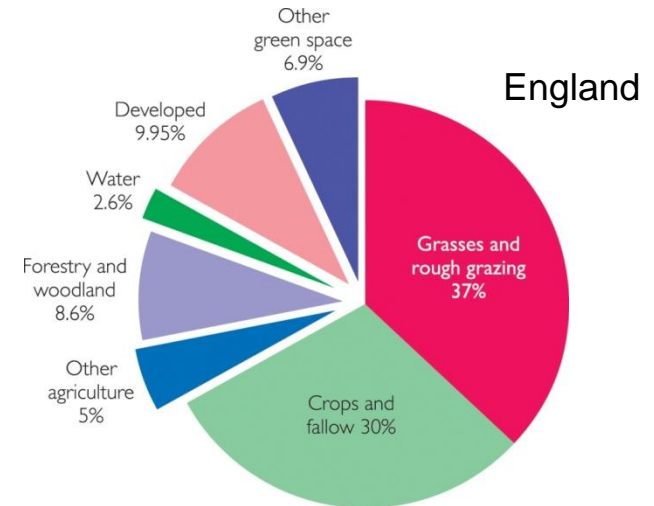
- Population changes
- Economic growth and affluence
- Climate change
- Transport and infrastructure
- Energy
- **Food security**
- Living within environmental limits



# Agricultural futures:

- Food security
- Climate change and environmental limits
- Technology
- Multiple benefits and rewards
- Policy –if the CAP fits...

Proportions of land use in 2005



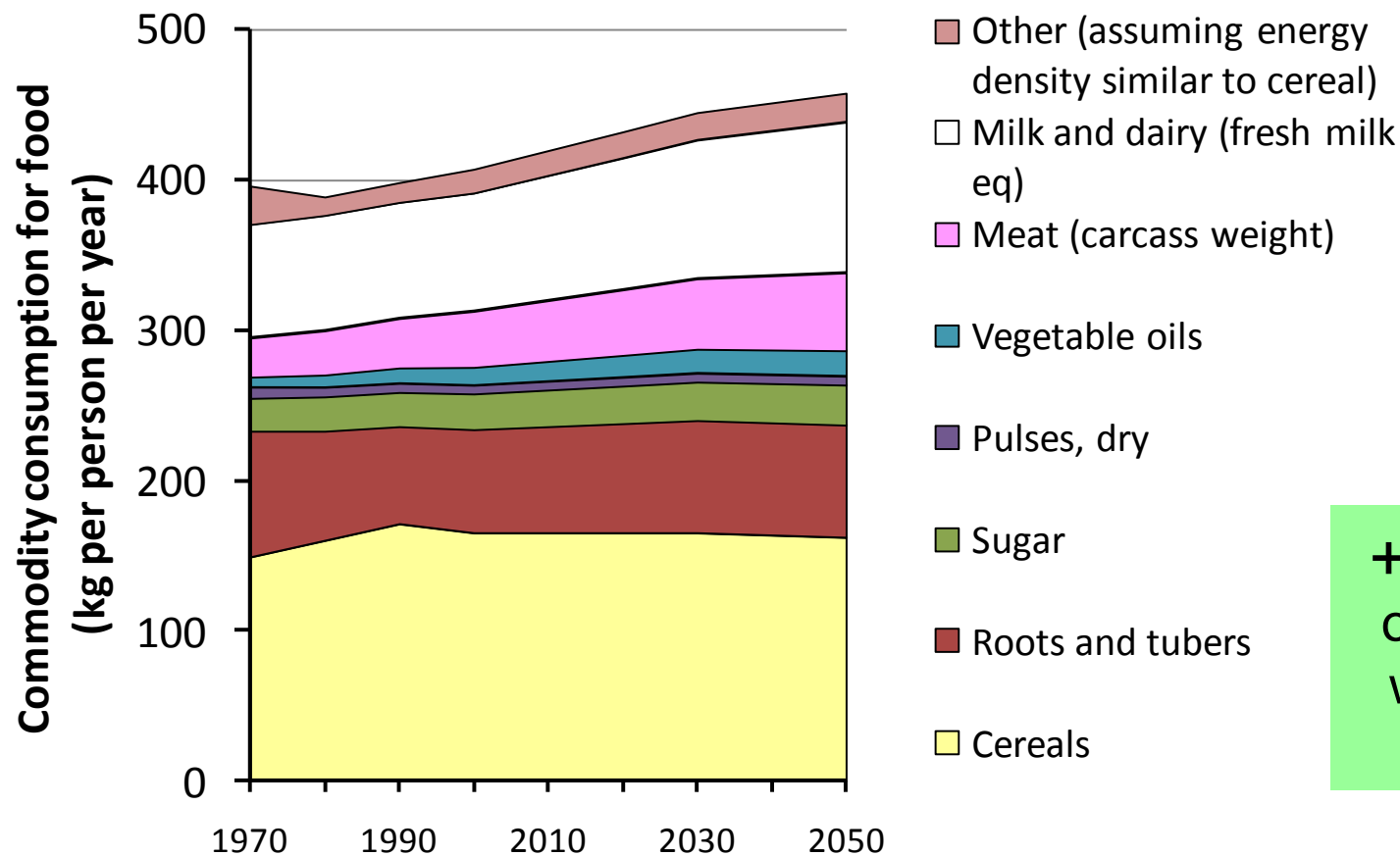
# Definitions of food security

“Food security is consumers having access at all times to sufficient, safe and nutritious food for an active and healthy life at affordable prices”

Defra (2008)



# Global demand: more people and more food per capita



**Increase in milk  
from 78 kg (2000) to  
115 kg (2050)**

**Increase in meat  
from 37 kg (2000)  
to 52 kg (2050)**

**+0.2% per year  
on the basis of  
weight of food  
consumed**

Predicted global commodity consumption per person by major food groups from 1970 to 2000 (actual data) and from 2010-2050 (predicted data) (FAO, 2006, pg 25). **Note that each kg increase in milk or meat, requires an addition 5 to 8 kg of animal feed.**

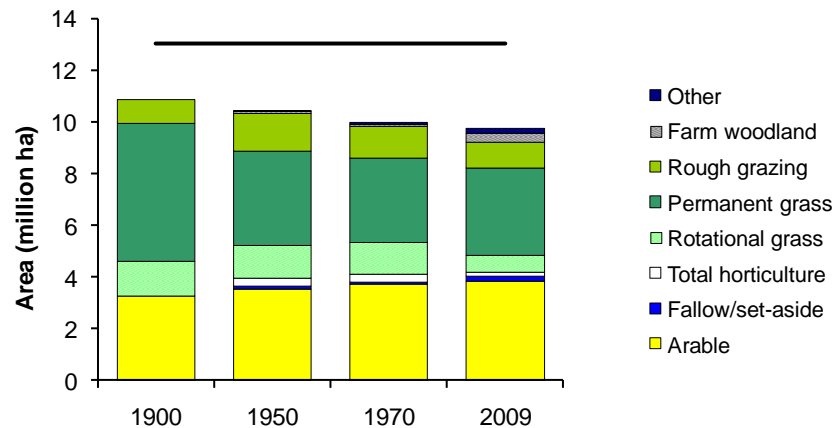
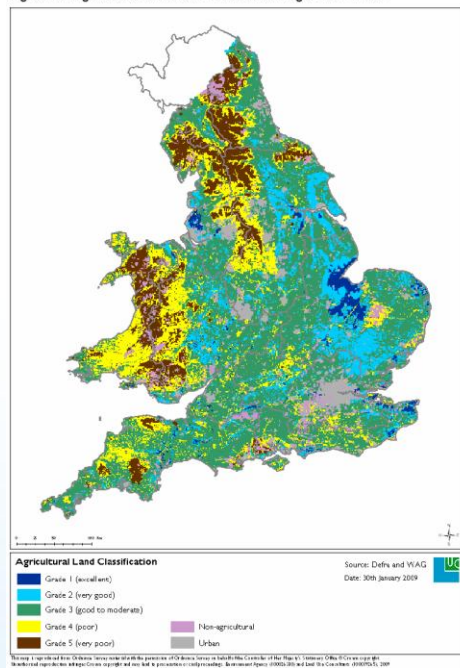
**Compiled by P Burgess**



# E &W : Land resources and use

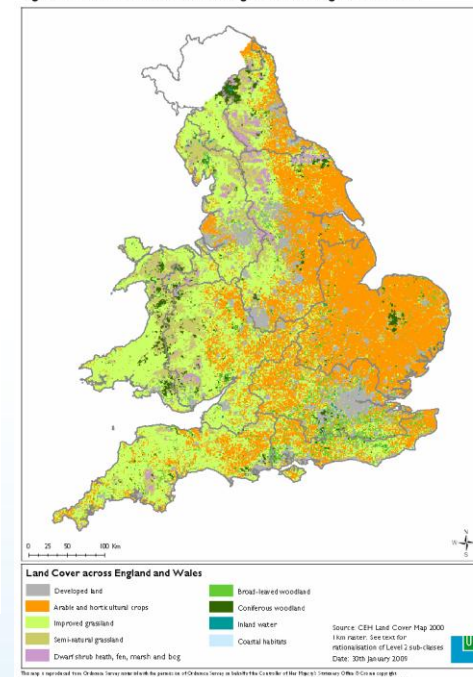
grade

Figure 4.7. Agricultural Land Classification across England and Wales

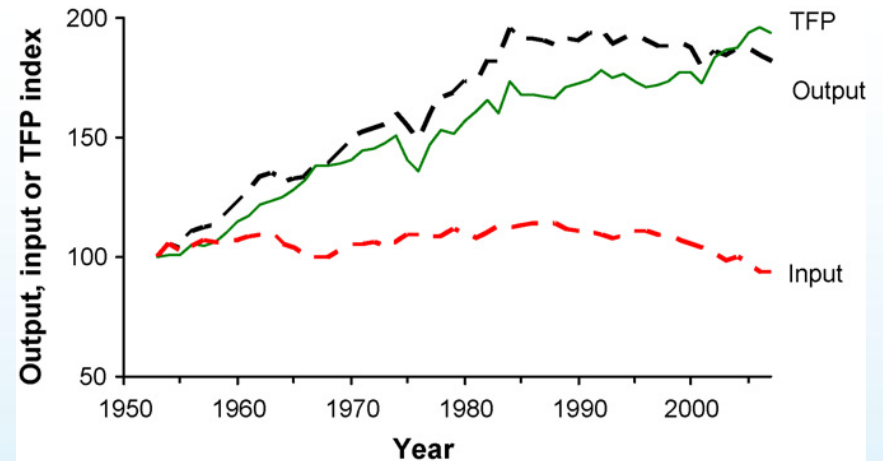
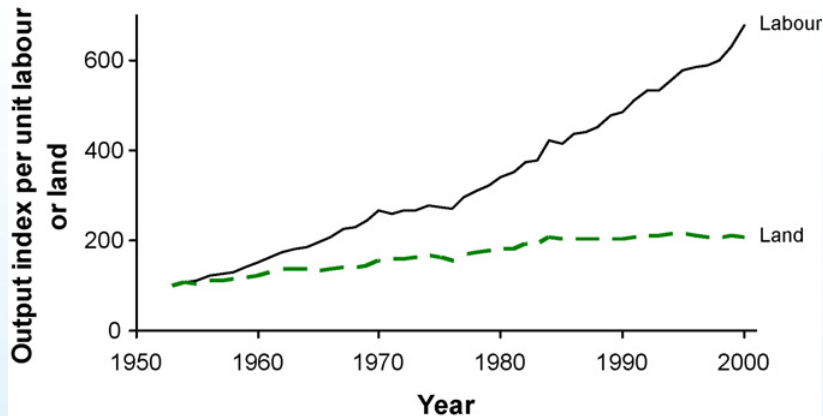
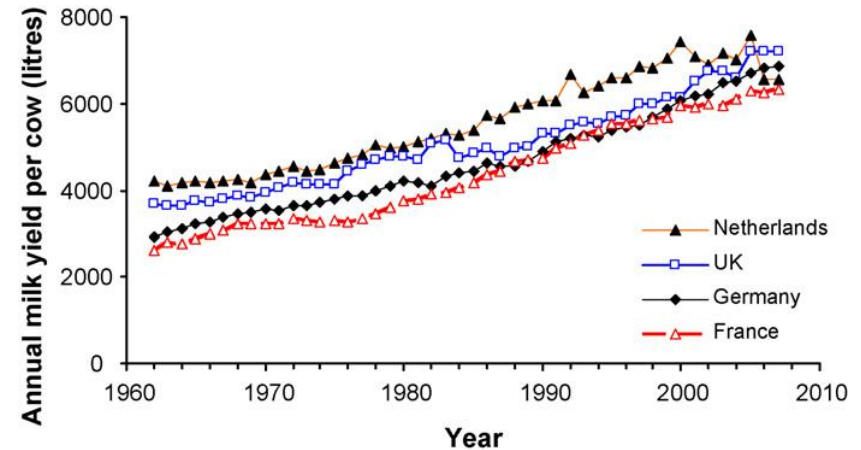
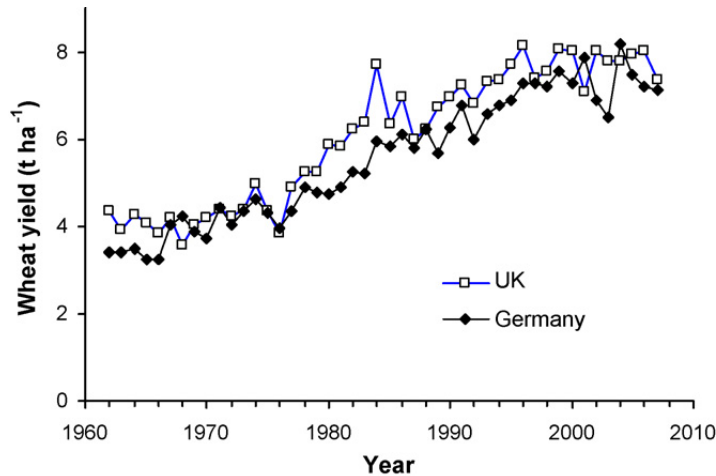


use

Figure 4.2. Distribution of land use categories across England and Wales



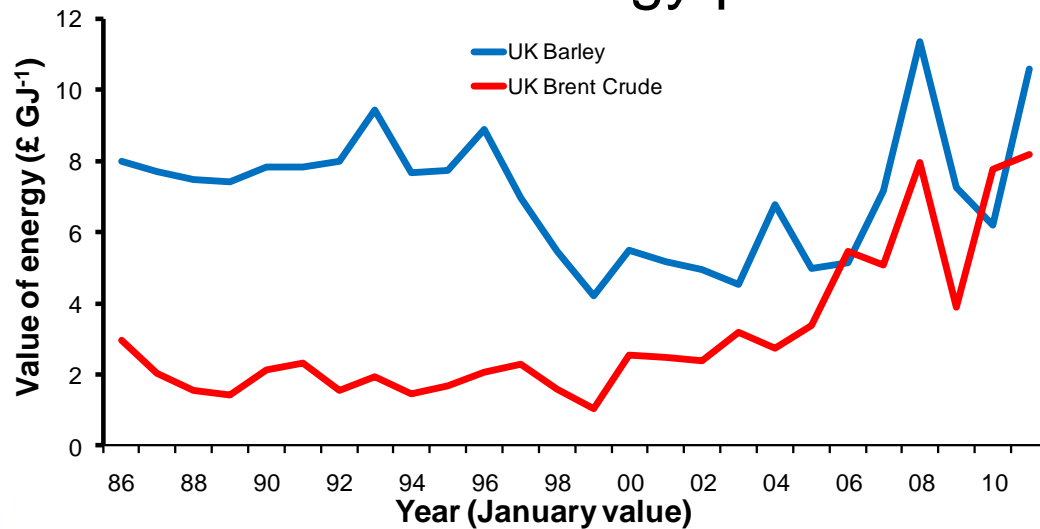
# UK Agricultural Performance: Trends



Based on Defra sources:

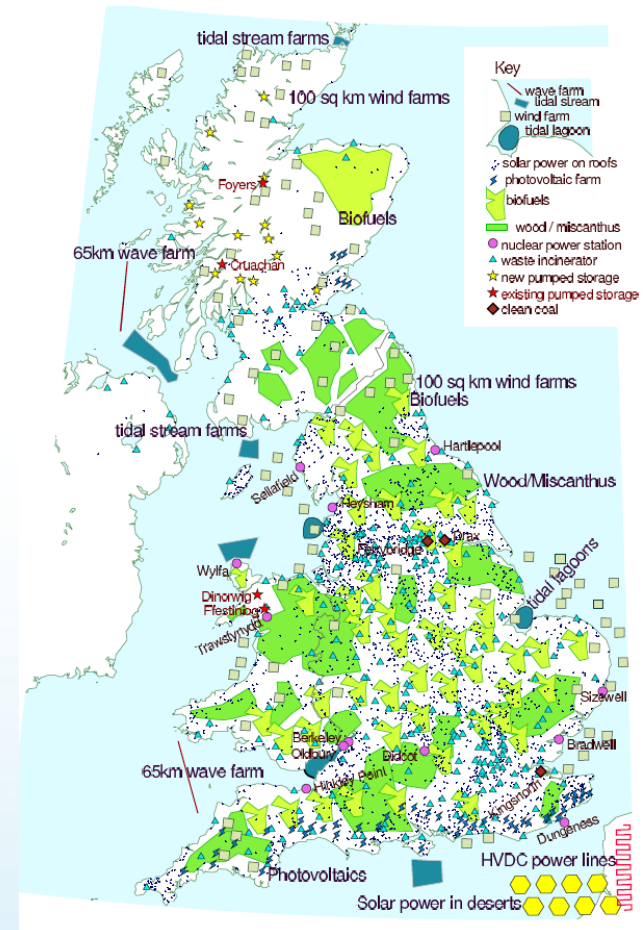
# Food and Energy

## Food and energy prices



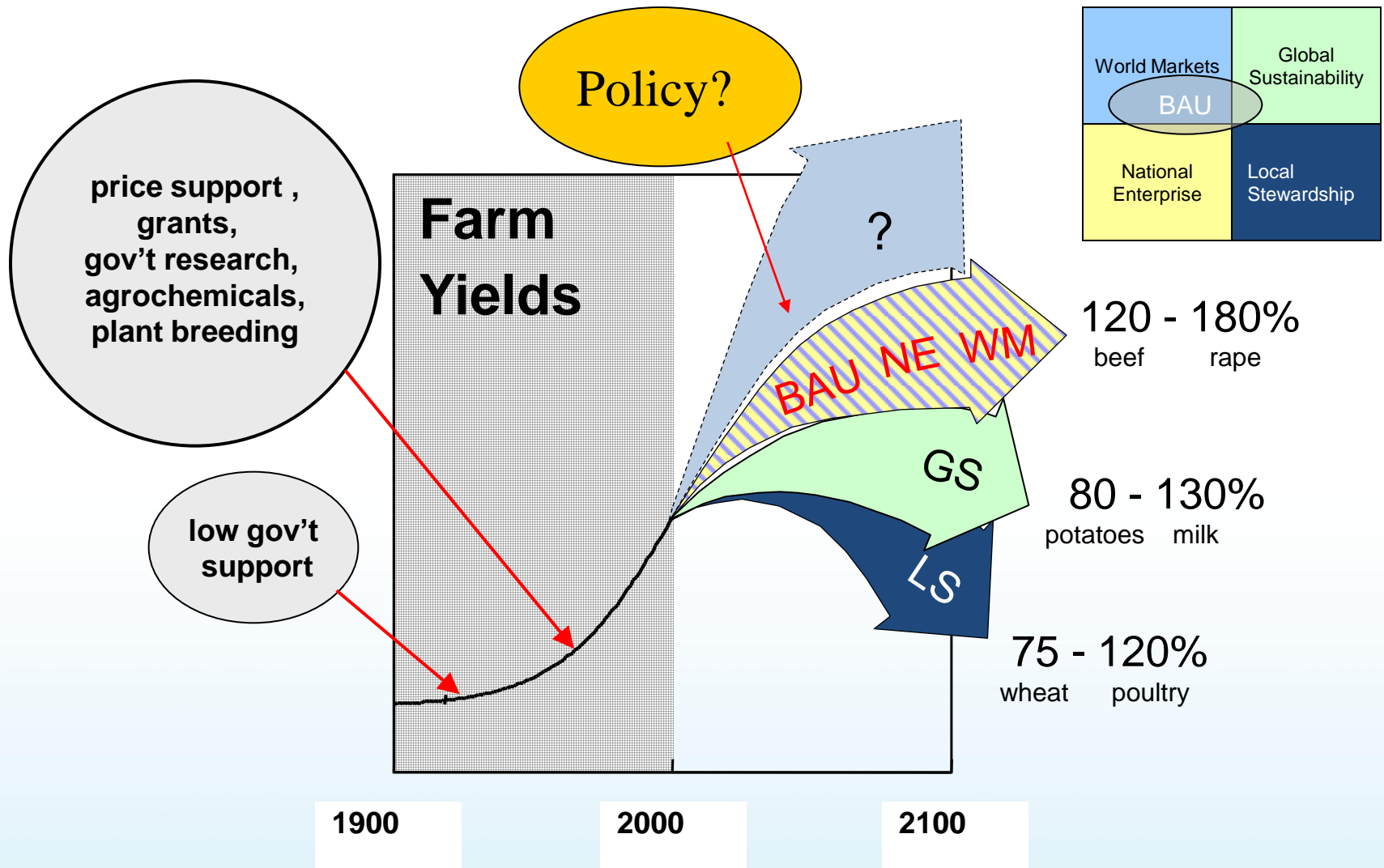
Value of UK barley and crude oil on a per unit energy basis  
(derived from Defra and US EIA data, 2010)

## Energyscapes





# Future Agriculture : supply side ?



# Agricultural Scenarios: E&W 2050

Scenario	Intervention regime	Relative change in technical efficiency*	Relative change in self sufficiency	% change in land use for agric**
<b>Bau</b>	<b>As per 2002</b>	<b>+19%</b>	<b>+6%</b>	<b>-20%</b>
<b>World markets</b>	<b>None: Market-driven free trade</b>	<b>+34%</b>	<b>-3%</b>	<b>-34%</b>
<b>National enterprise</b>	<b>Moderate: Protected domestic markets with limited environmental concern</b>	<b>+39%</b>	<b>+26%</b>	<b>-18%</b>
<b>Global sustainability</b>	<b>Low: Internationally competitive agriculture moderated by targeted compliance</b>	<b>+12%</b>	<b>+8%</b>	<b>-2%</b>
<b>Local stewardship</b>	<b>High: locally defined schemes reflecting local priorities</b>	<b>-7%</b>	<b>+23%</b>	<b>0%</b>

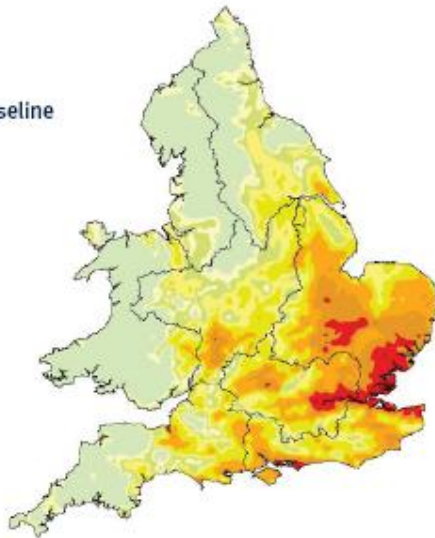
\* Based on yield increases for 5 crop and 5 livestock commodities. \*\*Excludes bio-energy crops

Source: Burgess and Morris, 2009, based on Morris et al, 2006, Agricultural Futures and Implications for the Environment , Defra Research Project IS0209

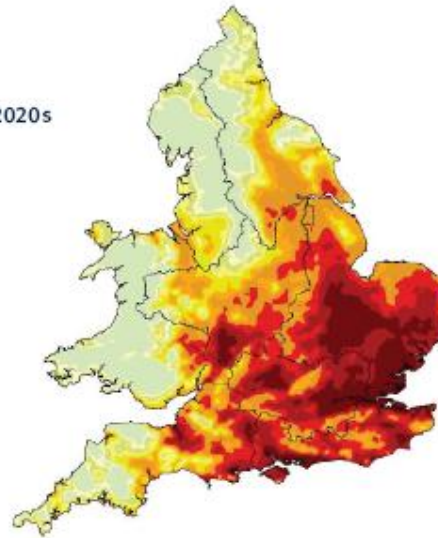
# Climate change and agriculture: changing use and value?

**Potential changes in summer growing conditions (after EA, 2009)**

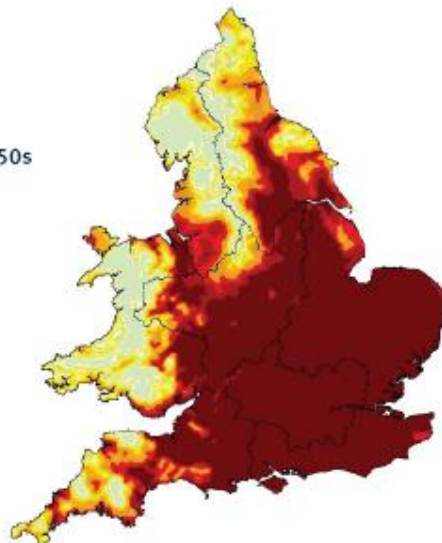
Baseline



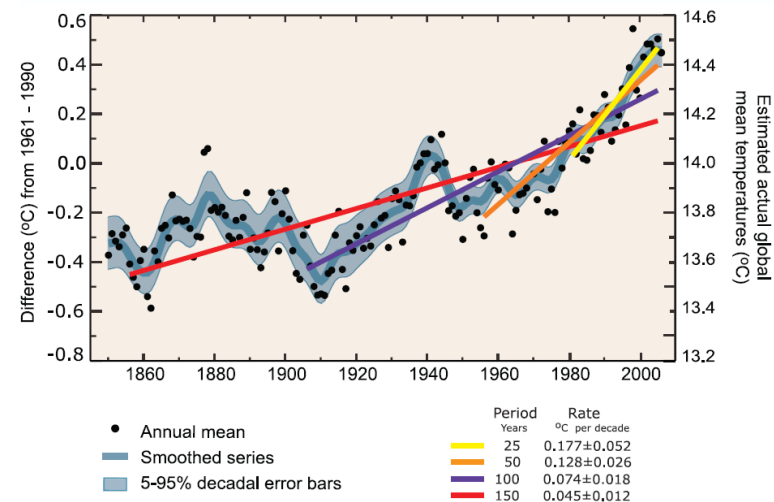
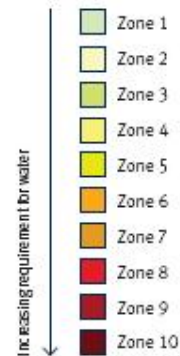
2020s



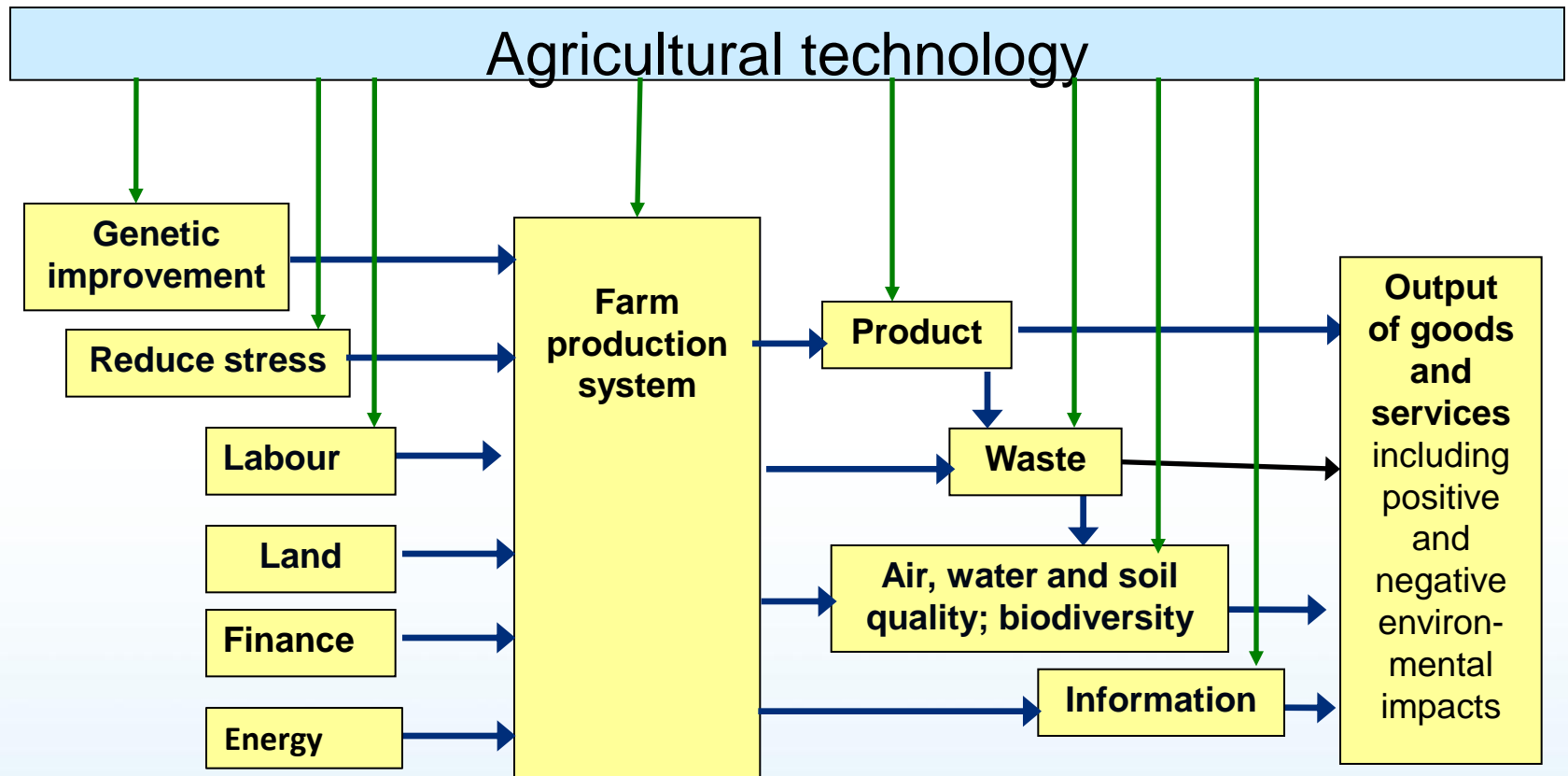
2050s



Agroclimatic zones



# Role of agricultural technology



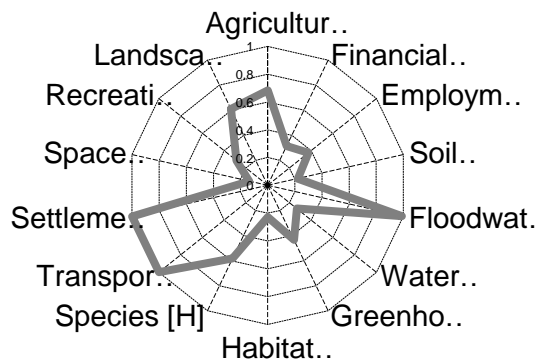
New and improved technology is an important driver of growth. Schematic diagram showing how a farmer uses land, labour, finance, energy, genetic improvement and husbandry methods as key inputs to a farm production system which results in outputs such as products, waste, environmental services and information (Burgess and Morris, 2009)

# Synergies and trade-offs

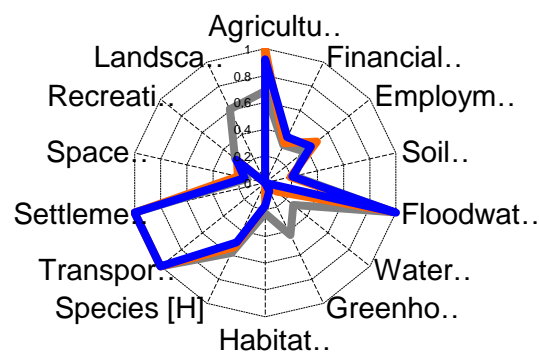
**Achieving multiple objectives in ways that appeal to stakeholders?**



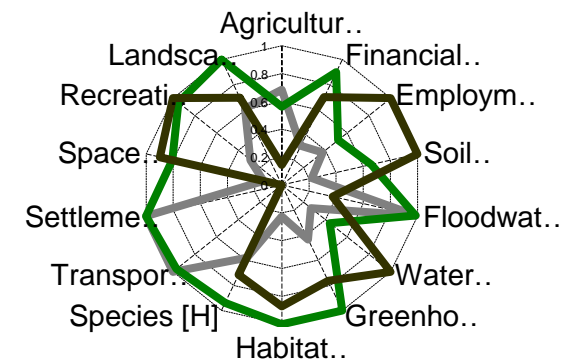
**Current**



**flood storage**



**agri-environment**



Source: Posthumus et al, 2010, Morris et al, 2009



# References

- Angus, A., Burgess, P.J. Morris, J. & Lingard, J. (2009). Agriculture and land use: demand for, and supply of, agricultural commodities, characteristics of the farming and food industries, and their implications for land use in the UK. *Land Use Policy* 26S: S230-S242.
- Burgess, P.J. and Morris, J. (2009). Agricultural technology and land use futures: the UK case. *Land Use Policy* 26S: S222-S229 Foresight (2010) .
- Foresight (2010). Land Use Futures: making the most of land in the 21<sup>st</sup> century. Government Office for Science. London <http://www.bis.gov.uk/foresight/our-work/projects/current-projects/land-use-futures>
- Defra (2010). Food 2030: a strategy for sustainable and secure food system. Department for Environment, Food and Rural Affairs, London. <http://www.defra.gov.uk/foodfarm/food/pdf/food2030strategy.pdf>
- FAO (2010). The State of Food Security in the World. Rome: Food and Agriculture Organisation of the United nations . 58 pp.
- International Assessment of Agricultural Knowledge, Science and Technology for Development. (2008) Agriculture at the Crossroads: North America and Europe. Summary for Decision Makers. [http://www.agassessment.org/docs/IAASTD\\_NAE\\_SDM\\_JAN\\_2008.pdf](http://www.agassessment.org/docs/IAASTD_NAE_SDM_JAN_2008.pdf)
- Morris, J., Posthumus, H., Hess, T.M., Gowing, D.J.G. and Rouquette, J.R. 2009. Watery land: the management of lowland floodplains in England. In Winter, M. and Loble, M. (eds.) What is Land For? The Food, Fuel and Climate Change Debate. Earthscan. pp.320. ISBN 9781844077205.
- Posthumus H., Rouquette, J.R., Morris, J., Gowing, D.J.G., Hess T.M. (2010) A framework for the assessment of ecosystem goods and services; a case study on lowland floodplains in England. *Ecological Economics*, 65, 151-1523
- Rural Economy and Land Use Programme. [www.relu.ac.uk](http://www.relu.ac.uk)