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## UK Food Supply in the 21st Century: The New Dynamic

The Chatham House food supply project is concerned with the effects of global trends on the realities of everyday life. Examining in detail the networks that supply two staples, milk and wheat, to the United Kingdom market, the study will map the patterns likely to emerge over the next 20 years. This Briefing Paper provides the baseline considerations from which the work will be taken forward.



### Summary

- Modern food supply networks are complex.
- In the years ahead, the interdependent mechanisms and resources that support them – including land, energy and people – will be influenced increasingly by global uncertainties and their effects.
- As a result, existing supply arrangements and policies are likely to undergo significant structural change.
- Managing the transition between what is in place now and what is to come will need to be a key focus of attention.

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### Introduction

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Many commentators and researchers agree that today's food supply networks have emerged from a period of remarkable change, one that has reconfigured what happens both within the food system and in its wider relationships with government(s), society and other economic actors. Food supply in the UK is bold and businesslike. Its characteristics include:

- a broad determination by governments to be more 'hands-off' in relation to food markets than in the past<sup>1</sup> (except for contingency planning for certain kinds of crisis);
- a regulatory framework that is mainly concerned with issues of standards and safety;
- activity that is guided by risk-averse consumer demand and sustained by the idea that anything is possible at a price;
- a 10–20% reduction from 1990s levels<sup>2</sup> in lead times for production, processing and retailing;
- a rationalized supply network with high levels of market concentration in the retail and processing sectors, and with any centralized control maintained through tightly defined product and logistics/delivery specifications;
- farm-based productivity that has increased 20% since the 1980s through the continued roll-out of industrialized techniques;<sup>3</sup>
- nutrition and diet as issues of individual education and discipline.

Today's consumer shops with high expectations. Year-round choice, historically low prices, assured availability, a-seasonality, and unprecedented quality have become the norm. Britain has a large and important agricultural sector of its own. Nonetheless, it is its access to the 'open', global market that has helped to shape current food consumption patterns and that now provides, some would argue, the only realistic means of sustaining them.<sup>4</sup> In an arena in which operations driven by commercial considerations are required ultimately to support the public good, the supply chain dynamic is becoming more susceptible to the effects of a range of global influences. The new

focus on these wider uncertainties has in part been driven by the growing debate on climate change, and most recently by the Stern Review which highlights the importance to be placed on 'the economics of risk and uncertainty'.<sup>5</sup>

Focusing on the arrangements for supplying milk and wheat to the UK, this Chatham House project will develop and test a range of supply scenarios. The aim will be to look forward 20 years to:

- identify the UK's future sources of food;
- assess the geopolitical implications of change;
- consider the effects on home markets including domestic producers;
- chart the balance required between sustainable supply and the consumer requirement.

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### Grounds for uncertainty

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Modern supply rests on a complex network of interrelated socio/politico/economic environments that span countries and continents.<sup>6</sup> The UK's agri-food networks operate in an intensively price-competitive market and have many interdependent components:

- product, money and information flows;
- physical infrastructure;
- distribution and packaging networks;
- transport networks;
- processes, control and governance mechanisms including regulatory frameworks;
- individual companies that together make up an industry;
- relationship-based factors including trust, coordination and collaboration.

The rise in low-probability, high-impact disruptions – BSE, foot-and-mouth disease (FMD) and the fuel price protests<sup>7</sup> – has served to underline this interconnected nature and how a disturbance in one seemingly unrelated area can ripple through to cause serious disruption across the wider network. But those challenges are essentially measurable. The key issue for the future will be to determine how food supply can remain assured over the longer term against more complex uncertainties and their effects (see Table 1).

**Table 1: The UK's milk and wheat supply networks: wider uncertainties and their effects**

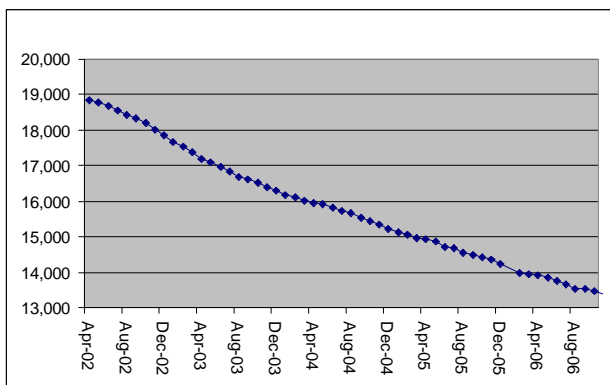
Network dependency	Wider uncertainty	Potential effects	Possible policy responses
Agricultural land use	Climate change-led land degradation. Further pressures from urbanization.	Competing and conflicting demands.	* A more strategic approach to planning the use of land?
Water	The availability of water.	Competing demands (e.g. between domestic use and irrigation).	* Pricing changes? * Rationing (hose-pipe bans and beyond)?
Weather	The extent of compliance with Kyoto-type agreements and the resulting effects.	(i) Changes in land usage (e.g. following increased flooding). (ii) Changes in crops and/or patterns of production in the UK and overseas.	* Evolving criteria for planning applications? * Adjustments in foreign policy as new growing regions gain in importance?
Energy (the total supply chain requirement)	(i) Increasing global competition for energy as the UK becomes more reliant on imports.  (ii) Pressure to reduce carbon dioxide emissions.	(i) Rising energy costs and/or restriction in energy use.  (ii) New supply practices, new cost structures, new skills in some areas.	* Energy-driven foreign policy?  * New market pricing to influence sustainable behaviours?  * Moves towards an emissions-based economy including further targets for renewable energy?
Transport	(i) Fuel: price and availability.  (ii) Food miles.	Further changes in retail distribution networks.	* Global sourcing versus the carbon impact of local production and supply models?  * Taxes on road use?
Labour	(i) Demographic-led shift of labour. (ii) Changes in skill availability.	Shortage of multi-skilled labour, particularly in the agricultural sector.	* Immigration and its social impacts?
Livestock	(i) Consumption patterns of dairy/meat.  (ii) Climate change: the increasing significance of livestock-related methane emissions.	(i) Increase in demand for animal feed.  (ii) Major changes in farming practices.	* Attempts to influence consumer behaviour, including in the emerging economies?  * Measures to influence sustainable farming practices?
Application of science to increase productivity	(i) Ecological changes. (ii) Developments in bio/nano-technologies.	(i) Threats to bio-diversity. (ii) New food production techniques.	* Health? * Policies to deliver a different public view of risk/safety?

## Box 1: The UK's Milk Industry

The UK's dairy industry, the seventh largest in the world, achieves a state of near self-sufficiency in the supply of raw milk, with only a minor volume of import and export trade.

A key focus in the industry is price.<sup>8</sup> Farm-gate prices have shown a marked decline over the last five years, with average prices now fluctuating between approximately 16 and 20 pence per litre (ppl).<sup>9</sup> While higher prices are available in some premium markets, many of the smaller farms, with average production costs of between 19ppl and 23ppl,<sup>10</sup> are unable to sustain a profitable business. Consequently, there has been a marked reduction in the number of milk producers in England and Wales (see Figure 1). Although milk yields overall have risen to counteract this fall, the trend has potential implications for the future structure of the industry.

Figure 1: Reduction in number of dairy producers, England and Wales



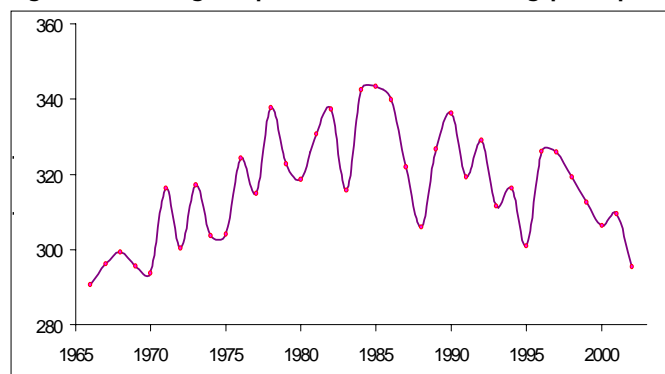
Source: MDC Datum, <http://www.mcdatum.org.uk>.

## Box 2: The UK's Wheat Industry

The UK is currently a net exporter of un-milled wheat,<sup>11</sup> with overall cereals production running at 21.1 million tonnes in 2005.<sup>12</sup>

As a world commodity, wheat is exposed to world prices, and price volatility is a key dynamic within the industry. Wheat prices have dropped by 20% since 1994 but poor harvests across Australia and North America have caused significant recent increases. According to FAO statistics, per capita availability of the main grains such as wheat, rice, maize and soya (which, owing to production methods and levels of investment, rose reassuringly from the 1950s to the 1980s) has always fluctuated. But throughout the 1990s and in the current decade, there has been concern about what is seen as a per capita levelling-off of availability (see Figure 2). Global wheat stocks are now at their lowest since the early 1980s (126 million tonnes, around 57 days of demand).<sup>13</sup> This has fuelled demands for improved productivity through more efficient crop and livestock management.

Figure 2: Global grain production 1966–2003, kg/per capita



Source: Adapted from figures obtained from FAO 2003 and UN Population Division, 2002 revision, <http://faostat.fao.org>. See also T. Lang and M. Heasman, *Food Wars* (London: Earthscan, 2004).

## Likely pressures on food production

A number of the issues raised in Table 1 deserve further comment.

### Politics and trade

By its nature, the UK's globalized food supply is also affected by the impact on markets of emerging economic powers, notably China and India, and by the changing patterns of world trade. In the latter case, the future development of the Common Agricultural Policy and the Common Fisheries Policy will be particularly important.

### Agricultural land usage

The Barker Review heralds the re-emergence of a core national debate about the value of land in the UK and its usage.<sup>14</sup> Competing demands include:

- food production, with a balance to be struck between human food and animal feed;
- the need for more sustainable energy: the European Union has set a target of 5.75% by 2010<sup>15</sup> for the use of fuel from bio sources;
- carbon sinks: the use of land to 'lock in' gases which otherwise would contribute to global warming;
- housing and amenities;
- biodiversity: maintaining genetic diversity and inter-species ecological reliance and relationships;
- public space;
- cultural identity: the British identification with, and preparedness to pay for, landscape and views.

Some industry commentators believe that the combination of food, feed and bio-fuel production pressures alone could result in developed countries' wheat surpluses becoming fully consumed by their

domestic markets and their export capacities being eliminated altogether.<sup>16</sup> That process, affecting among others the UK and the United States, could happen over a period of relatively few years.

## Climate change

Described by the Stern Review as ‘the greatest and widest ranging market failure ever seen’,<sup>17</sup> climate change is an issue of central importance. The impact of global warming is likely to include:<sup>18</sup>

- Regional yield increases and decreases. UK Meteorological Office studies indicate that small increases in cereal yields in high- and mid-latitude areas including Canada, China, Argentina and much of Europe will be more than offset by decreasing yields in Africa, the Middle East and India.
- An increase in climate variability and extreme events. Higher maximum temperatures, more hot days and heat waves will bring an increased risk of crop failure together with higher energy requirements as demand for electricity-based cooling increases. Against that, an increase in minimum temperatures and fewer cold and frosty days in some growing regions could reduce their risk of crop failure.
- Changing precipitation patterns. Average global precipitation is expected to increase in volume and intensity though, once again, regional changes are likely to vary. Possible effects include soil erosion and flooding. Regions of production are likely either to shift gradually, or to remain as at present but with new strains placed on water, energy and other resources.
- Regional increases in tropical storm intensity. Peak wind and precipitation are likely to raise the number

of tropical cyclones with an increased risk of Hurricane Katrina-type disasters. Damage and disruption to supply chain infrastructure are possible, along with potential labour disruption due to disease and displacement.

## UK food production: emissions

The UK’s carbon dioxide (CO<sub>2</sub>) output – the country’s carbon footprint – is much in discussion; and food production and consumption activities overall account for 13% of the UK’s emissions. ‘Food miles’ is one element of that, but no more than a quarter of the total.<sup>19</sup> The methane produced by livestock and the nitrous oxide created by manure and crop fertilizers are, however, intrinsically more damaging than CO<sub>2</sub> in their greenhouse effects.<sup>20</sup> Underlining the point, a recent FAO report identifies the improved management of methane and nitrogen output as a potentially major means of avoiding the worst impacts of climate change.<sup>21</sup> A move towards the emissions-based economy envisaged would almost certainly require changes in farming practices and would have a clear impact on the UK’s dairy and wheat supply networks, the farming elements of which currently account for 36% and 66% respectively of the UK’s methane and nitrous oxide totals.<sup>22</sup>

## Planning for change

The UK’s food supply network continues to function essentially as a response to a package of consumer-led expectations including assured delivery to the table, cheapness, convenience, unparalleled choice and market responsiveness. Continuing the process of change seen over the last 60 years (see Table 2),

**Table 2: A preliminary medium to long view of consumers’ food culture, supply chain drivers and policy frameworks**

Decade	Consumer culture characterized by	Shaped by experience of	Food supply chain drivers	Policy framework shaped by
1940s/1950s	Acceptance.	Rationing; price; availability; health.	Reconstruction; shortage of materials; labour difficulties; transport; focus on volume of food produced.	Under-supply; post-war reconstruction; focus on agriculture and increasing production; lowering prices.
1960s/1970s	Aspiration (rising expectations).	Pleasure and convenience; choice.	Europeanization; new products; the move from local to supermarket shopping and the emergence of large retailer power; price cutting.	Technology; product/process innovation; focus on manufacturing; concerns about over-production.
1980s/1990s	Contentment, but with worries.	Information deficit; time pressure; choice extension; also health, safety, genetic modification.	Expansion of supermarkets; information technology; retailer - driven choice; price competition and concentration of power.	Supply chain efficiency; EU single market; global trade barrier reduction; ‘informed choice’.
2000 to present	Personal choice alongside increasing ethical concerns.	Technology; obesity and health; ethics; food miles; sustainability.	Low cost vs ethical and healthy eating concerns; the rise of corporate social responsibility.	Over-supply alongside scarcities; global sourcing; tensions between public and corporate governance; health; fuel; water.

elements of that package will have to be re-examined in the light of emerging challenges and their effects.

For the first half of the 20th century, food was regarded in the UK as a strategic asset and one of great political significance, especially in times of national crisis. Something of that recognition may need to return to the policy arena over the next 20 years as consumers are increasingly forced to consider as part of their daily lives such currently remote concerns as access to land for food production, the availability of water, and competition in the use of fuel for agricultural and household purposes. The effects of some of these emerging uncertainties are at present unknown and do not appear to be being monitored.

For cross-sector policy-makers in particular, forecasting the scale and impact of change will help in managing the transition to a supply network and governance systems better able to cope with the new requirements presented. The new institutions, new laws, new risk management systems and new quality assurance schemes that have been put in place in recent decades have responded mainly to concerns

about food safety and consumer trust.<sup>23</sup> To adapt successfully, the current three-way governance model – regulation by public authorities, self-regulation by companies and consumer self-protection – will need to incorporate processes and mechanisms that embrace broader concepts of risk and uncertainty.

As a first step, answers are now needed to a number of pertinent questions facing the UK:

- Given strategic uncertainties, how will current supply dependencies and assumptions change?
- Over the next 20 years, what are the political, economic and social choices that society will need to make in terms of the food it eats?
- What are the 'carrots and sticks' that could influence the choices made? And what will be the capacity and role of domestic food production in supporting those choices?
- What is the role of communications in the new environment? And how best may consumer opinion be influenced, understanding advanced, and trust maintained?

### Research Programme

Consulting a wider range of stakeholder interests throughout, the next phase of this two-year research programme will run from January 2007 to March 2008 and will be concerned with the development of assumptions, scenario play and analysis:

- the collection and collation of qualitative data;
- the preparation of models of the UK's milk and wheat supply networks, their key assets, dependencies and resource utilization;
- the development of key assumptions on (i) internal supply uncertainties; (ii) strategic trends and uncertainties; and (iii) the likely policy responses;
- the conduct of feasibility studies to identify appropriate quantitative modelling techniques;
- the selection and working through of six scenarios;
- the assessment of the impact on the focal supply networks in each of the circumstances selected;
- the development of recommendations on (i) food supply policy; and (ii) supply governance arrangements.

## Endnotes

- <sup>1</sup> HM Treasury and DEFRA, *A Vision for the Common Agricultural Policy*, Crown Copyright (London: HMSO, 2005). Available online at <http://www.defra.gov.uk/farm/capreform/vision.htm>.
- <sup>2</sup> J.S. Hofstetter and C.C. Jones, *The Case for ECR: A Review and Outlook of Continuous ECR Adoption in Western Europe*. ECR Europe Academic Partnership and IBM. Available at [www.ecrnet.org](http://www.ecrnet.org). IGD, *Stock Holdings at their Most Efficient Level*. Available online at <http://www.igd.com/cir.asp?cirid=1360&search=1>.
- <sup>3</sup> Department for Environment, Food and Rural Affairs (DEFRA), *Agriculture in the United Kingdom* (London: The Stationery Office, 2005).
- <sup>4</sup> In a market worth £76bn in 2004 (Mintel, *UK Retail Briefing – Food and Drink Focus*. Mintel International Group Limited, 2006), the UK's agri-food industry represents some 8% of GDP and 12.5% of total employment (Department for Environment, Food and Rural Affairs, *Farming and Food's Contribution to Sustainable Development: Economic and Statistical Analysis*. UK: Crown Copyright, 2002). In volume terms, in a production environment still dependent on subsidies, the UK can produce more than two-thirds of its total food requirement. In practice, up to 44% of what it consumes, at least in the primary products (cereal, potatoes, vegetables, cattle, poultry, milk products, pigs/pig meat and fruit) is imported, the bulk from EU countries (European Commission, *The Common Agricultural Policy Explained*. Brussels: European Communities, 2004). Imports of food are considered important to ensure year-round choice and nutritional standards.
- <sup>5</sup> Stern Review, *The Economics of Climate Change: Executive Summary* (2006). Available online at [http://www.hm-treasury.gov.uk/media/8AC/F7/Executive\\_Summary.pdf](http://www.hm-treasury.gov.uk/media/8AC/F7/Executive_Summary.pdf).
- <sup>6</sup> This is shown by numerous commodity studies, such as W. Pritchard and D. Burch, *Agri-food Globalisation in Perspective: Restructuring in the Global Tomato Processing Industry* (Aldershot, Hants: Ashgate, 2003); USDA ERS, *Global Food Markets: Global Food Industry Structure*, Briefing, US Dept of Agriculture Economic Research Service, Washington DC, 2005. <http://www.ers.usda.gov/Briefing/GlobalFoodMarkets/Industry.htm>.
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- <sup>8</sup> House of Commons Environment, Food and Rural Affairs Committee. *Milk Pricing in the United Kingdom, Ninth Report of Session 2003-2004*, HC 335 (London: The Stationery Office, 2004).
- <sup>9</sup> D. Colman, J. Farrar and Y. Zhuang, *Economics of Milk Production England and Wales 2002/2003*. Special Studies in Agricultural Economics, Report No. 58 (2004). Available online at <http://www.defra.gov.uk/>.
- <sup>10</sup> Ibid.
- <sup>11</sup> DEFRA, *UK Wheat Production* (2005). Available online at [http://statistics.defra.gov.uk/esg/index/list.asp?i\\_id=062](http://statistics.defra.gov.uk/esg/index/list.asp?i_id=062) [last accessed 27/10/06].
- <sup>12</sup> DEFRA, *UK Trade Data in Food, Feed, Drink including Indigeneity and Degree of Processing* (2006). Available online at [http://statistics.defra.gov.uk/esg/index/list.asp?i\\_id=059](http://statistics.defra.gov.uk/esg/index/list.asp?i_id=059) [accessed 24/10/2006].
- <sup>13</sup> K. Morrison and L. Warwick-Ching, 'Drought pushes wheat to 10-year high', *Financial Times*, 10 October 2006.
- <sup>14</sup> HM Treasury. *Barker Review of Land Use Planning. Final Report – Recommendations* (London: HM Treasury, December 2006). [http://www.hm-treasury.gov.uk/media/4EB/AF/barker\\_finalreport051206.pdf](http://www.hm-treasury.gov.uk/media/4EB/AF/barker_finalreport051206.pdf).
- <sup>15</sup> [http://ec.europa.eu/research/energy/nn/nn\\_pu/renews/003/article\\_2273\\_en.htm](http://ec.europa.eu/research/energy/nn/nn_pu/renews/003/article_2273_en.htm).
- <sup>16</sup> G. Lean, 'As stocks run out and harvests fail, the world faces its worst crisis for 30 years', *Independent on Sunday*, 3 September 2006.
- <sup>17</sup> Stern Review (2006) (see note 5 above).
- <sup>18</sup> <http://www.metoffice.com/research/hadleycentre/pubs/brochures/B1999/contents.html#top>.
- <sup>19</sup> I. Herbert and J. Brown, 'Study calculates precise damage Britons cause to the environment', *The Independent*, 9 December 2006. See also [http://www.carbontrust.co.uk/about/presscentre/061206\\_Carbonfootprint.htm](http://www.carbontrust.co.uk/about/presscentre/061206_Carbonfootprint.htm).
- <sup>20</sup> Methane is calculated to be 23 times more potent, while nitrous oxide is 296 times more potent. Source: FAO report (see note 21 below).
- <sup>21</sup> H. Steinfeld, P. Gerber, T. Wassenaar, V. Castel, M. Rosales and C. de Haan, *Livestock's Long Shadow: Environmental Issues and Options* (Rome: Food and Agriculture Organization, 2006).
- <sup>22</sup> <http://www.defra.gov.uk/environment/statistics/globalatmos/gagccukem.htm>.
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<http://www.city.ac.uk/ihs/hmfp/foodpolicy/index.htm>

### **The Milk Development Council (MDC)**

<http://www.mdc.org.uk/>

### **Monsanto UK**

<http://www.monsanto.co.uk/monsantouk/monsantouk.html>

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