

A resilient UK food system



The food system underpins many aspects of our society. It feeds us and shapes the economic, social and natural environments that we live in. The COVID-19 pandemic has further highlighted the importance of resilience in the food system. This POSTnote defines resilience and why it is needed, describes what a more resilient UK food system would look like and explores possible ways of achieving this.

Background

A key goal of the UK food system (Box 1) is to provide access to safe, nutritious and affordable food for its 68 million citizens.^{1,2} However, the food system also plays a wider fundamental role in shaping the social, economic, public health and environmental status of the UK. For example:

- **Social & economic.** The agri-food sector is the largest national employer (employing 4.1 million people in 2018) and the biggest manufacturing sector (valued at £121 billion).³ Food exports were valued above £23 billion and went to over 220 countries in 2018.⁴
- **Public Health.** Around 61% of UK citizens are overweight or obese,⁵⁻⁸ while almost 1 in 5 children live in food insecure households.⁹ There are around 70,000 premature deaths annually due to diet-related ill health¹⁰
- **Environment.** Agriculture accounts for around 56–75% of UK land use,¹¹⁻¹³ and the whole food system for 19% of UK greenhouse gas emissions.¹⁴

The complexity of the modern food system means that it is vulnerable to a range of shocks and stresses. Examples include a 2008 global food price spike (which saw the price of wheat rise by 130%),¹⁵ a 2018 shortage of CO₂ gas that impacted supply chains across the food and drink sector,¹⁶ and panic

Overview

- A resilient food system would be robust, able to recover quickly after any disruption and reorient towards more sustainable outcomes.
- Many shocks and stresses threaten the food system, including environmental change, public health crises and political disputes. Some of these threats are increasing.
- There are many possible ways to achieve a more 'ideal' food system that is resilient, agile, sustainable and benefits society.
- Coordinated actions at all levels of the food system will be needed to achieve this. Policy frameworks could promote collaboration between different actors and improve the monitoring of progress towards resilience.

buying in the 2020 COVID-19 outbreak that led to shops introducing temporary rationing and limited opening hours.¹⁷

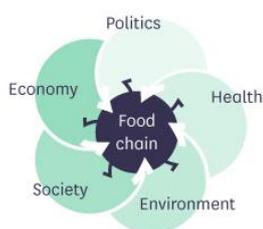
These disruptions have led to calls for a greater focus on the 'resilience' of the entire food system, including the need for more joined-up thinking and collaboration to address system-wide issues and problems.¹⁸⁻²² The UK Government has commissioned an independent review to inform a National Food Strategy (NFS),²³ due to be published later in 2020. The comprehensive review is being developed in collaboration with stakeholders from all parts of the food system. The Government has committed to respond with an NFS White Paper within 6 months of the review's publication.²⁴

Defining food system resilience

Defining resilience can be difficult, as the term is widely used across different disciplines, often with different meanings. Its origins trace back to the fields of ecology²⁵ and engineering.²⁶ In recent years a 'social-ecological' definition of resilience has increasingly been applied to food systems.²⁷ This describes a system in which humans and the environment are interlinked, where resilience is the system's ability to absorb change, adapt or transform, and then return to a steady state (which may differ from its original state).²⁸⁻³¹

Box 1: What is the 'Food System'?

The Centre for Food Policy describes the food system as “the interconnected system of everything and everybody that influences, and is influenced by, the activities involved in bringing food from farm to fork and beyond.”³² This includes processes and actors (businesses, workers, etc.) that contribute to producing, processing, retailing and consuming food. Taking a food systems approach to resilience is broader than looking at the resilience of individual supply chains. This is because, as well as incorporating supply chains, a food system includes the wider social, economic, environmental and political factors that affect its activities, goals and outcomes (see diagram below, adapted from a diagram produced by the Centre for Food Policy).³³

The food system

The Global Food Security Food Systems Resilience programme³⁴ has expanded on this, describing a resilient food system as one that is **robust** (shielded from disruptions), can **recover** quickly after disruption and **reorient** to accept alternative outcomes (such as accepting seasonal availability of some foods or reduced meat diets).

The term resilience is sometimes used interchangeably with sustainability,^{27,35} but this can be misleading. A system can be resilient to shocks and changes, but not be sustainable.^{35,36} For example, an engine that can run using different fossil fuels is resilient to fuel shortages, but it would not be considered environmentally sustainable. Many experts argue that the food system should be more resilient, sustainable, healthy and fair.^{36,37} They suggest that the 'reorientation' aspect of resilience is particularly important as it allows the system to transform, align with the goal of providing sustainable food, and accept alternative outcomes that reduce its negative impacts.³⁴

Threats to the food system

There are many things that can disrupt the food system and negatively affect its outcomes. As well as having an effect, many of these factors are themselves affected by the food system. For example, soil degradation can lower crop yields, and thereby impact food security and resilience,^{38,39} but some of the key drivers of soil degradation are intensive farming practices ([POSTnote 601](#)).⁴⁰ Understanding the interdependencies between different elements of the food system may be important for avoiding potential unintended consequences of resilience-building actions. While many complex multi-level interactions and feedback loops exist, the following sections only consider how these areas impact the food system and not vice versa.

Environmental threats

Climate change poses an increasing threat to the functioning of the food system. Short-term extreme weather events, such as droughts and floods, are forecast to increase in frequency in the UK.^{41,42} Globally, such events have already been shown to be major contributors to sudden losses in food production,⁴³ and can disrupt the logistical infrastructure needed to distribute food.⁴⁴ Longer-term stresses like increasing water scarcity or sustained temperature rise can cause regions to become unsuitable for growing crops,⁴⁵⁻⁴⁷ and help spread pests and diseases to new areas.⁴⁸⁻⁵⁰ Biodiversity loss also disrupts the food system. Declines in the number and diversity of animals and plants can reduce the amount of food harvested from habitats through activities like fishing,^{51,52} or lower agricultural yields by reducing pollination,⁵³ soil fertility⁵⁴ and pest control that wild species may provide.⁵⁵⁻⁵⁷

Geopolitical threats

The UK imports 47% of its food³ and is particularly reliant on imports for key produce like fruits and vegetables.⁵⁸ This makes the food system vulnerable to disruptions in trade brought about by geopolitical issues, conflict or political instability in food producing regions. Leaving the EU is widely seen as a potential risk, in part because 28% of UK food is imported from the EU and 60–65% of all the UK's agricultural exports go to EU countries.⁵⁸⁻⁶⁴ However, some see it as a potential opportunity to build resilience by putting more emphasis on local production or importing food from a broader range of countries.^{59,60,65} The level of disruption and the effect on food system resilience will depend on the future trade deals that are secured.

Public health threats

While diet directly impacts on public health, public health also plays a key part in determining how resilient the food system is. As well as wider societal impacts, poor health can strain institutions within the food system and lower productivity.⁶⁶⁻⁶⁸ There are concerns that the food system is currently making these problems worse, by promoting high fat and sugar products that increase levels of dietary-related ill health.⁶⁸⁻⁷¹ The widespread advertising of such products, their low cost relative to healthier alternatives, and the design of towns and high streets may all contribute.^{70,72-78} Public health shocks, such as the current COVID-19 pandemic, can also cause severe disruption to the food system due to restrictions brought in to tackle the disease, shortages of workers due to illness, or surges in food demand.^{79,80}

Social and economic threats

Shortages in available workers can disrupt the activities of the food system. Agriculture is not the only sector vulnerable to labour shortages,⁸¹ but there are particular concerns as an estimated 98% of the 75,000 seasonal workers required for the UK harvest come from the EU.⁵⁹ In 2016, almost one in four workers in the wider food and drink sector were non-UK EU nationals.⁶¹ The number of seasonal workers travelling to the UK is falling, as a result of the UK leaving the EU⁸² or travel restrictions due to COVID-19.⁷⁹ This can lead to food being left unharvested,⁸³ impacting national productivity and resilience.

Moving towards an ideal food system

Questions that need to be considered when trying to visualise a more resilient food system include:³⁴

- *Resilience of what?* Is the focus on the whole food system, components of it (such as farming) or its outcomes (such as food in the supermarket)?
- *Resilient to what?* In addition to those discussed above, there are many other shocks and stresses that could be considered threats. How severe a perceived threat is and what actions should be taken to boost resilience to it will depend on where in the food system it is acting.
- *Resilience for whom?* This question considers who or what benefits from resilience building, such as the general public, supply chain workers, businesses, natural resources, etc.
- *In what time frame?* The interventions needed to build resilience in the short-term (weeks or months) will be different from those needed for longer-term resilience building (years, decades, generations).

Different stakeholders may have different answers to these questions depending on their priorities and interests. More dialogue may be needed to develop a joined-up response that incorporates a wide range of views and minimises conflicts.⁸⁴ It is worth noting that building resilience will require a diversity of approaches to be pursued in parallel. Increasing diversity within food systems is itself considered an important aspect of resilience (for example, simultaneously strengthening both local production and international trade to help prevent disruption).^{85–87} There are many possible features that a resilient and sustainable food system could have and the following sections describe traits that are often linked with achieving these goals.

A more secure food supply

Many feel the food system should aim to provide continuous access to affordable food, and a resilient food system would be able to do this regardless of shocks and stresses. The price of food is relatively low in the UK compared with other European countries,⁸⁸ and supermarkets are typically well-stocked, but concerns remain over the affordability of food for people on lower incomes.⁷⁰ The widely-used 'Just-in-Time' (JIT) supply approach used within the food industry brings benefits such as improved efficiency and freshness, but some are concerned that it may make the system more vulnerable to disruption.^{89,90} This means that when shocks do occur, the system may only have a buffer of a few days' or weeks' worth of supply.^{91,92}

Moving towards a more secure food supply could involve building resilience through addressing the limitations of the JIT approach and increasing the national capacity to stock food.⁹³ This would require changing supply chain practices and improving food storage and processing infrastructure.⁹¹ Wider improvements to infrastructure (especially local and regional) could also increase resilience and food security, ensuring that there are multiple options for key services should a shock occur. For example, re-establishing small local abattoirs could increase resilience by reducing the current reliance on a few large abattoirs and buffer the system in case of future shocks.⁹⁴

To achieve a more secure food supply, the balance between international trade strategies and local food production could

also be considered. The UK imports food from more than 160 countries,⁹⁵ but one-fifth of fresh food imports come from countries facing increasing climate change associated risks.⁹⁶ For some produce, the UK is highly reliant on a few key countries or regions. For example, 69% of all fresh vegetables imported into the UK are sourced from two EU countries (Spain and the Netherlands).⁹⁷ Diversifying UK imports,³⁴ assisting producer countries to adapt to climate change,⁹¹ and boosting local production of produce that would otherwise be imported⁹⁸ could all boost resilience and increase food security.

Lower environmental impacts

Given the impacts that the food system can have on the environment and vice versa, promoting a more resilient system will require addressing the activities that currently harm the environment. The expansion and intensification of agricultural production are driving global biodiversity losses, soil degradation and pollution events ([POSTnote 589](#)).^{99–101} The food system is also a significant contributor to UK greenhouse gas emissions,¹⁴ and food waste is seen as a major problem.¹⁰² Moving to a less impactful food system could involve:

- Boosting efficiency by adopting new technologies like drones, sensors and genome editing to reduce farming inputs;^{103,104}
- Adopting more agro-ecological farming practices, such as cover cropping and the use of diversified crop rotations to build soil fertility and reduce negative impacts;^{105,106}
- Promoting a circular economy across the food system that finds new ways to reduce or reuse waste,^{107–109} such as feeding food waste to insects (for animal or human consumption)¹¹⁰ or using waste heat from sewage farms to heat greenhouses.¹¹¹

Transparent supply chains

Building resilience is often associated with the improved collection of information within food supply chains. However, this will only increase resilience if stakeholders have the capabilities to access and understand the data, make plans from it, and change their practices accordingly.⁸⁵ After high profile incidents like the 2013 horsemeat scandal,¹¹² efforts were made to promote transparency in UK supply chains,¹¹³ including through the use of certification schemes.¹¹⁴ However, due to the complex nature of the global food network and commercial confidentiality constraints this remains a challenge.¹¹⁵ Initiatives such as 'Trase' provide tools that can help account for this by tracking the impacts of international commodities like beef, soya and cocoa.¹¹⁶ Such tools produce useful metrics but achieving transparency can still be difficult, especially when dealing with hidden commodities, such as palm oil, that consumers may not be aware of.¹¹⁷ Without transparency, it is difficult to establish where supply chain problems may be occurring, who will be affected and what actions can best promote resilience.

Food systems containing transparent supply chains might allow for better risk analysis and greater resilience, if they harness data in useful ways, share it between different parts of the chain and coordinate their actions accordingly.^{118–120} The uptake of new technologies like blockchain and the Internet of Things could help to facilitate this,^{121,122} but there are concerns that small and medium enterprises (SMEs) may not have access to the resources needed to make full use of these emerging

technologies.^{123,124} Supporting SMEs to access them could help, but wider shifts in supply chain behaviour would also be needed to foster a more collaborative approach.^{125,126} Opening up supply chains and making more information available could promote wider cooperation, improve fairness and enable consumers to be more connected with the food they eat.^{127–129}

Healthier diets

A more resilient and sustainable system would allow greater access to healthy food options and promote the uptake of healthy diets.^{130,131} Many are now calling for more focus on providing greater access to affordable healthy food, not just affordable food in general.^{78,130–133} Currently, over 80% of adults consume fewer than 3.5 portions of fruit and vegetables a day despite the Government '5 A Day' guidelines.¹³⁴ The Food Foundation suggests that the poorest half of households would need to spend around 30% of their disposable (after-housing) income on food in order to meet the NHS Eatwell Guidelines, compared with just 12% for the richest half of households.¹³²

Adopting healthier diets may also bring wider benefits, including reducing the over-consumption of foods with higher environmental impacts, like meat and dairy.^{91,135,136} For example, a multi-disciplinary team of researchers and nutritionists have designed the 'Planetary Health Diet', which aims to be "good for people and planet".¹³⁷ Increasing the uptake of such diets may require:

- teaching the necessary cooking skills required for healthy eating to both children and adults;^{138–141}
- regulating the widespread marketing of less healthy food products (advertising vegetables made up only 1.2% of the total UK food advertising spend in 2015;^{134,142})
- subsidising and investing in the UK's horticulture industry to boost the production of local fruits and vegetables;^{143–145}
- working with food processors to reformulate recipes to make them less unhealthy.¹⁴⁶

Improved social outcomes

A system that contributes positively to tackling issues of socioeconomic inequality, provides stable employment and improves welfare, could be seen as a resilient one that works to minimise the impact of the threats discussed. However, research by the Trussell Trust shows problems such as food poverty remain an issue, with the number of emergency food parcels distributed by their food banks increasing from just under half a million in 2014 to over 800,000 in 2019.¹⁴⁷ The food system is currently a major employer but there are concerns that a large proportion of these jobs are low-paid and/or have little security.¹⁴⁸ It is also becoming increasingly difficult to recruit people (both skilled and unskilled) into food production, manufacturing and processing.^{82,149,150} The food industry has called for measures to address these issues, such as:

- the creation of more apprenticeships in the food industry;¹⁴⁹
- expansion of in-work education opportunities and improving employee benefits across the food and drink sector;^{150,151}
- improved careers education for young people to encourage them into farming (the average age for farm-holders was 60 years in 2016)¹⁵² and the wider food sector.¹⁵³

A joined-up approach to food

Achieving a more resilient food system will require many different actions above and beyond those previously outlined, at all levels within the food system. Policy-makers can help to improve resilience by encouraging a more coordinated view of the wider food system, in addition to providing funding, regulatory support and guidance for implementing measures.^{18,84,130,154–157} The following sections outline recent policy changes affecting the food system and discuss suggestions for improving policy to build resilience.

Recent policy developments

There are many government departments, agencies and regulatory bodies whose work affects food system resilience. These include the Food Standards Agency, Defra, the Department of Health and Social Care, among others.²¹ Each has its own aims and priorities, so it can be challenging to anticipate what effect an action taken by one body in a specific area of the food system might have elsewhere. For example, opening more trade links with non-EU countries could be seen as a positive action to increase resilience in case of a shock to EU food production. However, there are also concerns that doing so could create a two-tiered system of food standards, which might threaten the resilience of domestic food production.^{59–61}

Taking a broader systems approach that cuts across government departments may allow better predictions of the system-wide impacts of resilience-building actions and help to identify key leverage points.¹⁵⁸ Progress is being made towards achieving a more joined-up policy approach to the food system, which can be seen in the inclusion of the 'public money for public goods' idea and the requirement for regular reviews on food security in the Agriculture Bill 2019–21.^{159,160} The Environment Bill 2019–21 also contains proposals that are relevant to the food system, whilst the Well-being of Future Generations (Wales) Act 2015 includes resilience as one of seven key goals.¹⁶¹ Many commentators have also welcomed the plans for a National Food Strategy, and the potential this has for promoting a systems approach to food.^{84,162}

Building systems-level resilience

In the wake of recent policy developments, many see a need to build on these and go further in adopting a systems-level approach, in order to achieve a resilient and sustainable food system. There are many suggestions as to how to go about this, including creating new British Standards geared towards promoting system resilience,¹⁶³ enshrining new food system targets into law and periodically reporting progress,^{156,164} and boosting support and funding for projects that encourage greater collaboration between food system actors.^{98,125,165}

Some also propose the creation of an independent public body to transform the food system,^{156,164,166} which would act in a similar way as the Committee on Climate Change does to advise the Government's work on reducing emissions.¹⁶⁷ They argue that this would help with scoping out interventions and aid resilience planning. Such a body could work with existing government departments and regulators to better streamline efforts, plan and coordinate any interventions more effectively and continuously monitor the progress being made.

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