Climate change impacts on food supply chains

Mitigation & Adaptation Strategies to Reduce Climate Change Impacts in the Supply Chain

Tesco Carbon Reduction Knowledge Hub

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Challenges for food supply chains

- Increasing demand
- Climate change
- Balance between increasing demand and sustainable supply
Emissions from agriculture and food supply chains

Emissions from the UK’s food system:

- 160Mt CO$_2$e $\rightarrow$ $\sim$ 25% of UK’s total GHG emissions
UK’s emission reduction targets until 2050

- International aviation & shipping: 42 Mt CO₂e
- UK non-CO₂ GHGs: 98 Mt CO₂e
- Other CO₂: 108 Mt CO₂e
- Industry (heat & industrial processes): 103 Mt CO₂e
- Residential & Commercial heat: 134 Mt CO₂e
- Domestic transport: 184 Mt CO₂e
- Electricity Generation: 159 Mt CO₂e

2006 emissions: 695 Mt CO₂e
2050 objective: 159 Mt CO₂e

77% cut (≈ 80% vs. 1990)

* bunker fuels basis
Global impacts – food crops in a 4°C world

40% reduction in **maize** & **wheat** yields

*Soybean* yield could decrease in all regions of production

30% decrease in **rice** yield
Current global wheat production

- 680 Mt in 2009
- 30% of global cereals
- 70% supplied by 10 main producers
Global wheat demand trends

- Population growth: 900 Mt
- Economic development: 820 Mt
- Lifestyle & diets: 680 Mt
- Social structures
- Improving food intake

Wheat Demand Trend

Year
2009 2030 2050
Demand in Mt
500 600 700 800 900 1000

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Climate change impacts and wheat production – Global

- Lower latitudes
  - worsening environmental and climatic conditions
  - inefficient or impossible wheat production

- Higher latitudes
  - Yields improvement until 2050
  - More suitable agricultural land

- Extreme weather events
Climate change impacts and wheat production - UK

- Moderate temperature increase
  → Yield improvement by moderate temperature increase

- Changing rainfall patterns (drier summers, wetter winters)
  - Increasing pressure from pest and diseases
  - Increased occurrence of extreme weather events
Adapting UK’s wheat production to climate change

- Increase fertiliser inputs to access yield benefits

But:
- More fertiliser = higher emissions (non-CO$_2$-GHG)
- Conflict between sustaining livelihoods from the perspective of food security and the actual need for drastic GHG mitigation to avoid dangerous climate change
Climate Change Impacts on the consumer

Consumers and producers acceptance of using certain technologies, inputs and resources, and changing consumers demand and behaviour, prices increase and demand for certain products.

Availability and access to resources and products and available for price and availability.

Regulations with consequences for climate change.
Conclusion

• Growing global demand for food and dietary changes
• Regions with high demand increase suffer from climate change, supply highly dependents on northern producers
• Improved yields, land-use efficiency and adapting to climate change in regions with climate change benefits are essential to feed a growing population
• Improving yields lead to higher GHG emissions
• Conflict between sustaining livelihoods from the perspective of food security and the actual need for drastic GHG mitigation to avoid dangerous climate change
• Several climate change impacts on the consumer end, but consumer can make a choice and take responsibility by being aware of its own consumption and eating behaviour
Further information

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• Röder, M, Thornley, P and Campbell, G (2011), Sustainable global wheat supply scenarios under future climate change impacts,