The Royal Academy of Engineering

Securing food supplies up to 2050: the challenges for the UK

Response to the Environment, Food and Rural Affairs Select Committee

January 2009

Response to the Environment, Food and Rural Affairs Select Committee inquiry on 'Securing food supplies up to 2050: the challenges for the UK'

The Royal Academy of Engineering welcomes the EFRA Select Committee inquiry on 'Securing food supplies up to 2050: the challenges for the UK' and is pleased to submit evidence. This response has been compiled using contributions from appropriate Fellows of the Academy and from a meeting held in October 2008 on *Engineering and Global Food Security*. The Academy is content for its input into this consultation to be made public and would be pleased to provide supplementary evidence if required.

Executive summary

1. Food security is a complex issue that will require leadership from the Government and interdisciplinary working between farmers, scientists, engineers, policy-makers and consumers. An integrated and systematic policy approach is needed to address properly the interdependent issues affecting the food industry.

2. The Academy is not aware of a coherent cross-Government food strategy with clear and well publicised aims. Within Defra there needs to be better integration and communication.

3. The Government must encourage food production alongside consideration of environmental issues, and develop policies that reflect the dual aims of increasing food security and preserving the countryside

4. Significant food wastage occurs in the UK. Government and the science/engineering community must help to communicate the right message in order to effect changes in consumer behaviour.

5. It is important for the UK to consider the relationships between food and energy and to seek ways to improve energy intensive processes. This will reduce the sensitivity of the food system to oil and gas prices.

6. The UK's water drainage infrastructure must be reinvigorated and properly maintained. There should also be significant investment in water storage to allow for more efficient irrigation and water distribution on a national scale.

7. The UK has indirectly reduced its engineering skills capacity through a range of policies. Over the last few decades training provision has declined, particularly in the applied areas of food production and agricultural engineering.

1. How robust is the current UK food system? What are its main strengths and weaknesses?

1.1 The UK food system is reasonably robust. The UK produces around 60% of its food, particularly in temperate products such as grains, oilseeds and vegetables.

1.2 Strengths include:

- Mild climate with adequate rainfall and fertile soils
- Large farms (compared to some EU countries); this is important for better land efficiency
- The top UK farmers are also world leaders in agricultural methods
- Very robust quality assurance and control systems are in place and enforced.

1.3 Weaknesses include:

- Lack of legislative support over recent decades, with generally more emphasis on preserving the countryside than primary food production.
- Perceptions caused by periods of food surplus in Europe (i.e. the 'grain mountains'), that led the Government and consumers to believe there wasn't a global food shortage problem but a distribution problem. Although the global situation has since changed, this belief is still fairly widespread and hinders the UK's prospects for food security.
- Insufficient consideration of the energy and carbon costs involved in food production.
- Lack of effective applied research and knowledge transfer services to deliver research messages to farmers and feedback to researchers.
- Land scarcity; the land area available to farming in the UK is approximately one third of a hectare per person, making land the most limited input to agriculture. To maximise yields from limited land, farmers rely on intensive methods and the substantial use of fertilisers, chemicals and fuel which causes the cost of food production to be sensitive to oil prices.

2. How well placed is the UK to make the most of its opportunities in responding to the challenge of increasing global food production by 50% by 2030 and doubling it by 2050, while ensuring that such production is sustainable?

2.1 As a result of the weaknesses detailed in section 1 and other factors, the UK is not currently well placed to make a major contribution to increasing the world supply of food. However, the UK should be able to meet a larger proportion of its own requirements, and thus contribute to increasing global food production if certain actions are taken.

2.2 By 2050, because of mounting concerns over energy sources and environmental impact, it will be necessary to have found a way to either reduce the amount of energy required for the Haber Bosch process (the energy intensive method by which nitrogen fertiliser is produced) or find an alternative process/source. Here the role of chemical engineers will be particularly important. Maintaining soil quality is vital for sustainable food production, hence the importance of the nitrogen fertilisers. Using existing technology, biowaste and compost could also be modified and applied to fields to maintain soil fertility.

2.3 New technologies should be fully exploited where appropriate to increase production sustainably. Nitrogen and water use efficiency could be improved using plant and animal genetics research to develop crops and agrochemical equipment, and employing precision farming methods to reduce wastage during application.

2.4 In order to sustain a robust glasshouse industry renewable energy sources or more efficient processes will be required. The UK should explore how the Dutch manage an effective glasshouse industry utilising waste heat from power stations. Utilising waste heat to warm soils can also have a positive impact on productivity.

3. In particular, what are the challenges the UK faces in relation to the following aspects of the supply side of the food system?

3.1 Water availability:

- Irrigated agriculture accounts for 1% of UK water abstraction and 4% of the crop area, yet accounts for 20% of the crop value.
- There needs to be significant investment in water storage to allow for more efficient irrigation and water distribution on a national scale. The number of on-farm storage reservoirs could be increased and precision farming methods could be used to apply water more effectively.
- The water drainage infrastructure has been poorly maintained since Government subsidies were removed in the 1980s; this will become increasingly problematic as the delayed effects start to show. The drainage infrastructure must be reinvigorated and properly maintained. Studies have shown that strong relationships exist between drainage and yield. For example, in 2007, Birds Eye lost 40% of its pea crop due to heavy rainfall and poor drainage.

3.2 The science base:

- The UK food science base is reasonable at the moment, but lacks adequate funding to safeguard it for the future.
- The incorporation of the Agricultural and Food Research Council into the Biotechnology and Biological Science Research Council in 1994 has resulted in a loss of focus on food research in the UK.

3.3 The provision of training:

- The UK, once an international leader in the provision of services, has indirectly reduced the engineering skills capacity through a range of policies. Over the last few decades training provision has declined, particularly in the applied areas of food production and agricultural engineering.
- Training facilities are not attractive and the food industry has a reputation of poor rewards for long hours.

3.4 Trade barriers:

- The dominance of the "Big 4" supermarkets imposes distortions in the market place and reduces competitiveness through effects on various parts of the supply chain.
- EU quotas and tariffs limiting the production of foods in the UK (e.g. milk) reduce opportunities to become food secure.

4. What trends are likely to emerge on the demand side of the food system in the UK, in terms of consumer taste and habits, and what will be their main effect? What use could be made of local food networks?

4.1 It is likely that there will be a continued decrease of home-cooking caused by changes in lifestyle. This will increase the demand for packaged and processed foods.

4.2 Developments in technology (e.g. machinery, genetics, chemicals) will continue to become available. However their acceptability to consumers, and therefore their adoption, will be questionable. In the case of genetic modification there is still a lack of consumer acceptance in the UK.

4.3 Due to superficial quality standards particularly for fruit and vegetables, there is significant food wastage in the UK. Consumer and supermarket-driven standards feed back into the supply chain, often resulting in fruit and vegetables not being harvested by farmers. Additionally, an estimated 25% of all fresh produce is thrown away by consumers after purchase. Government, along with the science/engineering community, must help to communicate the right message in order to effect changes in consumer behaviour.

4.4 Dietary preferences for meat protein increase pressure on farming as vastly more land, water and feedstock is required to produce meat than plant-based foods. The global demand for cheaply priced meat is increasing.

4.5 It is likely that there will be an increase in the trend for local production. Much more use could be made of local food networks. However the importance of convenience to the consumer means supermarket chains are likely to remain dominant. For local food networks to be viable across the UK there would be significant logistical and operational changes required. The current value of the pound against the Euro could now encourage more home production.

5. What role should Defra play both in ensuring that the strengths of the UK food system are maintained and in addressing the weaknesses that have been identified? What leadership and assistance should Defra provide to the food industry?

5.1 The Government must encourage food production alongside consideration of environmental issues and develop policies that reflect the dual aims of increasing food security and preserving the countryside. Past schemes such as set-aside land initiatives have disincentivised the farming community from increasing production.

5.2 The decline of agricultural research centres in the UK has significantly reduced agricultural research capacity. Defra could now take a more strategic long-term view of what research is needed and maintain strategically important areas.

5.3 Food security is a complex issue that will require leadership from the Government and interdisciplinary working between farmers, scientists, engineers, policy-makers and consumers. An integrated and systematic policy approach is needed to address properly the interdependent issues affecting the food industry.

5.4 Technology can help increase food production and has historically resulted in many agricultural revolutions. In the UK, leading up to 2050, changes in consumer behaviour, trade barriers and agricultural policies could have a comparable impact to technology.

6. How well does Defra engage with other relevant departments across Government, and with European and international bodies, on food policy and the regulatory framework for the food supply chain? Is there a coherent cross-Government food strategy?

6.1 The Academy is not aware of a coherent cross-Government food strategy with clear and well publicised aims. Within Defra there could be better integration and communication.

7. What criteria should Defra use to monitor how well the UK is doing in responding to the challenge of doubling global food production by 2050 while ensuring that such production is sustainable?

7.1 It should be possible for Defra to monitor the UK's progress using its existing statistical collection methods, although measures for sustainability may require further development.

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