



Food System Challenges

Public Dialogue on food system challenges
and possible solutions

Which? and the Government Office for Science

Research conducted by TNS BMRB

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Executive Summary

Introduction and background

There are many food security and sustainability challenges facing the food system. The global population is forecast to be over 9 billion by 2050¹, leading to an increasing demand for food and placing further pressure on finite resources. More food will need to be produced with less. This raises questions for the types of food production we have in the UK and the choices that will be available for consumers. But it is also an issue of the wider food system. The UK is currently 68% self-sufficient in foods which can be produced here², but wider resilience is also important, with a large proportion of our food and inputs that enable us to produce it coming from overseas. The food supplies that we rely on may not be sustainable in the future as the impact of climate change will lead to greater weather shocks and combined with other risks such as water shortages may threaten supply chains. Food production is in turn a major contributor to greenhouse gas emissions as well as water scarcity and wider biodiversity issues. Over-consumption and waste further exacerbate these issues by placing unnecessary pressure on the food system, whilst rising obesity rates and diet-related illness are major killers in the UK and place increasing strain on the health service. At the same time food fulfils many other social and cultural functions and so these issues need to be considered and dealt with in a way that enables people to have food of the nature and quality that they expect and at a price they can afford.

Work is being carried out by Government and the scientific community to understand the impact of current food production practices and identify potential future solutions^{3,4} to safeguard the food supply. It is important that these practices and solutions are acceptable to consumers. Consumer demand and behaviour are also an important aspect of these solutions and a potential driver of more sustainable practices. It is therefore essential that the consumer voice is acknowledged and taken into account by policy makers.

In the light of this, Which? and Government Office for Science (with co-funding by Sciencewise⁵ for the Government Office for Science contribution) commissioned deliberative public dialogue research from TNS BMRB to explore in detail public responses to food security and sustainability.

The research was designed to understand the public's priorities for Britain's future food supply, the wider food system that underpins this and their expectations, any misgivings and level of engagement with the issues.

Design and method

The research comprised three stages:

- A pilot stage of two group discussions held in London comprising 16 participants from a range of demographic backgrounds to test the initial discussion format and materials.
- Two-day public dialogues in London, Cardiff and Paisley, with each day a week apart. The dialogues included discussion around three types of everyday products - chicken, meat and wheat

¹ Foresight. *The Future of Food and Farming* (2011). Executive Summary. The Government Office for Science, London, p.9

² Environment, Food and Rural Affairs Committee. *Food Security: second report of session 2014-15* (2014). House of Commons, London, p.3

³ Ibid, p.33-4

⁴ Ibid, pp.5, 32

⁵ Sciencewise is the UK's national centre for public dialogue in policy making involving science and technology issues. See www.sciencewise-erc.org.uk/

- as a means of anchoring the discussion in real life behaviour. Across the three dialogues there were 49 participants taking part, selected to reflect a broad range of individuals in terms of: age, gender, social grade, educational attainment, family status, ethnic background and geographical locality.

Day 1 of the dialogue explored participant priorities for food shopping, their unprompted views about the challenges facing the food system, followed by materials (detailed handouts and video clips from a range of experts on food issues) that introduced a wide range of food system challenges for discussion.

Day 2 of the dialogues explored whether participants had changed their attitudes or behaviour towards food buying, followed by discussions about a wide range of potential solutions to the challenges facing the food system. For example, for red meat this included eating less meat and eating different cuts of meat, through to eating insects as a different source of protein and lab produced meat. Participants were then asked to draw up an action plan and to assign tasks for the various parties in the food system.

A pre-task was used before the first workshop and between the first and second workshop to help people think about their own food shopping behaviour.

- Two months after the dialogues a follow-up telephone interview was made to 20 participants who had given consent for re-contact to explore participants' reflections and attitudes after they had time to think about them more in an everyday setting.

Key findings

The participant journey

As food consumers, participants' initial priorities were generally concerned with quality, price and health. Prompted to think more widely about the food system as a whole, concerns were also expressed about the increasing industrialisation of the food industry, a lack of transparency about food processes and additives, animal welfare and to a lesser extent the environment.

Having been informed of the challenges facing the food system on Day 1 of the dialogues, participants were generally aware of rising obesity and health issues but were shocked to hear about the impact of food production on climate change, the environment and water shortages. By the end of the first day, participants realised that consumers were part of the food system challenge and believed it was essential to change food consumption habits.

Focussing on potential solutions to the food system challenges on Day 2 of the dialogues, participants recognised a need for change. In discussing a range of potential solutions there was clear support for those that were low-tech, natural or focused on behaviour change, although novel technologies or production processes were not rejected out of hand. For hi-tech solutions and processes there was a desire for an independent organisation to ensure that these were safe, worthwhile and that there were no low-tech alternatives which would be publicly acceptable and achieve similar outcomes.

In developing their action plans for change, participants continued to emphasise behavioural solutions aimed at consumers but also thought that all parties in the food industry had a role to play in finding sustainable solutions – retailers, manufacturers, caterers, farmers and Government.

Informing participants about the challenges facing the food system on Day 1 had clearly led to changes in attitudes and food purchasing behaviour in the week between the two dialogue sessions. Following up a selection of participants after two months indicated that attitudes had become more firmly embedded and that changes in food purchasing behaviour had generally been sustained.

Awareness and beliefs about the food system

Initially, convenience, price and to a varying extent healthiness were key influences when buying food. Participants commented that making healthy choices was often difficult because of marketing practices, price promotions and a lack of useful and accessible information.

On reflection, participants thought that consumers had become quite distant from food production and as a consequence knew relatively little about how food was produced and the challenges facing the food system.

Responses to food system challenges

Participants were very surprised at the food system challenges that were presented to them. After hearing about some of the challenges facing the food system, participants generally felt that the wider sustainability issues needed to be addressed, including:

- the impact of food production on climate change, biodiversity and embedded resources (including water use);
- the impact of climate change on food production;
- food safety and public health, in terms of how food is produced, the levels of campylobacter in chicken and the use of 'chemicals' in food production and preservation;
- making it easier to make healthier choices;
- the level of waste in the food system by manufacturers, retailers and consumers; and
- ethical issues of food production, in part the way in which animals were reared and in part the impact of taking scarce resources through imports from developing countries.

Responses to possible solutions to the food system challenges

During Day 2 of the dialogues a range of possible solutions were presented to participants, the purpose of which was to explore how they would respond to the different types of approaches and what they thought would be more or less acceptable to consumers.

Overall, none of the solutions were rejected out of hand, although some were approached with a much greater degree of caution and need for reassurance. In considering the range of potential solutions, participants reached for behavioural solutions first as they considered that this was something they could do something about, although they recognised that the extent to which they could change their behaviour was to some extent limited by the products available to buy.

Solutions that were of a more technological or scientific nature were acceptable with differing degrees of warmth. For example:

- the introduction of biological controls in the form of predators mirrored the workings of nature and so was broadly accepted;
- precision farming, which worked to minimise the impact on nature by reducing pesticides and water shortage, was also broadly accepted but participants required reassurances that small farmers would not be disadvantaged;

- processes that participants had never heard of (such as irradiation and chlorine washing) and far reaching technologies (GM and lab produced meat) needed to pass a number of tests before they would become acceptable: robust, independent oversight of safety, safeguards that the technology was being developed for the wider good rather than exclusively for industry profit; and that the same result could not be achieved by alternative means.

Promoting a sustainable food system

The deliberative process of providing wide-ranging and neutrally presented information about the challenges to the food system and some of the potential solutions engaged participants and provided them with the opportunity to view food buying from a wider perspective. However, participants recognised that the amount of information about food system challenges to which they had been exposed was not the norm and that in the real world there would need to be changes involving all the parties in the food system - farmers, manufacturers, retailers, caterers and Government.

From the participants' perspective, awareness-raising about the food system was a key requirement. They thought that there should be:

- greater emphasis on the challenges to the food system in the National Curriculum, capturing the imagination of young people who were seen as potential ambassadors of change;
- broad coverage awareness-raising campaigns; and
- more informative labelling at the point of purchase to further enhance consumer choice.

What were participants' expectations?

Participants recognised that consumers could not address the food system challenges alone and expected Government to take the lead in bringing about change.

Participants expected Government to:

- a) ensure that the food industry tackles the issues facing the food system by providing leadership and through greater regulation of farming, manufacturing and production processes;
- b) ensure that food products have more informative labelling so that consumers can make better informed choices;
- c) help consumers to make affordable sustainable food choices; and
- d) provide general awareness-raising campaigns and demonstrate how people can change their food buying behaviour so that it is more sustainable.

However, as there was some distrust of both the food industry and the Government to commit to addressing the issues of food sustainability, participants wanted to see an independent body that would act as a 'consumer champion'. They expected that this champion would be an independent organisation and would:

- a) determine the best way forward to address sustainability issues;
- b) take into account consumer priorities and the need for radical change; and
- c) monitor the long-term effects of food system changes in terms of food safety, impact on public health, impact on the sustainability of farming and food production; and other ethical considerations.

1. Introduction

1.1 Background

The global population is forecast to be over 9 billion by 2050⁶, leading to an increasing demand for food and placing further pressure on finite resources. In this context, the sustainability of Britain's food system is an issue of increasing pertinence. A sustainable system provides safe, healthy and affordable food for all and does not use natural resources at a rate that exceeds the capacity of the Earth to replenish them. However, it is widely acknowledged that the UK's current food system is not sustainable and that we are facing threats to the security of our food supply⁷.

Unsustainable food production also threatens food security, leading to issues from over-fishing to soil erosion and contributing to climate change⁸. Climate change in turn affects food production due to extreme weather conditions and it is likely that this effect will increase (notably, in no small part, because of agricultural emissions)⁹.

The UK is currently 68% self-sufficient in foods which can be produced here, and there has been a steady decline in this level over the last 20 years¹⁰. There are risks attached to the food supplies and agricultural inputs that are imported from other countries as extreme weather, water shortages and changing international demand threatens supply. Over-consumption and waste further exacerbate these issues by placing unnecessary pressure on the food system, whilst rising obesity rates and diet-related illness are major causes of death and place an increasing strain on the National Health Service. At the same time food fulfils many other social and cultural functions and so these issues need to be considered and dealt with in a way that enables people to have food of the nature and quality that they expect and at a price they can afford.

Work is being carried out by Government and the scientific community to understand the impact of current food production practices and identify potential future solutions. The Government has also committed to develop a food and farming plan. There are a plethora of potential approaches to support a more sustainable food system, ranging from changes to consumer behaviour through to a wide variety of production technologies to reduce the environmental impact of food production. Indeed, the first call for proposals at the Agri-Tech Catalyst Innovation Competition was oversubscribed six-fold¹¹. These ranged from GM technology to robotic weed removal, improved seed priming and precision farming technology¹². However, whilst the Government is investigating wide ranging initiatives and interventions to safeguard food supply, there is a need to understand the public's priorities, hopes and fears in relation to potential approaches to enhance sustainability and ensure acceptability.

An earlier Which? report¹³ called for more effective consumer engagement on food issues. It explored views about the current food system and consumer priorities, emphasising that, to date, there has been

⁶ Foresight. *The Future of Food and Farming* (2011). Executive Summary. The Government Office for Science, London, p.9

⁷ Food Security: Second Report of Session 2014–15, House of Commons Environment, Food and Rural Affairs Committee. <http://www.publications.parliament.uk/pa/cm201415/cmselect/cmenvfru/243/243.pdf>

⁸ Ibid, p.10

⁹ Ibid, p.17

¹⁰ Environment, Food and Rural Affairs Committee. *Food Security: second report of session 2014-15* (2014). House of Commons, London, p.3

¹¹ Ibid, p.33-4

¹² Ibid, pp.5, 32

¹³ Which? The future of food: giving consumers a say (2013)

little public debate around the many issues facing the food system. One key concern was that within any strategy for sustainable food supply consumers' views must be taken into account in decisions about the potential role of new foods and technologies.

Research into public responses to challenges inherent in the current food system and possible ways to address these is essential to ensure that public interests are taken into account when determining the best way forward for sustaining Britain's food supply¹⁴. With a limited amount to be spent on research and development¹⁵, it is vital that the public voice is acknowledged when it comes to funding prioritisation in this area. However, Sciencewise¹⁶ claims, "There is a gap in knowledge about the public segments' preferences and trade-offs when comparing different technologies and approaches"¹⁷.

Which? and Government Office for Science (with co-funding by Sciencewise for the Government Office for Science contribution) commissioned deliberative public dialogue research from TNS BMRB to explore in detail public responses to food security. It was designed to understand the public's priorities for Britain's future food supply, the wider food system that underpins this, their expectations, any misgivings and level of engagement.

1.2 Research and Dialogue Aims

Specifically, the aims of this research were to:

- Explore consumers' awareness, understandings and concerns about food sustainability – and how these play out in the food choices they make;
- Understand consumers' awareness and attitudes toward current and future food production and consumption, including new food technologies;
- Deliver insight into consumers' priorities and expectations concerning Government and food industry initiatives to safeguard the food supply including both demand side (e.g. changing consumer behaviours and shaping consumer choices) and supply side (e.g. novel food technologies).

1.3 Method

The research began with a **pilot stage** comprising a pair of workshops held in London that were designed to explore initial public responses to the issue of food security with the specific aim of testing comprehension of the wide range of stimulus materials that were to be used in the public dialogues. The materials included:

- Paper handouts of each of the case studies – chicken, meat and wheat – that were used to help participants understand the challenges facing the food system;
- A video presentation by Professor Tim Benton, UK Champion for Global Food Security, and short videos by food expert contributors. These introduced challenges to the food system from different standpoints, then, later, possible responses to these challenges. (These are described in more detail in the description of the public dialogue sessions below.)

These pilot groups were held during January 2015 and comprised a total of 16 people. They were recruited using free-find methods to reflect a broad spread of people in terms of age (18+), gender, social grade, family status, educational qualifications, Black and Minority Ethnic (BME) background, a

¹⁴ Foresight, p.11

¹⁵ Environment, Food and Rural Affairs Committee, p.5

¹⁶ Sciencewise is funded by the Department for Business, Innovation and Skills (BIS). Sciencewise aims to improve policy making involving science and technology across Government by increasing the effectiveness with which public dialogue is used, and encouraging its wider use where appropriate to ensure public views are considered as part of the evidence base. www.sciencewise-erc.org.uk

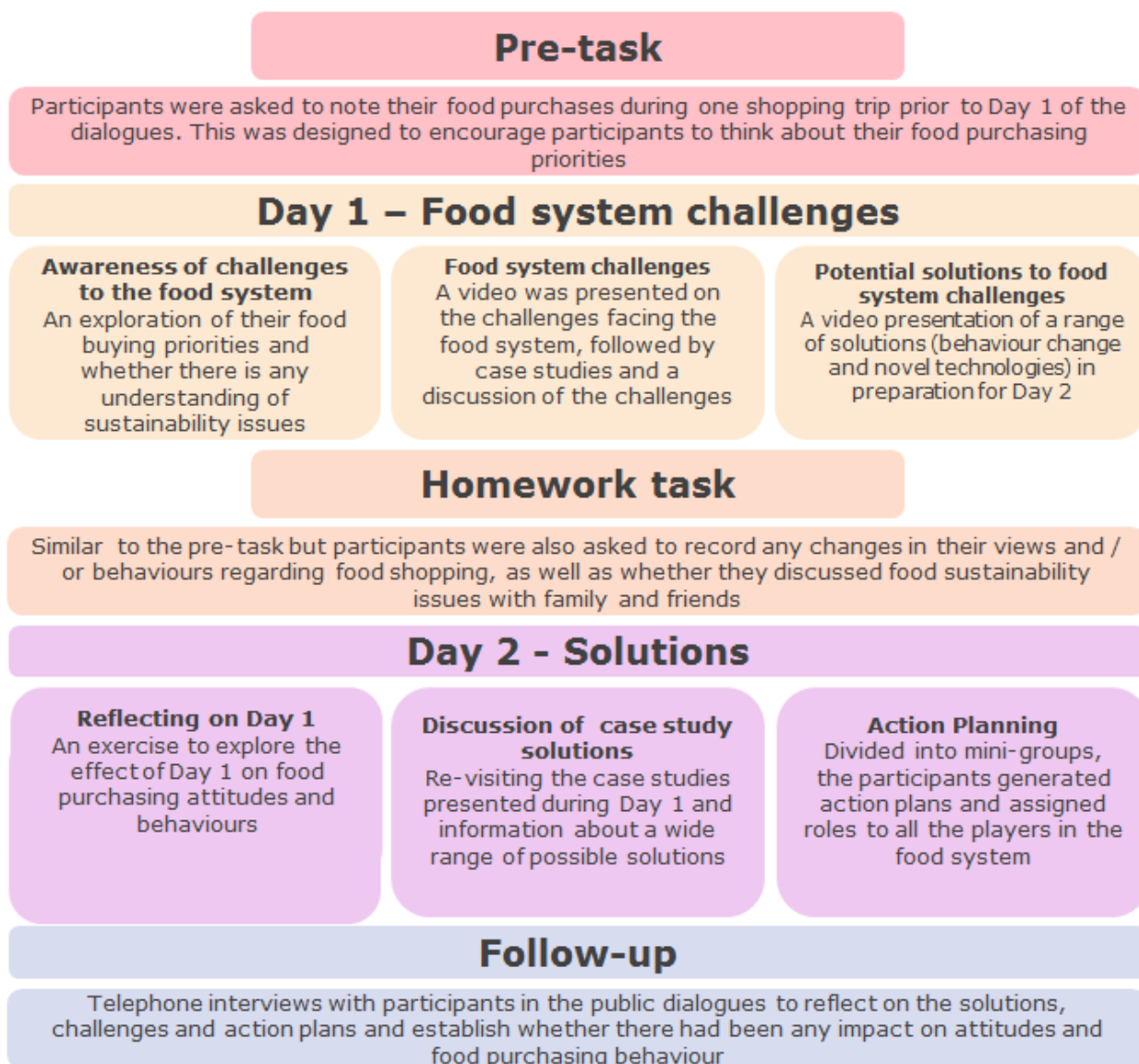
¹⁷ Sciencewise. *Talking about GM: Approaches to Public and Stakeholder Engagement* (2011). BIS, London.

range of dietary requirements and location (urban, suburban or rural) with definitions provided in the Appendix.

Following the pilot stage, a two stage deliberative research method was used. This involved three reconvened dialogues. Each dialogue consisted of two days, spaced a week apart. Workshops were held in London, Cardiff and Paisley, in January and February 2015. During the week prior to the first day of the public dialogues, participants were asked to note the types of foods they bought and their thoughts about the influences on their purchases during one food shopping trip.

Finally, a sample of participants were subsequently followed up by telephone. These interviews explored their reflections on the challenges, solutions and action plans after they had time to think about them more (and to do so in an everyday setting), as well as establishing whether the dialogues had had any impact on their food attitudes or buying behaviour.

The diagram below shows the different stages of the dialogue process and what this meant for the participants' 'journey' of understanding. This is followed by a fuller discussion of the topic coverage of each workshop session.



Day 1 – Food system challenges

Day 1 comprised:

- Seven hour events consisting of presentations and discussions;
- The primary focus was on food system challenges and issues. These included long-term sustainability, obesity and diet-related illness, food prices and affordability, food wastage, climate change, and water use;
- An exploration of the basis of consumers' decision making about food purchases and consumption and their initial views about food sustainability issues. Three case studies were presented as examples for consideration and discussion. These were issues around the production and consumption of wheat, beef and chicken. These were selected as they reflect typical everyday food purchases and allowed participants to discuss decision-making and possible solutions to the food system challenges discussed on Day 2 in an accessible way.
- A range of stimulus materials were used and included:
 - Video presentations by Professor Tim Benton, UK Champion for Global Food Security, and food expert contributors that introduced participants to the challenges facing the food system from different stand points. The contributors represented farming; food producers; retail; Government; and non-Government bodies that campaign for ethics in the food system, more sustainable and healthier food choices by the public;
 - Case study hand-outs comprising information and statistics about the range of challenges facing the food system, linked to the production and supply of wheat, beef and chicken. These were designed to instigate discussion and allow different views across the participants to emerge;
 - Respondent workbooks to allow participants to record their thoughts and questions throughout the workshop.

Day 2 – Possible solutions to food system challenges

Day 2 comprised:

- Seven hour events consisting of presentations and discussions;
- The primary focus was on a range of solutions to food system challenges, from behaviour change, to wider use of production processes already being deployed through to novel technologies. This included some of the possible ways to tackle the challenges and issues introduced in Day 1, the previous week. Some of these solutions involved the application of technologies, such as precision agriculture, new feed practices, genetic modification, irradiation, smart labelling, carcass treatments, and lab produced meat. The examples were all related to the three case studies from Day 1, with six solutions presented for beef and five solutions presented for each of chicken and wheat;
- Respondents were asked if their views and behaviours about food had changed as a result of the Day 1 dialogue. For each of the three case studies in turn, respondents considered and discussed the example 'solutions'. They noted the possible advantages and disadvantages of the 'solutions', and conditions under which use was acceptable, then grouped them in terms of possible acceptability. Finally, the respondents worked in small groups to prepare and present 'action

plans' for tackling food system issues and what they expected Government and the range of parties involved in the food system to do to promote sustainable food production.

- The stimulus materials used included:
 - Video 'vox pops' from food expert contributors reflecting a range of viewpoints from the perspectives of the food industry, Government and other public bodies;
 - Full-colour posters presenting each solution;
 - A video presentation of a 'precision agriculture' proposal;
 - Respondent workbooks.

Follow-up interviews

Two months after the final dialogue, the research team attempted to re-contact all those participants who consented to being followed-up for a short telephone interview. The purpose of this was to explore participants' reflections on the challenges, solutions and action plans after they had time to think about them more (and to do so in an everyday setting) as well as establishing whether any changes in purchasing behaviour that had been seen between the two days of the dialogue had been sustained.

All the materials used in the research – topic guides, stimulus materials, workbooks and biographies of all those involved in the videos may be found in the Appendix.

1.4 Achieved Sample

The workshops took place in London, Cardiff and Paisley. In total, 49 participants took part in the three workshops. They were recruited using free-find methods using a screening questionnaire to meet a sampling frame with quotas designed in agreement with Which?, Government Office for Science and Sciencewise.

Deliberative research aims to capture a wide range of views – rather than seeking to achieve a representative sample. The attendees were recruited to include a mix of people in terms of:

- **Gender** – roughly equal ratio of male and female;
- **Age** – a range reflecting the local population;
- **Educational level** – reflecting the general spread of qualifications in the population;
- **Ethnicity** – included a mix of ethnicities in each workshop to reflect the local population, with approximately 10% of the participants being from minority ethnic groups;
- **Rural / urban** – a mix of localities to reflect local and surrounding area.

The follow-up sample comprised 20 interviews with participants who had consented to be re-contacted.

Full details of the sample of participants taking part in the each of the stages of the research may be found in the Appendix.

1.5 Research Project Guidance and Development

In addition to input from Which?, the Government Office for Science and Sciencewise, a Government Management Group (GMG) and Advisory Group (AG) were created to provide further guidance on the focus and content of the research and to ensure that the materials presented were correct and neutral in their presentation. Specifically, they guided the balance of expert viewpoints presented in the videos, the

selection of case study topics, and the accuracy, relevance, and comprehensibility of information given to respondents.

The Government Management Group comprised a range of Government departments and bodies with interests in food, and sought to ensure that the scope and objectives of the research met pressing questions of importance to policy making. The GMG comprised:

- Robert Bradburne, DEFRA
- Kieron Stanley, DEFRA
- Sean Ryan, DEFRA
- Alec Weir, BIS
- Joanna Disson, Food Standards Agency
- Kevin Naylor, Department of Health
- Patrick Middleton, BBSRC

The Advisory Group comprised academics, representatives of the food industry and bodies concerned with promoting healthy, sustainable ethical food choices. The AG comprised:

- Dan Crossley, Food Ethics Council
- Professor Tim Lang, Professor of Food Policy, City University London
- Andrew Opie, British Retail Consortium
- Andrew Kuyk / Barbara Gallani, Food and Drink Federation
- Dr Robert Doubleday, Centre for Science and Policy
- Professor Charles Godfray / Tara Garnett, Oxford Martin Programme on the Future of Food
- Sue Dibb, Eating Better

Representatives of Which?, the Government Office for Science and Sciencewise attended each workshop, and were involved in reviewing the method and materials following each one.

2. Awareness and beliefs about the food system

When first asked about their priorities as consumers, participants' unprompted responses initially focused on issues which impacted them as individuals, such as quality, price and health. However, when prompted to think about the food system as a whole, they expressed concern about increasing industrialisation of the food industry, a lack of transparency and the use of processing techniques and chemicals that they believed were potentially harmful to public health, animal welfare and to a lesser extent the environment.

The initial session of the public dialogues began by asking participants to think about what their priorities were when they were shopping for food. They were also asked to think about food in the wider context and to consider what they knew about how food is produced, what farming is like nowadays, people's diets and whether they were aware of any issues in the way that food is produced, retailed and consumed. To capture unprompted views, these discussions were conducted before participants had seen any information about the food system prepared as part of this dialogue. Consequently this chapter reports their unprompted consumer priorities and initial views about the food system and is based on the task they undertook prior to the first day of the food dialogue and the initial sessions of Day 1.

Whilst there were no stimulus materials presented at this stage, exercises were used to encourage participants to reflect on their own choices and think about where the food they buy comes from. In order to support and inform discussion about consumer priorities, participants were asked to keep a note of the food they bought in one food shopping occasion in the week preceding the first workshop. As part of this task, they were asked to make a note of their motivations for making choices and what factors were most important in determining what they chose to eat. Participants were asked to consider a range of factors including issues relating to sustainability, for example the environmental impact of foods and whether the items were produced ethically. A quiz was also used (See Day 1 Workbook in the Appendix) to allow participants to consider how much they knew about the food system. This also introduced some issues and practices they may not have known about and was designed to encourage them to reflect on the wider food system prior to discussing the challenges in subsequent sessions.

Throughout the discussions participants referred spontaneously to foods and food processes that were 'natural', 'organic' farming, and often expressed concern about 'chemicals' in foods. None of the stimulus materials defined these terms. However, participants used the terms to mean the following:

- Natural – farming methods and food processes that are generally not industrialised and do not use synthetic fertilisers, pesticides or additives. For example, natural farming was often seen as being similar to how a person would grow their vegetables in their garden or on a small-holding;
- Organic – farming methods where the minimum of pesticides or antibiotics are used;
- Chemicals – participants often talked about chemicals in a negative way, usually referring to fertilisers, pesticides, preservatives and food additives. In addition, terms such as 'acid', as in

lactic acid were mostly seen in a negative way, although citric acid was generally viewed as lemon juice and seen as acceptable. Familiarity was often the deciding factor as to whether a chemical was acceptable or not.

2.1 Consumer priorities

At the start of the first workshop, participants were asked to reflect on the task they had undertaken prior to the dialogue about their priorities when making food choices. Issues affecting food sustainability rarely emerged as a core, or even secondary, consideration when making food choices. For the most part, participants said their food choices were shaped by price and what they thought was good for them. While there were a small number of individuals in each location who said they prioritised buying organic, free range or local produce for ethical reasons or reasons linked to sustainability (i.e. the environmental impact of the food system), most would prefer to do so but considered these foods too expensive.

Core priorities



Price was overwhelmingly a key consideration, particularly for low income households who had a limited budget. Participants often talked about how their food budgets had been squeezed over the past few years as a result of the recession. In order to make their food pound go further participants had moved to different, cheaper supermarkets, as well as shopping around for bargains

when they had the time. Some also mentioned moving to cheaper 'value' foods as these enabled them to buy more food for the same food budget although there was some comment about there being differences in quality between value and standard brands.

"We don't earn a lot and it can be difficult to make ends meet so I always buy on price ... I buy the cheapest where I can and often get the value foods ... I know they aren't always the best quality so I do work out what is best for price and what you get." (Paisley, Female)

Some participants, predominately those trying to feed a family on a small budget, considered that food is currently too expensive and that it is not possible to eat healthily on a budget. However, this was contentious with many arguing against this, saying that fresh, healthy, raw ingredients are inexpensive. This was a view held by both low and higher income participants. They argued that it was not difficult to cook healthy foods from scratch providing one has the time and inclination to do so.

"If you go to Lidl you can buy a pack of tomatoes for 39p. It's down to lifestyle as well, and education. They need to prioritise their food before they prioritise their lifestyle."

(Cardiff, Female)

While many of the participants felt that they were able to cook healthy foods, there was also a general feeling that not all consumers had sufficient cooking skills which meant they were more reliant on ready-prepared meals and processed foods.

Very early in the discussions about food priorities there emerged a perception that processed foods were very cheap, resulting in potentially poor food choices and also waste, as less thought is likely to be given

to wasting cheap foods. This perception persisted and was reinforced by the discussions across the two food dialogue days.

In the context of discussing food purchases both price and value for money were raised. So, while participants were not necessarily looking for the cheapest item they had become much more used to looking for 'bargains' when shopping for food. They would look for opportunities to save money by switching brands and supermarkets as well as special offers and 'two for one' deals. However, they also pointed out that the special offers were nearly always on 'junk foods' rather than on healthier options.

"I'm very much one for a bargain, things that are on special offer. I tend to stay in the middle aisle to see what's on offer. A lot of that tends to be junk food... I do try to get my fruit and veg in, but alongside that there's lots of crisps and snacks." (London, Male)

There was also a recognition that while in principle the special offers were a 'good deal' – as buying in bulk provides an overall cost saving - this could result in wasting money and food, as one is encouraged to buy more than they really need, some of which is likely to be wasted.

"I tend to go for the offers. I bought one thing last week. I only really needed one, but because they were two for £5, I found myself buying two. And we didn't really need two. And we find that we're throwing quite a lot of stuff away at the end of the week [from these special offers]...and most of the stuff I'm throwing away is the fresh stuff, because it's going off or starting to wilt in the bottom of the fridge." (London, Male)

"I bought two pizzas on Saturday; they were 75 pence each and we didn't need two pizzas, one would have done. My wife cooked both of them and two thirds of the second one got thrown away. So it encouraged us to waste that bit of food." (Cardiff, Male)

Quality and Freshness

While views were mixed, participants generally thought that the quality of food available had deteriorated over recent years; the increasing mass production of food and the use of additives to maintain freshness and shelf life were all felt to contribute to poorer food quality.

"I think the quality of the food in this country has taken a big hit because of the supermarket price wars and [the use of] a lot of additives to try and keep the food as fresh as possible – mass producing them has just driven the quality down." (Paisley, Male)

There was some degree of overlap between quality, healthiness, freshness and food safety. For example, good quality foods were thought to be 'good for you' and therefore healthy, partly because they are made from good quality ingredients, partly because they were less likely to be processed and therefore lower in fats, sugars and salt.

Food quality was also judged in different ways by participants. For some, the brand and the supermarket from which they bought equated with quality products; for others it was the country of origin, the look and colour of the product or how it felt and smelt.

Freshness was also linked to quality and participants also questioned whether processed foods were 'fresh' because they use additives and processing techniques to extend shelf life. The use of 'sell by' (as they were referred to) and 'use by' dates by participants were common, especially amongst younger people and those who felt less confident in their ability to judge freshness. However, older and more experienced participants tended to be a little cynical about 'use by' dates considering that they were very conservative and that the food would be edible and safe for longer than printed on the packet. For them, the look, feel and smell of the product were sufficient to assess product freshness.

Convenience / Foods which fit into busy lifestyles

Convenience was frequently a key issue for participants as few considered that they had the time (and in some cases the skills) to cook all meals from scratch every day. There was a real sense that people have less time to shop and / or prepare food. Food needed to fit into their lifestyle with food choices being made that reflected the time they had available to shop and / or prepare meals.

"I don't think people cook fresh the way they used to – no Sunday mince and potatoes, families are so busy now and it's easier just to get a microwave meal ... convenience foods rather than fresh."

(Paisley, Female)

Convenient food meant different things to different people and was really shorthand for food choices that fitted within peoples' lifestyle – this included where they could go to shop, the time they had to shop and prepare foods and their cooking skills. Individuals who had more time on their hands, easy access to a range of food retailers aside from supermarkets, and who were skilled and experienced cooking a range of foods, had a wider repertoire of food choices which they considered convenient. Individuals who lacked cooking skills or had very limited time for shopping and preparing foods talked about making compromises - in some cases this meant buying fast foods, ready meals, or pre-prepared food / ingredients; in others it meant buying from just one supermarket rather than buying from a range of local shops – the latter taking up more time and potentially limiting choice.

Those who described themselves as very busy and 'living on a tight budget' felt forced to buy convenience foods as these were necessary to fit within time and budget constraints. They were annoyed that 'easy' healthy foods and prepared foods such as supermarket meal deals and prepared salads (which were also considered to be healthy) were more expensive and therefore out of their budgetary reach.

For those with children, convenience and 'preference' were often said to go hand in hand with a tendency for children to want foods that were unhealthy.

There was also considered to be: less enthusiasm for cooking generally, especially during the working week (although weekend and special occasion cooking were often mentioned); an increasing use of convenience food; and less eating as a family. Similarly, there was some discussion about UK citizens generally caring less about their food compared to other Europeans in terms of the quality and diversity of food, and that consumers have become detached from how food is produced. These views were voiced most strongly in London where there were more participants who were immigrants to the UK.

Overall, while participants varied in the strength of their views there was a general consensus that:

- people do not know, or really think about, where their food comes from; and
- people do not value food, as evidenced by the low priority people place on eating as a family and cooking from scratch.

For some participants, these views went hand in hand with a desire to return to more home-grown, traditional and natural¹⁸ production methods.

Diet and health

Diet and health was the one area that people recognised as a key issue. However, as discussed earlier, healthy foods may be out of reach of some people for whom money and time are in very limited supply.

¹⁸ In this context, participants defined 'natural' production methods as those where food crops were grown without pesticides and food underwent the minimum of processing.

With healthy foods being considered expensive and some reliance on cheaper, processed foods it meant that some participants felt they were having a less healthy diet than they really wanted.

There was also some confusion around what constitutes healthy food. Participants commented on conflicting information in the media over what was healthy and what was not, with views changing over time. They also commented that some of the marketing of healthy foods was potentially misleading. For example 'low fat' processed foods often contained considerable amounts of salt or sugar which they saw as being bad for people's health.

Before the first workshop, participants were asked to keep a note of the food purchases they made during one shopping trip. Through this exercise, many said they discovered their diets were far less healthy than they had assumed. This made them realise that despite intending to make healthy choices, they were often tempted to buy foods they knew to be bad for their health because of the way they were marketed and priced.

Finally, although there was an increased consciousness about diet and health, participants still succumbed to the 'temptation' of unhealthy foods – often much more than they initially realised.

"It surprised me. Our food choices tended to fall into two categories – relatively healthy and junk. And nothing much in between. It's almost as if we're treating ourselves with a sin or two. And we're eating relatively healthy the rest of the time." (London, Male)

2.1.1 Secondary considerations

Secondary buying considerations tended to be around four issues:

- Treats and special occasions where price and value for money were less of a priority as they were looking for 'luxury' items;
- Trying something new – adding variety to the weekly shopping;
- Food preferences – such as shopping for an elderly relative where fresh, simple food was a priority, compared with teenage children who tended to prefer 'junk food' or when entertaining and providing different party foods where variety rather than price was the key consideration; and
- Impulse buys, which were often said to be '*naughty but nice*'.

2.1.2 Additional concerns

Issues around food sustainability and food production methods (such as organic and free range) were often very low down on the list of food buying priorities, with the possible exception of free range eggs which were usually a 'must have' rather than a 'nice to have'.

Where the issue of sustainability emerged, this was as a tertiary consideration and generally only if affordable. Bound up with the issue of sustainability was often the view that production processes that were thought to be more environmentally sound (e.g. organic and free range) also produced safer and better quality foods. When discussing organic food, for example, concerns about the food safety implications of consuming chemicals used in food farming far outweighed environmental considerations of organic farming methods. Indeed, with the exception of a small number of individuals who were already engaged in issues relating to the environment, there was limited understanding of organic farming methods amongst participants other than a vague belief that organic food used fewer chemicals. While there was no detailed discussion within any of the events as to what types of processes or products fell within 'organic food', the general perception was that the chemicals used to produce foods were

potentially harmful to people's health, an issue particularly mentioned by those with children, and that organic food was therefore better as the method used less chemicals.

While there was some preference for buying organic foods, it was not possible for everyone because they were too expensive; however, some thought the additional cost of organic food was simply profiteering.

Buying free range produce was generally associated with a better quality product. Although there was some recognition, mainly in Scotland, that free range also equated with higher animal welfare standards, this was not generally the reason for buying these products.

Buying local or UK produce was often raised as preferable and whilst this was in part driven by ethical considerations (e.g. participants believed that UK farmers adopted better animal welfare standards and that buying local produce supported local businesses and the local economy), participants considered that as quality and safety standards were higher, such food was better value for money. For a small number of individuals, shopping at farmers' markets, local grocers and butchers that sourced produce locally was a key priority. These behaviours and attitudes were more common in Cardiff and Paisley than in London, possibly because these included participants living in rural areas who felt closer to the farming community.

Overall, therefore, interest in organic or free range produce was largely indicative of an interest in the quality and health benefits rather than the impact on the environment. However, in each of the dialogues there were a small number of individuals for whom animal welfare, production methods and the environment were key concerns. These participants tended to feel very strongly about the issues; they had invested something of themselves in 'practising what they preached' and these views continued to shape their responses throughout the dialogue sessions.

2.2 'Uninformed' views about the food system

When prompted to think more deeply in the initial sessions of the food dialogue about how food is produced and the food system more broadly, participants generally acknowledged that they knew little about how the food system operated. However, they recognised that it was a complex system and believed that it was likely to be dominated by 'big businesses'. This gave them cause for concern which they expressed in a range of ways:

- Participants commented on how diets had changed over the years, with a general loss of cooking skills and an increasing reliance on less healthy, processed foods;
- Many were concerned about the use of chemicals in food, especially processed foods, and the possible effects of these on health in the long term;
- Concern about a lack of transparency in the food system, with food manufacturers being seen to use processing practices that participants felt were dishonest;

"I saw a programme that the [meat] fillets are pumped full of water to make them look bigger ... [it's all about] profit." (Paisley, Male)

"Food is supposed to be a necessity we can't do without yet they're making so much money out of us they're willing to give us anything and put stuff in it for us to crave it." (Cardiff, Female)

- A lack of trust in supermarkets and manufacturers to provide good quality foods. For example, outside London, participants largely believed it was preferable to buy meat from a high street butcher as they believed that locally reared meat would mean higher animal welfare standards, resulting in better quality meat.

"For meat, I have started to look at local and buy from the butcher rather than off the supermarket shelves." (Paisley, Female)

- There was a common perception that supermarkets' drive for profits was having a negative effect on British farming by driving down prices such that some farms – especially dairy farms - were thought to be no longer viable. Some also thought that supermarkets were importing food (in particular meat) from countries where quality, safety and welfare standards were lower in order to keep costs low. As a result, participants believed UK farmers were becoming uncompetitive.

Environmental issues were not spontaneously raised by participants when talking about their food shopping preferences, only tending to emerge when talking about the food system more broadly. Typically, the most frequent issues raised were around the environmental impact of food production methods (due to pesticides and fertiliser run-off) and the ethical implications of the current food system. There was some awareness, largely among individuals who already engaged with environmental issues and those who had existing knowledge of farming techniques (generally those living in rural areas), that food farming could have a negative impact on the environment, in particular pollution from chemicals and the impact this has on biodiversity.

Even during this early discussion (before any information had been presented about the impact of the food system on the environment), many participants expressed a preference for more environmentally-friendly farming methods (particularly in relation to livestock) in part to reduce the environmental impact but largely (as described above) to counter perceived harm to consumers of ingesting chemicals. Ethical considerations also emerged, with participants talking about choosing (or preferring) free range and fair trade produce. This was because they were concerned about animal welfare and the fair treatment of workers in the food industry, rather than food quality, when they discussed this in relation to consumer priorities. Wastage was also mentioned both in terms of the perception that farmers are given subsidies to grow foods that may not always be appropriate and the wastage of food by retail outlets.

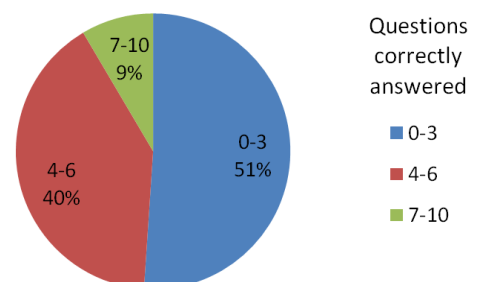
As discussed earlier, participants generally recognised that they were very 'distant' from farming and food production methods and either knew very little about the food system or based their opinions on what they had heard in the media, which was generally around food scares. By contrast, however, there was some evidence to suggest that participants living in more rural areas around Cardiff and Paisley had a better understanding of farming methods. In general, they recognised that farming was much more 'hi tech' and that efficiency and yields were greater nowadays. Similarly, there was also the view that UK animal welfare standards were very high and that despite food scares such as the 'horsemeat scandal', food safety was also very high.

2.3 How much do people know about the food system?

Against the backdrop of their initial thoughts and views about their priorities when food shopping, participants were given a short quiz to answer to find out how much they did or did not know about the food system. The quiz may be found in the workbooks in the Appendix.

Across the participants in the dialogues there was a variety of knowledge and understanding about the food system. The pie chart to the right shows the quiz scores obtained by the participants, with just over half getting three or fewer questions correct and less than one in ten getting seven or more questions correct. There were no differences between locations when comparing median

Food system challenges Quiz Score



scores. While these should not be seen as indicative of knowledge in the general population, due to the small sample size and qualitative nature of the research, they do provide an interesting indication that overall there is little knowledge about the challenges that are inherent in the food system.

2.4 Key findings

The first morning session of the food dialogues gave participants an opportunity to reflect on their own choices, behaviours and existing understanding of the food system. From this discussion, a number of issues emerged which participants themselves referred back to throughout the two-day dialogue:

- Consumers do not know enough about where their food comes from;
- There was limited awareness and understanding that the food system has an impact on the environment;
- The food choices that people made were linked to price, convenience and healthiness rather than the sustainability of the food system;
- It can be difficult for consumers to make 'good' food choices as food processes were not always clear and food marketing and price promotions were more likely to have a strong impact on people's behaviour compared with issues of food sustainability;
- Consumers generally prefer food production processes that they see as being 'natural' (i.e. minimum use of pesticides and man-made fertilisers) and are concerned about the use of 'chemicals' such as preservatives in food;
- There is a lack of trust in big business, particularly manufacturers and retailers, to be transparent about food production processes and a strongly held view that the drive for profit is greater than the desire to provide healthy foods at affordable prices.

3. Response to food system challenges

During Day 1 of the workshops, participants were informed about the range of challenges facing the food system. While they were already aware of rising obesity and health issues, they were shocked to learn about the impact of food production on climate change, the environment and water shortages. They questioned why these issues were not publicised more widely.

Participants focused on areas where they could envisage making change, such as pricing food appropriately to discourage unhealthy food choices or waste, tackling consumer over-consumption and waste, and promoting more ethical food choices.

During the course of the first day, participants learnt about how food is produced, including some practices they were not aware of but about which they proved to have strong reservations. From this discussion, participants felt increasingly strongly that a lack of transparency in the food system hid practices consumers may feel uncomfortable about. As a consequence they were making unsustainable or unethical choices without realising it.

By the end of the first workshop, participants recognised that consumers were part of the food system challenge and believed it was essential to change public attitudes to food and their consumption habits. Enabling this, however, would require changes to the context in which food choices were made so that sustainable food choices were seen as both healthy and best value.

This section describes participants' responses to a range of challenges affecting (and affected by) the food system as it is today. Participants' initial reactions to information about both current and future pressures on the food system are discussed. This is followed by considering the extent to which participants were concerned about the range of food system challenges and whether they supported change to address these – including the type of change they want to see and how these should occur.

During the first day of the food dialogue, participants were given information about a diverse range of challenges relating to the food system, including:

- the effect of food production on the **climate** and the potential impact of climate change on food supply;
- food production's effect on the **environment**;

- use of **water** in food production and the impact of importing water embedded in food from drought-prone countries;
- the prevalence of **waste** in the food supply chain and by consumers;
- possible risks to food **safety**;
- the **ethics and acceptability** of current food production practices (including fair treatment of food production workers, animal welfare and the inequity of consumption across the developed and developing world);
- impact of over-consumption, **obesity and diet related illness** on public health and the health service; and
- the effect of some of these factors on **food prices and affordability** and how this impacts on the choices people make.

These challenges were first introduced in a video presentation from Professor Tim Benton, followed by a talking heads style video from a number of experts representing a range of organisations, with differing standpoints and agendas¹⁹.

The challenges were then explored in more depth through detailed discussion of case studies (chicken, beef and wheat) to illustrate the relationship between the challenges facing the food system and the food choices that consumers make. This was both in terms of the impact that certain food choices have on the food system and how issues affecting the food system in the future will be felt by consumers. Using a case study approach allowed participants to engage more fully with the challenges discussed as they were able to interpret these challenges in the context of their life, food choices and behaviours.

3.1 Views about food security

When discussing population growth and possible food shortages, participants tended to assume that in wealthier countries the impact of increasing worldwide demand on food supply would be incremental. In countries like the UK, participants believed that consumers were unlikely to feel the effects of food shortages in any significant way for many years or even decades.

When thinking about the possible effects of increasing worldwide demand they believed that some imported and out of season foods may increase in price or cease to be available all year round. However, they did not generally see this as a problem because they had already started to think that consumers have too much choice – which gives rise to poor food choices and waste – and that changes in food buying patterns would ultimately be necessary.

"We've been spoilt, we're just used to having what we want when we want." (Cardiff, Male)

"I've actually never given that much thought to it. I just buy what I want – if it's there. If it's not there, then I would just buy something else." (Paisley, Female)

Whilst there was a perception that the impact of food shortages in the UK would be minimal, for developing countries or those more at risk from extreme weather events, participants recognised that the impact of food shortages could be greater. There was considerable disagreement concerning the extent to which the UK Government and consumers should act to curtail the impact of shortages in developing countries. For some this was an ethical consideration - wealthier countries / consumers had a

¹⁹ See the appendix for biographies of contributors

responsibility to source food responsibly so as to minimise negative consequences for others. Others saw the global economy as being outside the control of one country and that it was wrong to dictate how another manages its economy. There was very little movement in either direction on this point; this was a political and ethical standpoint that people brought to the sessions and which shaped their responses to the discussion throughout.

"That's their business – you can't stop them exporting. They need to for their economy."
(Paisley, Female)

"It's a hard one, isn't it? Going back to that bean in Kenya, I feel that if I refrain from buying that produce, really will it make any impact unless a large percent of the population goes and does the same thing? ... Am I really going to make that change for a country in another place? I definitely will be conscious of it a lot more, and I probably will end up doing it. But do I feel that I am actually making a change? Probably not!" (London, Male)

Ultimately, participants recognised that population growth may lead to food shortages (particularly of imported foods) and this may be even more pronounced if countries across the world started to eat more like the West (and specifically the UK and USA). This led to discussion about the benefits of countries like the UK adopting diets from other parts of the world, which comprised alternative protein sources to red meat. Diets that were rich in alternative protein sources, such as pulses, were also considered healthier and therefore better for the individual as well as being more sustainable in terms of their impact on the planet.

From participants' discussion about population growth and food shortages, two conclusions emerged:

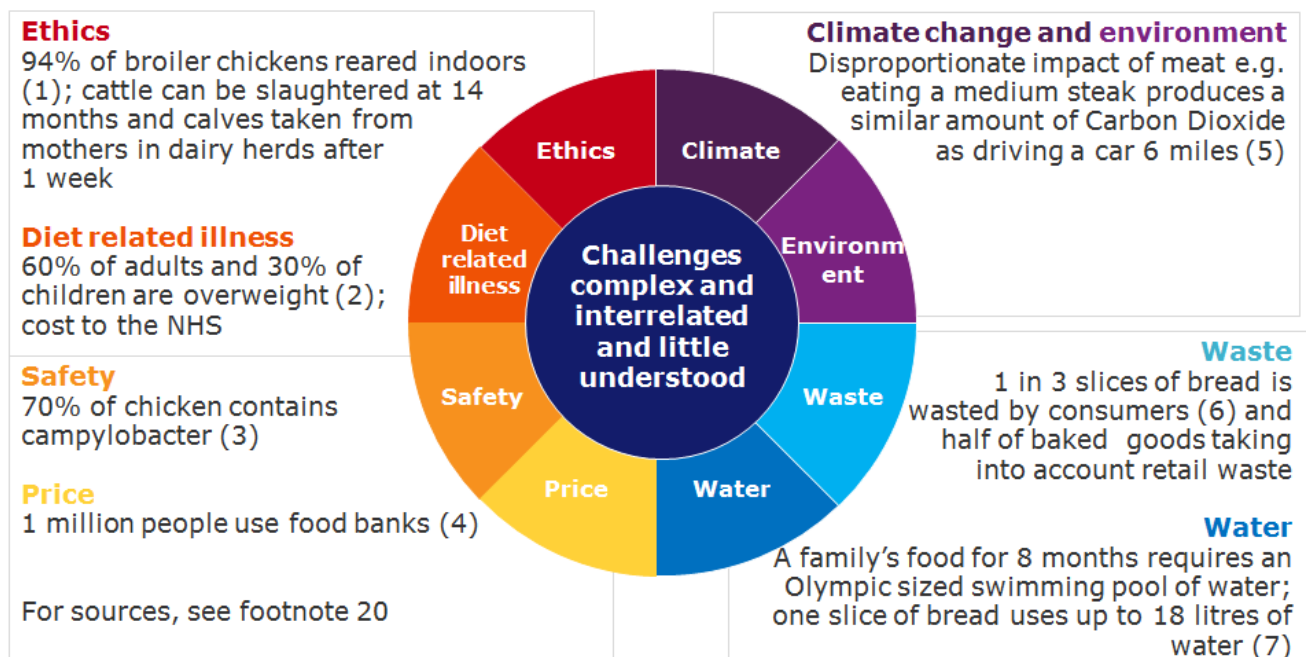
- ultimately, UK consumers' expectations about imported foods would have to change due to worldwide food shortages in the future; and
- that changes in our choices and preferences would be ultimately beneficial both in terms of sustainability and an individual's health.

3.2 Initial response to food system challenges

When participants were first presented with information about the challenges facing the food system they were initially struck by certain facts or issues which were new to them and which in some way brought to life the scale and complexity of challenges facing the food system.

There were a number of reasons why a particular issue stood out to participants. In some cases it was something that they had not thought about before, but was intuitive, such as the impact that changing tastes in developing nations to eat 'more like the west' would have on global supply and competition for resources. In other cases the use of an engaging statistic or imagery in the stimulus material enabled participants to better understand and interpret information – for example, expressing water use in terms of swimming pools and carbon dioxide emissions as car miles.

Much of the information on food system challenges was entirely new to participants, with the exception of obesity and diet-related illness. In some cases, participants already had some awareness of certain issues and the information presented in the workshops demonstrated that the issue was more pressing than they had thought. The following image highlights key statements which engaged participants and which they returned to in the discussions across the two days of the food dialogue to illustrate their own views and concerns.



These 'stand out' pieces of information²⁰ were generally a surprise to participants who often realised that there was a wealth of information about the food system that was previously unknown to them. On first hearing about the range of challenges facing the food system many participants were initially overwhelmed and began to recognise that food sustainability was a pressing and multi-faceted issue facing society.

"All of that really worried me, it's a massive problem." (London, Female)

"It's just a big eye-opener – the amount of greenhouse gas, the water, the crops ... it's just everything." (Paisley, Female)

Having reflected on these issues, participants generally accepted that the challenges facing the food industry necessitated far reaching and fundamental changes in the way food is produced and the types of foods that people buy. Consequently, in their initial response to the challenges presented, they were surprised about how little they felt these issues were publicised.

In the next sections, each of the challenges is discussed in turn, drawing out the key issues participants felt most strongly about and their spontaneous views about what needs to happen or change (this is discussed in depth in the next chapter, Chapter 4 on Responses to Solutions to Address Food System Challenges).

²⁰

- 1) British Poultry Council
- 2) www.oecd.org/unitedkingdom/Obesity-Update-2014-ENGLAND.pdf
- 3) www.food.gov.uk/news-updates/news/2014/13251/campylobacter-survey
- 4) www.trusselltrust.org/resources/documents/Press/Trussell-Trust-foodbank-use-tops-one-million.pdf
- 5) Based on: timeforchange.org/eat-less-meat-co2-emission-of-food and www.co2list.org/files/carbon.htm
- 6) www.ifr.ac.uk/waste/Reports/WRAP%20The%20Food%20We%20Waste.pdf
- 7) Based on: qz.com/#171698/it-takes-53-gallons-of-water-to-produce-a-single-egg/

3.3 Priority challenges – Impact of the food system on the planet

3.3.1 Environment

The materials presented about the environmental impact of the food system focused predominately on the impact of food farming on biodiversity and water pollution. In discussion however, the term 'environment' was used by participants as a catch-all phrase to express the harm caused by food production on the planet – whether that be through greenhouse gas emissions resulting in climate change, pollution or harm to biodiversity.

Participants largely focused on the risk of pollutants entering the water system and the impact of farming on biodiversity, primarily because they had heard about these in the media. In particular, their focus was on the impact that pesticides have on public health and wildlife. This discussion was closely interwoven with that about food additives and preservatives. These views were often deep-seated and for the most part difficult to challenge, primarily because many argued that even with testing and monitoring, they believed it was impossible to ascertain the long-term impacts of chemicals used in food. Consequently many engaged with any information which supported their pre-existing view.

"In years gone past they would never have used insecticides and wheat was good enough to eat – why did we even start using them? It must be so expensive to keep changing them as we find out that they damage the environment." (Paisley, Male)

There was a minority view amongst some individuals living in rural areas that the use of chemicals in farming was positive as it had increased yields, but on the whole, participants believed that reducing chemical use in farming was preferable.

3.3.2 Water Use

Water consumption was presented in relation to 'everyday' food items as this enabled participants to more readily grasp why disproportionately high quantities of water were used in food production. The statistics used to illustrate water usage sparked considerable interest and debate – in particular that a slice of bread requires 18 litres of water to produce. Concern about apparently high water requirements was compounded when considered in the light of other pressures on the food system - for example that climate change in the future might lead to water shortages and drought.

In most instances, participants said they had never thought about the water that is used to produce food and were therefore very surprised by the amount that was required.

"That shocked me, I never expected that we use that much water" (Cardiff, Male)

Although participants generally agreed that water use was a pressing issue, opinions varied about the likely impact. Some were sceptical about the impact of the high water requirements to grow and produce food, arguing that water is never lost, but recycled and would re-enter the food system. They also assumed that much of the water required for farming would come from rainfall and would therefore be naturally replenished.

Learning that some drought-prone countries were using finite fresh water reserves to grow food for export led to a countering of these views although this sparked debate about whether this was something that UK consumers should be concerned about. After all, as some participants argued, exporting foods was integral to each country's economy and therefore the transfer of resources from one country to another was inevitable.

3.3.3 Climate change

During the course of Day 1, participants were presented with information explaining the range of ways in which the food system may contribute to climate change. The stimulus material focused largely on greenhouse gas emissions from food farming, as within the time constraints for this project, it was not possible to fully educate participants about the causes and impact of climate change. Consequently, participants' responses to the stimulus presented were largely shaped by their existing knowledge and perceptions, with views changing little over the course of the dialogue.

Prior to attending the sessions participants had tended to assume these greenhouse gas emissions resulted from transporting imported foods, rather than farming processes (e.g. methane emissions from cattle and the use of nitrogen based fertilisers). This perception emerged most clearly in Paisley, where there was a strong preference for buying local food, although the belief that buying out of season and imported produce was particularly damaging to the planet due to the associated transport emissions was evident across all the groups. Consequently, much of the discussion focused on reducing food miles, even though this was not covered in the stimulus material.

However, participants were surprised by the extent of greenhouse gas emissions from cattle in comparison to other foods, with a strongly held view emerging that reducing meat consumption was the most effective step that consumers could take to reduce the impact of their diet on the climate.

A statement made by Professor Tim Benton in his introductory video on the food system challenges about the increasing frequency of extreme weather events being strong evidence of climate change was clearly heard by participants, and raised the issue to being a high priority for change.

"I think there's been too much emphasis on this debate going on about the causes [climate change]. There's evidence there that it's happening and therefore there's a degree to which you could cater to it. And world economies have got to adjust to it to lessen its effects - to be more efficient, less carbon intense, along with a cautionary message about flood defences."

(London, Male)

"We've already seen a bit of it with the floods. How it would just wash away any food crops that are growing." (London, Female)

There was, however, some confusion about the likely impact on the UK with some questioning whether this was an issue for the UK or for other countries. The upside of climate change was the view that, as the UK becomes warmer, farmers will be able to grow crops that the UK currently imports.

3.4 Priority challenges - Food safety

Although on the one hand many participants said they expected that the foods they buy should be safe to eat, on the other hand some also believed that manufacturers currently cut corners to save money and allow unsafe ingredients to enter the food chain. Food scares such as the horsemeat scandal were referenced as evidence that the complexity of the food system allowed for fraudulent activity and for foods that were not certified as fit for human consumption to enter the food chain.

The belief that food manufacturers would place profit over food safety also underpinned the perception that the chemicals used in food production (including but not restricted to – pesticides and fertilisers, antibiotics used in livestock, and additives and preservatives in processed foods) were harmful to people's health. Participants were concerned about what they perceived to be the potential long-term harm caused by sustained consumption of these chemicals over time. This emerged strongly in discussion of the meat case study where participants were concerned that the use of antibiotics in livestock may be contributing to resistance in humans. This further reinforced participants' views that meat production was potentially harmful in many ways – public health, environment and climate.

Participants were also surprised by the prevalence of campylobacter in chicken (as shown in the stimulus materials). Very few had ever heard of campylobacter and questioned why this was not being more widely publicised by Government or the food industry. However, this was countered by the view that the risk of food poisoning from chicken is well known and that knowing the name of a particular bacteria was not necessary if people know how to handle chicken safely. For those who were aware of the recent press coverage of campylobacter levels in supermarket chicken, this further supported the perception that this was unacceptable, especially for organic chickens, where the level of campylobacter is generally higher. This was considered by participants to be indicative of poor farming practices and a lack of transparency about food risk in the industry.

3.5 Priority Challenges – impact of consumer behaviour on food sustainability

When considering the food system challenges that were presented to them through the case studies, participants tended to focus on areas where they could envisage that they could make changes. Typically, these were: **waste, diet, food prices** and **ethics**. Participants believed that changing behaviour in relation to these four issues would reduce consumer demand and have a positive impact on the challenges to the food system.

"There's things you can't change like wars or like climate, we need to concentrate on things that are in our control in the UK like people's diets, obesity - everything seems quite linked up. We all need to change our lives together rather than individually, I think it needs to be everyone because you're not going to do it, you need everyone to do it together." (Cardiff, Female)

3.5.1 Reducing waste

There was a clear emphasis placed on reducing waste as a priority approach to tackling food system challenges across all the groups. Participants believed that waste should be avoidable. Producing foods that were ultimately discarded unnecessarily compromised the food system by using embedded resources (water and energy). Consequently, reducing waste was considered the first and most obvious step towards tackling food system challenges. In doing so it would reduce the amount of food produced without changing the amount consumed (i.e. without affecting consumer choice whilst reducing wasted embedded resources).

Although the amount of food thrown away by consumers was a surprise, when reflecting on their own behaviour, they could see why so much food is wasted. Only one participant across all the three workshops thought that the food waste in the home materials overstated the case. However, all the other participants conceded that they wasted food to some extent, with participants with larger families and higher disposable incomes recognising that they were very often wasteful.

Food waste in the home was thought to be caused by disorganisation, carelessness and buying foods on a whim.

"We do the big shop and to be honest with you quite a lot of that just gets thrown out, goes to waste ... you just keep buying and buying and buying and then it's out of date." (Paisley, Male)

"I think a lot of people are aware of waste but they don't really care." (Cardiff, Male)

Participants accepted that they had ultimate responsibility for wasting food and should plan ahead and not 'buy on a whim'. However they also thought that there were factors which contribute to wastage: consumers have too much choice; it is so easy to buy out of season foods; bulk purchase promotions (e.g. buy one get one free) and large pack sizes.

"If we knew we could only buy bread three times a week then maybe people would only go and buy it then and there'd be not so much being wasted." (Cardiff, Female)

Retailers were also thought to be very wasteful, throwing away food that had passed the 'display by' date even though it was still likely to be fit for human consumption. Indeed, there were some individuals who believed that the 'use-by' and 'best before by' dates were artificially short and designed to encourage consumers to throw away good food and buy more.

"I used to work in a supermarket and the amount of food that got chucked away was unbelievable. That's the stuff they didn't sell." (Cardiff, Male)

Participants in the dialogues believed that retail food waste could be reduced by making the following changes to practices:

- ensuring food nearing its use by date is given to relevant food distribution charities rather than thrown away;
- giving food that is unfit for human consumption to animals (but only where this was part of their natural diet); and
- producing smaller portion and pack sizes that are suitable for smaller households (e.g. smaller loaves) that were comparable to larger packs in terms of offering value for money.

3.5.2 Price

While food was seen as expensive for those on low incomes, overall, participants tended to argue that many foods were low in price. This devalued food in people's minds and thereby prompted waste and poor food choices.

Low pricing on foods was considered to have two key negative outcomes:

- promoting over-consumption of unhealthy foods, as consumers were tempted by special offers on snacks and processed foods; and
- promoting waste, as consumers over-purchase perishable foods because 'buy one get one free' offers or larger pack sizes appear to offer better value for money than buying the amount that they need.

"As long as people have got cheap food they will waste it ... it's a balance. You need to have cheap food to make it affordable for everyone but not too cheap that people will waste it."
(Cardiff, Male)

"If it's a genuine saving and the food will last or keep, I would do it, but I think most of them tell a lot of lies ... to make you think you're getting a bargain and you aren't." (Paisley, Female)

Applying appropriate pricing was considered a key priority for addressing food challenges, as current pricing was thought to promote unhealthy and wasteful food habits.

3.5.3 Diet and obesity

Before attending the first workshop, participants were asked to keep a note of the food choices they made in one food shopping trip. Many were surprised by the amount of 'junk food' and 'unhealthy snacks' they bought 'on impulse', contrasting this with their ongoing belief that their food choices were largely healthy.

"I was quite surprised at how much of it was stuff I'd bought on special offer ... and the impulse buys were all junk food, such as crisps." (Paisley, Female)

After discussion, poor diet and poor food choices were considered to be at the core of some of the food system challenges discussed. Consumption of highly processed foods was considered to be bad because: it was assumed that low cost foods (especially meats) used the least ethical production techniques in order to keep costs down; and contributed to the increasing cost of the NHS in treating diet-related illnesses because of their high fat, salt and sugar content.

Whilst on the one hand, participants believed that people were more aware of the risks of a poor diet and were more conscious of eating healthily, they recognised that rising obesity rates were evidence that this was not translating into sustained behaviour change. There was a perception that the context in which consumers make food choices undermines, rather than supports, positive change for a number of reasons:

- misleading and contradictory advice about what foods are good or bad for you;
- the use of marketing strategies and packaging designs to make some foods appear healthy when in fact these foods may be high in sugar content (e.g. fruit drinks for children and low fat yoghurt); and
- price promotions and bulk purchase offers on foods such as crisps, chocolate and pizza that encourage consumers to over-purchase and over-consume.

3.5.4 Ethics

Throughout the workshops, participants learnt about a variety of practices that they considered unfair or unacceptable but which they thought consumers knew little about or 'try not to think about'. When they thought more carefully about the acceptability of the way that food is produced this further supported their perception that radical change is required to the way food is produced.

"Something's going to have to change, we can't carry on as we are and the ethical side stood out to me. It's just crazy really." (Cardiff, Female)

Fair treatment of people – Participants were aware of instances of poor treatment of employees in the food production industry, low wages of food industry employees and low rates paid to small farmers supplying food to big business, although this was not at the forefront of their mind.

In this respect, participants believed that as there was insufficient oversight of large corporations, particularly in developing countries, they were able to treat workers and suppliers unfairly in order to reduce their costs and increase their profits. Learning that imported foods from drought-prone countries used up finite water resources was further illustration of a wider imbalance whereby consumers in the developed world were buying low cost foods to the detriment of developing countries. However, there was some debate here with some participants arguing that whilst unfair, developing countries are often dependent on these exports to support their economy.

"If we're taking food from a certain country we ought to make sure we're not just taking but we're all working together globally." (Cardiff, Female)

"I didn't think for a moment that we were taking water from a drought stricken country ... I would definitely question the inequality and unfairness of it all." (London, Male)

Fair treatment of animals - When participants learnt more about intensive farming of livestock, there were a number of practices that were new to them. They were surprised to learn, for example, that 94% of broiler chickens (chicken reared for meat) are raised indoors; they were also surprised to learn that

organic chickens are reared less intensively and have more space to live in, initially thinking that organic meant less chemicals were used in their rearing.

This again indicated that consumers do not clearly understand food production and welfare standards and consequently are not well equipped to make choices that align with their values or expectations.

For those who prioritised ethical practices there was a need to make the food industry much more transparent.

3.6 Addressing the food system challenges – participants' initial thoughts

Having heard about and discussed the range of challenges facing the food system, participants were largely overwhelmed by the enormity of the problems faced. Consequently they questioned whether there could be a viable solution and whether the level of change needed was possible.

"It's very disjointed - there's no-one there trying to get them to all act together."
(Paisley, Female)

"Why are they (experts) not all sitting round a table like this and discussing it. Why are they not doing something about it?" (Paisley, Female)

Participants believed that consumer demand was in many ways driving the challenges within the food system. There was a strongly held view, which was reinforced over the two day events, that over-consumption and over-purchasing (resulting in waste) of food, alongside the demand for imported foods and low cost meat were all at the heart of many of the challenges discussed.

However, whilst participants recognised that consumer demand influenced and was to some extent driving unsustainable food farming and production practices they felt constrained by what was on offer to them in the shops. They believed that consumers were conditioned to prioritise price, choice and convenience over sustainability. The packaging and pricing of foods that rewarded over-purchasing, as well as the wide choices available, made it too easy (and tempting) for consumers to purchase foods that were unsustainable or unethical.

Consequently, towards the end of the first day of the dialogues, participants were largely in agreement that significant change was required across the food system and began to suggest that behavioural interventions may be necessary to help consumers to make better choices. These included:

- awareness-raising of the harm associated with certain food choices on the food system;
- greater emphasis on healthy diets and healthy eating;
- recommending alternative protein sources to meat; and
- more direct approaches including limiting consumer choice and controlling prices.

"We've got all things on fag packets saying it's unhealthy for you, should we be doing the same with food, saying all this unhealthy processed rubbish is going on." (Cardiff, Male)

"If the shops weren't selling this stuff I wouldn't be buying it." (Cardiff, Female)

"Could we have better labelling on food products – tells us more about where and how it was produced, food miles, and so on." (Paisley, Male)

Participants took the view that there needed to be both a top-down and a bottom-up approach to addressing the food challenges – Government and the food industry as well as consumers all had a significant role to play.

However, there was some cynicism about whether Government and the food industry would really address the food system challenges and supply 'good' sustainable foods and place consumer wellbeing above industry profits. These participants took the view that Government was too easily lobbied by big business, with the food industry likely to resist change as this would affect their profitability.

"I'm a total cynic when it comes to Government – if [a retailer's] chairman is funding whatever Government is in they are going to let them carry on." (Paisley, Male)

3.7 Key findings

By the end of Day 1, participants almost unanimously took the view that the sustainability of the food system was a pressing challenge, requiring significant changes to the food system. Whilst many acknowledged that consumers' appetite for variety and low-cost foods was making the food system unsustainable, they also argued that consumer appetites were themselves shaped by food marketing and retail practices which were seen to promote unhealthy and unsustainable choices (i.e. red meat, low cost processed meat products, and multi-pack offers on unhealthy foods). They also recognised that food waste also contributes to food system challenges through wasting embedded resources.

During the last session of the Day 1, participants were asked to start thinking about ways to tackle the challenges faced. Already, at this stage there was strong consensus concerning the need to change consumer behaviour, a view that continued throughout Day 2 of the dialogue.

Change would be required by consumers and the food industry, but there was considerable cynicism about whether changing consumer behaviour was realistic. While changing consumer behaviour was seen as a challenging task, it could be achieved with Government and food industry collaboration.

4. Response to potential solutions to food system challenges

Participants started Day 2 of the food security dialogues with the view that changing consumer food choices was not only necessary, but ultimately unavoidable. Discussion on the first day had also strengthened concerns about intensive farming (which by association reinforced support for more 'natural' practices).

Consequently, participants were more inclined (at least initially) to support low-tech, natural solutions or behaviour change. However, they did not reject novel technologies or production processes out of hand – rather, they wanted to know that 'someone' (either Government or an independent body, impervious to pressure from the food industry) was determining what approaches were most 'worthwhile' before backing them.

'Worthwhile' went beyond weighing up the benefits of a solution against any risk (which included safety and other unforeseen consequences, such as the possible impact of novel technologies on the environment or pricing-out small farmers). It also comprised: the development costs of hi-tech foods and how these would be paid for; the potential market (or lack of) for foods produced using hi-tech processes; and whether there were alternative approaches which were more acceptable to the public and achieved similar outcomes.

This section considers participants' responses to a range of 'solutions' – that is, different approaches to address food system challenges, produce food more sustainably and ensure that the food supply can meet changing demand from a rising population in the long-term.

4.1 Influence of Day 1 on attitudes and behaviours

At the end of Day 1 participants were asked to again note down the foods they bought during one shopping trip and to consider what was influencing their purchases. At the very start of Day 2, before participants were given any information about some of the possible solutions to food challenges, participants were asked to group themselves according to the extent to which their food shopping attitudes and behaviours had changed. London and Cardiff were fairly similar, with up to three participants in each saying that they had not changed their views about what they would buy; whilst the rest were fairly evenly spread across the other two categories ('changed attitudes but not actions' and 'changed both buying attitudes and behaviours'). In Paisley the majority said that they had changed their attitudes and behaviour; one said they had changed their views but not what they bought; no one placed themselves in the 'not changed attitudes and not changed behaviour' category.

Consequently, participants started Day 2 with the view that when food sustainability challenges were properly explained, most were willing to take some positive steps towards changing behaviour. However, some had found it difficult to make more sustainable choices. This was for a variety of reasons and shown in the table below.

No change	Changed what I think, not what I do	Changed what I think and do
<p>One participant was strongly sceptical about the challenges presented and the need for change – in other cases participants said they were already doing enough or all they could.</p>	<p>Participants in this group said that they had intended to make more sustainable choices but had been unable to find alternatives that were comparable in terms of cost or convenience. They bought the same shopping basket as usual, despite being more aware of sustainability because they did not have time or it was not obvious what they should buy instead.</p>	<p>There were a range of ways in which participants had adapted their food choices in response to the challenges presented on Day 1: they had reduced the amount of meat they consumed; they had been more conscious of over-purchasing; and many had started freezing bread – often in response to being unable to source smaller loaves at a comparable price.</p>

Comments made in response to the challenges information presented on Day 1 show that, in some cases, individuals not only thought that change was inevitable but also that consumers had a personal responsibility to make more sustainable choices. Change was the ethical thing to do - being conscious of the consequences of continuing to make unsustainable food choices.

"I would say we have a responsibility as individuals as much as the people who made the videos – challenging food waste and climate change – there are things we could do." (London, Female)

"If you are ethical about waste or not overproducing, it would have an impact on the environment. And dietary things as well, because if you know something's going to harm you then you shouldn't eat it." (Paisley, Male)

4.2 Day 2 – presenting a range of potential solutions to food system challenges

Following the initial session, the first half of Day 2 focused on presenting and discussing a range of potential solutions to the food system challenges. A diverse range of possible solutions were selected in agreement with the Government Management Group and the Advisory Group, ranging from promoting and supporting behaviour change through to the use of agri-technology and biotechnology. The solutions considered were aligned to the three case studies considered in Day 1 to make the materials more accessible. These were not presented as an exhaustive list, rather as a selection of approaches to aid discussion about consumer priorities and concerns when considering different ways to tackle issues affecting food sustainability. Before reviewing the solutions, participants watched a talking-heads style video from a number of experts representing a range of organisations. This discussed their views about the balance between demand-side solutions (e.g. interventions to encourage consumers to make more sustainable choices) and supply-side solutions (e.g. changes to production and farming methods, disseminating best practice and adopting novel technologies to produce food more sustainably) to address challenges in the food system.

The table below shows the solutions considered in relation to each case study:

Beef	Wheat	Chicken
Lab produced meat	Precision agriculture	Insects as feed
Biotechnology	Biotechnology	GM soya as feed
Eating insects	Biological controls	Preparation controls
Eating less meat	Irradiation / microwaves to	Mechanically separated poultry
Eating different cuts of meat	extend shelf life	Improved packaging (freshness
Sustainability labelling	Product redesign	labelling, roast bags, portion packs)

Participants were asked to consider each solution in turn, during three 'carousel' tasks for each case study (beef, chicken or wheat). During each task, the solutions for that case study were presented at separate stations which participants reviewed in pairs. They recorded their responses to the solutions both individually in their workbooks and as pairs on boards positioned alongside each station. This was followed by a discussion of the perceived positives and negatives of each of the solutions plus a sorting task. Participants were asked to sort the solutions into those they would be inclined to support, inclined to oppose, and were completely unsure about. There then followed a discussion about the caveats for their decisions as well as the conditions required for solutions to become more acceptable to them.

The solutions were only used to aid discussion; it was not the intention for participants to select one over another. By presenting a range of different approaches, it was possible to explore what makes one approach more acceptable than another, and through this discussion understand and unpick the different factors that participants believed should be taken into account when considering ways forward to tackle food system challenges.

Whilst novel technologies were included, participants were also presented with information about changes to behaviour as well as food farming and production processes that were already in use. So, although solutions are discussed throughout the remaining chapter, this does not only refer to novel food technologies but includes developing new technologies, wider use of existing technologies and consumer choice.

4.3 Factors which influenced acceptability of solutions

When discussing the range of potential solutions to address challenges facing the food system, there were a range of considerations that participants raised. As part of the discussion, participants were asked about the types of conditions they would want to see applied for different approaches to be considered acceptable. As might be expected, participants talked in terms of:

- the risks and benefits of different approaches;
- reassurance that the products of technologies and processing methods were safe to eat (with respect to both short- and long-term harm); and
- other unforeseen consequences being monitored.

The potential for unforeseen consequences was viewed as wide-ranging, depending on the intervention, but included for example:

- any impact of new farming techniques on biodiversity;
- whether novel technologies will price out small farmers; and

- whether alternative protein sources will undermine the meat industry as consumers will eat less meat.

In addition to the potential risks and benefits of the solutions presented, participants were also asked a number of questions, which are shown in the diagram below.

What are the risks?

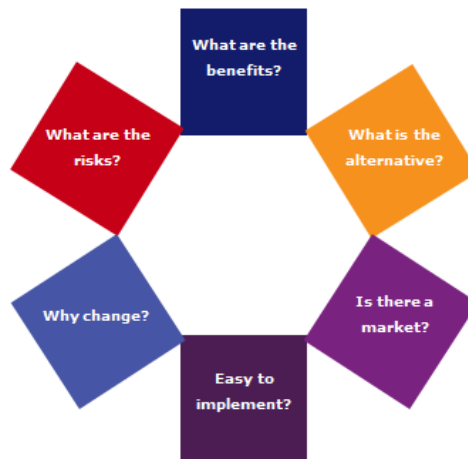
Is it safe? Will the solution exacerbate other challenges e.g. biodiversity, waste?

Why make the change?

Is the solution for the public good or motivated by profit; does it seek to maintain the status quo or drive necessary change?

How easy to implement?

How far from market; who will pay to implement / promote change?



What are the benefits?

If / how it addresses priority challenges?

What is the alternative?

Are there other ways to address the challenge that are more *natural*?

Is there a market?

Will the public buy the product; will price (too high or too low) put people off?

Throughout the remainder of this chapter, participants’ responses to each of the solutions they were asked to consider are examined, referencing the factors above to illustrate how these core questions influenced their views about the acceptability of different solutions. At the close of the chapter these factors are re-visited, summarising how participants assessed the solutions against each of these factors.

4.4 Response to the potential solutions to food system challenges

Having reviewed each of the solutions, participants were asked to sort them into those they would be inclined to support, inclined to oppose, and those they were unsure about and weren’t able to categorise as inclined to oppose or support. Throughout, participants’ views were fully explored to understand what they would need to know about the solutions in order to consider them acceptable to take forward, or whether they would always be unacceptable.

In the following table, the solutions are categorised according to how participants responded to them. It should be noted that this table is not intended to represent a hierarchy as it was not possible, nor was it our intention, to prioritise the solutions or to reach consensus on this. Where there was largely consensus across participants – either in support or rejection of a particular solution – this is indicated using an asterisk (*).

	Predominately supported	Inclined to oppose, but mixed responses	Very unsure about
Reducing meat consumption	*Eat less meat Different cuts of meat	Eating insects Mechanically Separated Poultry	*Lab produced meat
Reducing waste	*Portion packs *Freshness sensors		*Irradiated wheat *Long-life bread
Supporting sustainable choices through new products / labelling	Sustainability labelling Product redesign- chickpea flour		
Farming more sustainably	*Precision agriculture Insects as animal feed	Biological controls Waste as animal feed Plant biotechnology	Meat biotechnology
Improving food safety	Roasting bags Rapid surface chilling	Lactic acid wash	Chlorine wash

In the sections below, we discuss the solutions, grouping these according to the perceived benefit in order to explore how consumers compared solutions where these were addressing the same problem.

4.4.1 Reducing the impact of meat production

When considering different approaches to reducing the amount of livestock being reared globally, behavioural solutions – simply reducing the amount of meat consumed and eating different cuts of meat – were preferable to participants than novel protein sources. This is because there were clear benefits to individual consumers (improved diet, reduced cost and ensuring as much of the carcass as possible is converted to food for consumers). By contrast, alternative protein sources (lab produced meat, eating insects and mechanically separated meat) were less appealing. This was because participants considered these foods unappetising (eating insects), or unhealthy (mechanically separated meat, as it was assumed this could only be used in processed foods) and risky (lab produced meat).

Eating insects and mechanically separated poultry were considered to be a more palatable alternative to that of lab produced meat, as these used ‘natural’ protein sources, and in the case of insects, had been a part of some people’s ‘natural’ diets for millennia. Eating insects, however, would require work to build a market in the UK. However, many argued that change is possible – given the speed with which consumers adopt other cuisines or ‘super-foods’ – and throughout the sessions participants returned to the view that people in the West should learn from other parts of the world (Asia in particular) where diets were thought to be healthier and more sustainable.

Despite initial negative reactions to eating MSP, the view softened when, through discussion, it was recognised that MSP is already used in some processed foods they had probably eaten in the past (even regularly)²¹. However, given that participants considered processed foods to be unhealthy (due to high levels of salt, fat, sugar and other additives and preservatives), they had reservations about supporting this as a potential solution. While recognising MSP provided a low cost protein source and minimised

²¹ This shift in stance further evidences the importance of foods being ‘tried and trusted’ (i.e. part of humans’ diets) for the perceived acceptability of different foods, processing methods or novel technology

wastage, acceptance was conditional on demonstrating it would not be harmful to health and that it was clearly labelled.

Eating less meat was by far the most popular proposed approach to reducing meat production. It was also seen as achievable, by the individual household, without any 'unnatural' interventions.

Already, by this stage in the food dialogue, participants had assumed that they would have to make personal dietary changes in the future if there was to be more equitable production and distribution of food. Many were already considering consuming less meat as it had a wide variety of benefits:

- saves water;
- reduces greenhouse gas emissions;
- reduces food shopping costs because meat was seen as a relatively expensive foodstuff;
- addresses the priority challenges regarding obesity and diet;
- provides considerable health benefits for individuals and families – particularly if consumers ate more vegetables and pulses instead; and
- reduces the burden on the NHS.

They generally saw eating less meat as an achievable aim as many had already reduced their red meat consumption and altered their diet in other ways, in the last few years. Change was possible:

'We are going to start buying Quorn beef as well, because of the cows and the effect it's got on the planet. I'm not going to turn veggie or anything, but I'll just eat less meat.' (Paisley, Female)

But not for all:

"I have my doubts about it. Personal preference. I like eating meat. It's good for you. We're programmed carnivores." (Paisley, Male)

There was some concern about the potential negative consequences of reduced meat consumption for British beef farmers, an issue that was particularly pertinent in Cardiff and Paisley where participants had been recruited from both urban and rural areas. At the same time there was recognition, particularly among participants from rural Scotland that farmers were good at adapting and changing their farming activities from year to year in line with the changing markets for produce.

Eating different cuts of meat, so that less well-known cuts and offal were not wasted, was also largely approved by participants. Some acknowledged that encouraging the public to eat more of the animal would lead to fewer cattle reared and reduce environmental harm. For others this was less clear, as these participants argued that this solution was not directly addressing what they considered the primary issue that people, particularly in the West, were eating too much meat.

Participants also argued that eating different cuts of meat brought no health benefits and although participants were told that different cuts of meat may be less expensive, they argued that consumers would not save as much as they would by cutting down their meat consumption altogether.

Overall, views about eating different cuts of meat were mixed. While it was less wasteful it did not address the issue that people eat too much red meat. Participants also raised the issue of acceptability and considered it would be challenging to get the general population to eat the cuts of meat they usually rejected - presentation would be important.

"When the population's increased, if we're getting more of the parts of the cow, eating all the different cuts that come out of it, then long term it's going to be more efficient." (London, Male)

"I haven't got strong feelings about it, it's just that it doesn't really address the central issues we've identified." (London, Male)

"I think it could be a challenge to sell this ... I don't know anyone who eats offal for example and I think it's difficult to sell to people." (London, Female)

Eating insects as a way of reducing meat consumption received mixed reactions. Generally, participants acknowledged a range of benefits: eating insects might provide a cheaper source of protein than other meat; and the possible health issues and the environmental impacts associated with conventional meat production would be reduced, views that were particularly evident in Cardiff and Paisley.

However, all the participants immediately recognised a largely-cultural 'yuck' factor and therefore questioned whether there would be a substantial market for insects as an 'everyday' protein source. Several respondents in London predicted that the 'British palate' would never stand for eating insects, in any form, and would reject the option outright. However, insects are eaten in many countries and are a low-risk, 'tried and trusted' food, which was recognised by many, particularly those participants from non-Western cultures.

"I think it's a cultural thing. In this country we don't eat insects but in other parts of the world it's huge because they don't have the resources we do." (Cardiff, Male)

"It's the next generation. It's like curries, my grandparents, no way would they eat a curry, [but] I grew up eating curry." (Cardiff, Female)

"People should vary their diet. They should be more open. It's just a cultural thing. I mean, they're eaten elsewhere." (Paisley, Female)

Mechanically Separated Poultry (MSP) meat, on first review, was considered unappealing and many participants said they would never eat it. However, it is important to note the potential impact that the imagery used in the stimulus had on this response. Had this been presented in its processed form, such as a chicken nugget or low-cost sausage, rather than in its raw form, their initial reaction to MSP may not have been as strong.

There were pros and cons to MSP. The pros were:

- there was nothing inherently unnatural about this process: common processed meat products including hot dogs and chicken nuggets already contained extruded meat; and
- the process was seen as fairly 'natural' in that it was not the result of hi-tech processes.

The cons were:

- a perception that MSP had low nutritional value;
- considerable use of additives would be required to compensate for its lack of texture and flavour, which could give rise to health problems; and
- it does not address the issue of how much grain is used and thereby the consequences of growing grain for feed.

"That looks disgusting. It's less waste, so it's good in that sense, but what about the nutritional value of it? Is it nutritional?" (London, Female)

"You can't argue with it in a way, because it's using the bird more efficiently and wasting less..."
(London, Female)

"It doesn't solve the grain problem, you're just using it (the chicken) more efficiently."
(London, Male)

The issue of transparency was also raised. This discussion further supported participants' perception that foods were sold in a way that disguises processes or content that consumers would find unappetising and as such they were never making fully informed choices.

"The only issue we had there was, great to put a whole chicken though a blender if you wanted to, as long as you're telling the consumer that's what you're doing. So people have a choice then, whether they want to eat it or not." (Cardiff, Male)

'Lab produced meat' was strongly rejected as an approach to reducing the impact of meat production, even though participants acknowledged many clear, potential 'benefits'. These included: food production efficiency; reduced wastage; freeing-up of farm land for food crops; an absence of animal welfare issues including transportation stress; and 'more meat for the world'. However, lab produced meat – particularly as it was presented to respondents as a photograph of a raw red substance in a petri dish – was fundamentally 'unnatural' and did not meet cultural expectations of meat, or even of 'food'. Consequently, participants thought there would be no market for lab produced meat, particularly because it did not appear to have the shape and texture of natural meat.

Overall, participants thought that lab-produced meat was a product without a market and that it had been designed more as a scientific exercise than as a real alternative protein source. They were also concerned about the development costs and who would be paying for these. Ultimately, there was a strongly held view that this was a way for large-scale food conglomerates to profit at consumers' expense.

"There are alternative sources of protein, like Quorn and soya, so why would you want to mess with lab meat?" (Paisley, Male)

"There's lots of environmental pros for it. But we were looking at the wee mad scientist in the laboratory, experimenting with things. It's an unnatural process and we're not used to that."
(Paisley, Male)

"I get the benefit of that ... there won't be the greenhouse gas, the carbon footprint, the cows ... but I don't like the idea of it at all." (Paisley, Female)

"There's no need to go that far when all we have to do is cut down on a bit of meat."
(Cardiff, Female)

4.4.2 Reducing waste

Tackling waste across the food chain was considered to be high priority to address challenges affecting food sustainability – not least because there was an apparent means of reducing the amount of food that is produced without changing what is consumed. Whilst there was strong support for introducing smaller packs and sensors to replace date labelling to help consumers throw less food away, participants on the whole rejected the use of irradiation and microwaves to slow decay and lengthen shelf lives.

The **Freshness Indicator** was generally seen as an excellent method of reducing how much fresh food consumers throw away.

"I liked the 'it will tell when it's off' type thing, or 'when it's not safe to eat'. Because then you'll not go by the sell by date, you'll go by when it's decaying. You're not relying on a date. If it's still okay to eat, 'cause it's not doing you any harm, then why not eat it? Then you're not going to waste it." (Paisley, Female)

"It's a quick win and can be implemented straight away and doesn't rely on a change in culture or attitudes." (Cardiff, Male)

Single serving **portion packs** were considered beneficial for some single person households, although discussion really focused on the need for smaller pack sizes of fresh foods in general. Smaller loaves, that were no more expensive per slice than family sized loaves were considered a key step to minimising waste. However, the portion pack was not so clearly linked to any reduction in waste. A few participants considered its impact might rather be to increase plastic packaging and reduce the consumer's choice of the amount of fresh produce to buy.

Irradiated wheat and long life bread using gamma rays and microwaves, respectively are a way of extending shelf life and reducing waste. While participants acknowledged that the radiation of wheat and bread met one of their 'high priority' challenges - reducing the amount of fresh food thrown away by households - they saw the process as being 'unnatural' and possibly dangerous to health and the environment, in unspecified and unknown ways. Irradiated food was also seen as over-processed, sterile, and possibly lacking flavour or nutrients, due to its treatment. (Sterilising food was viewed with ambivalence – getting rid of germs was good, but destroying 'naturalness', enzymes or flavour was not.)

The key concern for most of the participants arose out of an association between radiation being harmful to health. Therefore food that was treated with radiation would, by implication, also be potentially dangerous. However, there was also the recognition that many people use microwave ovens every day with no side effects. Concern arose partly through a lack of familiarity with the words used and also a sense that the irradiation labelling shown as part of the stimulus was felt to be misleading by using 'natural' colours and imagery to disguise processes that consumers would find worrying. One group in Paisley further discussed the notion of radiation and its connotations, and decided that the term 'rays' might be more acceptable than 'radiation' because – as one respondent pointed out – sunshine is full of natural rays, and sunshine is 'good' although the fact that ultraviolet radiation is harmful was not raised. Through discussion, participants moved from rejecting outright the proposed irradiation of food to recognising that the risk was probably low, but considered that consumers were still unlikely to purchase it.

Some respondents also suggested that consumers - now more than ever - have especially strong associations around the 'freshness' of bread. 'Bread freshness' has been used as a key marketing technique by supermarket chains in recent years, as they open in-store bakeries and pump the smell of baking bread around the store. For this reason, bread with a long shelf life would now be particularly unappealing and difficult to market, compared with 'fresh' bread. In any case, there were easier alternatives – simply produce and sell smaller loaves and half loaves, and encourage consumers to freeze portions of larger loaves to save for later.

"I don't know much about radiation. You just hear the word and it scares you. You don't know much." (Cardiff, Male)

"Well we thought it was quite like X-rays and you can't go near to an X-ray in hospital yet we're allowed to consume food that's been exposed to it." (Cardiff, Female)

"If it was a more natural process, it could move up. Or if it was put forward like that. But it's associated with radiation and chemicals, irradiated bread." (Paisley, Male)

"(On further reflection) I think rays can be a good thing as well. Like the sun has rays. Sunshine."
(Paisley, Male)

4.4.3 Supporting sustainable choices through new products and labelling

Despite considerable support for behaviour change to tackle food sustainability issues, participants considered that the context in which people made food choices did not always support this. During the week between Day 1 and Day 2 of the dialogues, participants had noted their attitudes and food shopping behaviours during one shopping trip and had found that making more sustainable food choices was hampered by a lack of sustainable alternatives that were comparable in terms of cost, convenience and availability. In addition they recognised that: they make purchases that are influenced by price promotions, marketing or enticing food packaging; and that it was almost impossible to determine whether one food choice may be considerably more harmful to the environment than another. Consequently, there was strong support for labelling which interrupts buying habits and makes more (and importantly, less) sustainable choices stand out, alongside providing comparable sustainable options.

Participants referenced traffic light food labelling as a good example of using simple labelling to make consumers more aware of the nutritional content of their food - although there was some debate around how successful this was, given that obesity rates continue to rise. Nonetheless, participants generally thought that they were at least more conscious of making unhealthy choices when confronted with a row of red indicators.

"I know my husband never looks at the pack information but I do. I think that if it's really bad for you the colours make it obvious, so I would notice then." (Cardiff, Female)

Labelling the 'sustainability' of meat in terms of factors such as CO₂ emissions, water use, animal welfare, fair trade, packaging, waste and impact on biodiversity involved in rearing and processing was considered desirable. This proposal would support necessary attitudinal and behaviour change, for the public good. However, the new labels were predicted to have little or no impact by themselves: 'sustainability' would have to be a concept that consumers were familiar with and engaged with before the labels became meaningful. At most, the proposal for sustainability labelling would help maintain the profile of food sustainability once it had already been raised, and inform consumer choice. Otherwise, it was thought that a sustainability label would just add even more clutter to package labelling, and could incur extra cost.

"It (sustainability labelling) would encourage people to ask questions and think more deeply ... It would be good to have something in the store, an information post, an information station, so people could look at it until it was ingrained." (Paisley, Female)

"It's only going to be useful if people know what it is and why it's there. So there needs to be education. But we all know if we see that (sustainable meat label), we'll go 'Look!', but we didn't before [taking part in the workshop]..." (Paisley, Female)

Product redesign - chickpea flour. Based on what they had been told about wheat production, participants thought that, in principle, the use of soya flours was a sensible alternative as it would be better long-term for the soil and reduce the use of fertiliser. It was also a solution that seemed to be for the public good, not motivated by profit, and fitted well with the basic attitudinal and behavioural changes required. However, some pointed out that eating fresh bread made from wheat is such an ingrained feature of British culture that it would be a challenge to market alternative breads as a substitute, especially if the taste or texture were very different.

There was some concern about the use of soya flour, if it meant Britain would substitute home-grown wheat for imported soya, with the consequent issues of water use and food miles.

"It's worth looking at. It reduces our reliance on wheat ... it puts useful nitrogen into the soil, it's a good part of the nitrogen cycle." (London, Female)

"Although I think you might have some convincing to actually introduce chickpea bread because I've had chickpea rostitis and, for me, I didn't like it. It had that particular texture that I didn't like." (London, Female)

4.4.4 Farming more sustainably

There were a number of solutions presented to farm more sustainably which were largely met with approval by participants. Overall, while the research presented neither the pros nor cons of the use of fertilisers and pesticides, there was considerable concern expressed about their use. These views were largely based on coverage in the media about the possible long-term harm caused to humans from a range of chemicals used in food production.

As a result of participants' mistrust of chemicals used throughout the food chain, there was strong support for solutions that sought to reduce the amount of fertilisers or pesticides required. Overall, precision agriculture was welcomed more than biological controls (using insects to prey on pests). This was because of a concern about possible unforeseen consequences of biological controls, including the possibility of swarms or predation on non-target species.

Precision Agriculture. There was considerable support for the proposal for farmers to adopt precision technology so that they can more accurately deliver the right amount of fertilisers and pesticides to arable crops. The application of this technology brought several benefits: it would be environmentally friendly, because farmers would use less chemicals and diesel; and there would be reduced run-off from pollutants. Environmentally and health-wise, there were seen to be no new risks. It would also represent a more efficient use of resources, and might save money in the long run.

There were some concerns about the start-up costs for farmers adopting precision technology. Smaller farmers might not be able to afford the equipment, putting them at a disadvantage, and allowing large farms to monopolise grain production. However, respondents with links to local farming, including those from rural areas at the Paisley dialogue, were familiar with the already established norm of farmers sharing large or expensive equipment, including combine harvesters. A few respondents wondered how farmers in developing countries would fare.

A minority of participants worried about an over-reliance on technology – for example if the computer system failed. Others questioned if all farmers would be willing or able to change. However, rural participants who knew farmers said that farm processes had changed in many ways over recent years, and farmers were used to having to adapt to change.

"We prefer not to use fertilisers in the first place, but if they have to be used we think it's a great way to ensure you're treating the land that needs to be treated." (Cardiff, Female)

"[Precision farming] makes absolute sense. Why waste what you spray on the crops?"
(Paisley, Male)

Biological controls can involve insects, fungi or bacteria to combat pests on arable crops, in place of chemical pesticides. Participants were mixed in their response to the use of biological controls.

Those in favour saw this as a 'natural' approach with 'natural' predators being used to kill pests and the use of 'unnatural' chemicals being reduced. However, there were concerns about risks: they might upset the 'natural' ecological balance of the farmland and beyond, if the farmer failed to contain the control species, which had the potential to destroy biodiversity.

Overall, participants believed that biological controls should not be utilised without testing to ensure these were both effective and would not impact on biodiversity. Some also wondered to what extent the proposal was economically viable – perhaps the control species brought in by the farmer would be too vulnerable to changes in weather, temperature, or other predators, or might just leave the area?

"I think biological controls are a really great idea. It's using nature to cure nature. There's no chemical involved. These insects already eat insects." (London, Female)

"It sounds brilliant, it sounds like there's nothing wrong with it ... but I think it may end up being unreliable. The inclement weather here could have an adverse effect on them." (London, Male)

Better utilisation of food waste. Arising from the discussion about waste was the idea of feeding food waste to animals. This was considered to be an intuitively good idea and presented dual benefits: minimising waste and reducing the quantity of crops required to feed livestock. Furthermore, feeding waste to animals has a precedent (e.g. pig swill) and was consequently considered as a traditional way of using waste food. However, it was considered important to learn previous lessons, such as BSE, and there were also concerns about unforeseen consequences of feeding meat waste to herbivores.

There was also a concern about the quality of waste that might be fed to animals. Feeding 'rubbish' food to animals was seen as dirty, unhygienic, unnatural, unethical and potentially unsafe as consumers, further along the food chain, would effectively also be eating the 'rubbish', albeit indirectly.

Respondents agreed that for this proposal to be more acceptable, the type and quality of waste food fed to the animals would have to be tightly controlled.

Insects as animal feed. The proposal that hens be fed insects received a mostly positive response, with some qualifications. It was seen to offer several benefits. As the insects would be fed on waste products (for example, leftover food from factories and slaughter house by-products) this idea was recognised as meeting the priority challenge of reducing waste as well as reducing the need to grow feedstuffs, although there was no recognition that this might reduce the incentive to cut down on the amount of waste produced.

Feeding insects to hens was largely seen as posing no risks to safety, although the 'naturalness' of the proposal was questioned – did hens eat insects naturally, or would this be an artificial diet for them? Some respondents concluded that as long as the chicken's diet was balanced and that the resulting meat had an unchanged taste and texture then it would be an acceptable alternative.

On further reflection, there were some qualms about insects being reared on slaughterhouse waste or even excrement, although they concluded that this was probably 'natural' for insects. Some visualised the waste products being ingested by the insects, then by the hens, then entering our bodies through the chicken meat. After some discussion the proposal began to be seen as 'less safe'; if the insects were reared on only left-over 'food', the proposal would be more acceptable – and the resulting chicken meat more marketable.

"But the thing is most flies will eat excrement, so that's the problem. It is a natural process, but the idea of excrement and left over carcasses being fed ... it's still going to them [the hens] at the end of the day." (London, Female)

"We don't want hens eating undesirable stuff, like excrement and larvae – even albeit indirectly – then we eat it." (Paisley, Male)

"I think it's fairly natural for chickens to eat flies." (London, Male)

Using biotechnology to improve yield and reduce the need for fertilisers and pesticides.

Participants' response to biotechnology encapsulated their reaction to technological innovation more broadly. Whilst they did not reject biotechnology out of hand, they wanted reassurances that it was used for the right reasons (i.e. to support sustainable food production rather than drive profit). They also wanted assurances that unforeseen consequences were properly monitored, including any possible risk to public health or biodiversity.

The discussion of biotechnology and concerns about unforeseen consequences gave rise to some discussion about genetically modified produce (GM). Participants were split between those who thought GM was acceptable providing any consequences to biodiversity and human health were adequately monitored, and those who thought that it was not possible to sufficiently monitor the consequences. This led to a view by some that there would never be a market for GM foods. However, some of the participants were aware that GM foods were already on the market, although this came as a surprise to others. This further reaffirmed the general perception of participants that due to a lack of understanding about the food system people were unable to make informed food choices.

A range of specific applications of biotechnology were presented as part of this research and on the whole (with the exception of cloning) responses to these specific applications were neutral, with participants largely acknowledging that these applications presented clear and worthwhile benefits, such as creating wheat varieties that required less nitrogen fertiliser. However, there was a perception that supporting one application would pave the way for other less acceptable and less ethical applications (e.g. cloning humans or breeding deformed livestock that suffer in order to produce more meat).

Biotechnology and plants. Respondents had mixed feelings about the use of biotechnology, specifically genetic engineering, to 'improve' plant varieties.

The pros were seen as:

- plants being able to 'take more care of themselves' because they would be hardier, more disease resistant or more resource efficient; and
- they were an ethical response to global concerns, including the importing of crops, and 'water-in-crops', from drought prone countries.

The cons were:

- largely-unknown long-term effects of modifying the genetic make-up of plants;
- cross-contamination of species could not be prevented entirely and that the damage to the environment or ecosystems might be irreversible;
- tampering with nature, at a molecular level, was seen as 'short-termist' and possibly unethical; and
- it was not possible to test for these impacts before introducing the produce into the food chain.

Despite these views there were participants, in Paisley for example, who were more personally familiar with farming methods and outlined a clear distinction between the selective breeding of crops to create new 'improved' varieties throughout farming's history, and genetic modification. Overall, selective breeding was seen as an acceptable, more natural and safer alternative to biotechnology.

A key concern throughout this discussion was that biotechnology was concerned less with food sustainability and more about corporate profit. Many participants were very cynical about the motives of the agro-chemical and seed firms which they believed may be 'pushing' genetic modification and other biotechnology applications to the farming and food production industry. As can be seen in the following verbatim quotes, participants were polarised in their views.

"If we could engineer plants to take care of themselves, then we could save ourselves hassle and put our efforts elsewhere." (London, Male)

"It's not that different to selective breeding ... it's what we do already with cattle and with plants."
(Cardiff, Male)

"I'd be worried we'd be opening a Pandora's box that can't be closed." (Paisley, Male)

"We just thought that it's unnatural and the problem behind that is probably deep rooted trust issues with things that we've been exposed to such as mad cow disease, horsemeat, tobacco. It's only taken till recent years to admit that it's harmful to us." (Cardiff, Female)

Biotechnology and meat - artificial insemination of cows; using IVF to implant many surrogate cows with embryos created from one female cow; and cloning cows were discussed.

Participants were more consistently negative about the use of biotechnology when applied to livestock, than to plants. This was mostly because – having already decided that consumers should eat less meat and reduce the number of cattle - they could not see the need for it.

Participants in London were largely unaware that artificial insemination is already a well-established practice for inseminating cows and were less able to clearly distinguish between the three forms of biotechnology application compared with participants in Paisley and Cardiff. Nevertheless, there was a concern in all the locations that biotechnology was "messing with nature". The level of interference represented by the specific example of IVF given (where one cow provided many 'eggs'), and cloning, was seen as "unnatural" and could have unspecified negative consequences in the future. There were also some concerns about narrowing the livestock gene pool and in-breeding.

As before, cynicism about the companies involved in biotechnology was expressed by some. Those in Paisley spoke of their familiarity with Dolly the Cloned Sheep, whose creation nearby was not generally seen as a success by lay-Scots due to their understanding that the sheep had multiple health and physiological issues. Generally, respondents thought that 'solutions' involving cloning and IVF were motivated by profit, or scientific endeavour, and not the public good.

"The whole point is we don't need more meat." (Paisley, Female)

"I've nothing against either artificial insemination or in-vitro fertilisation, because I know about it happening. Human beings get it, so I've no objections to it happening to animals at all. But I don't see where the benefits are, because it's still going to be an animal and it's still going to need to be fed." (Paisley, Female)

"We're only doing this so the top cats can make lots of money. Ethically it's completely wrong. Who'll be paying for the cloning, those companies that are going to make a fortune out of it later?" (Cardiff, Female)

4.4.5 Innovations to improve food safety

The food safety solutions presented were all focused on reducing the risk of food poisoning by campylobacter. Given that consumers could protect themselves from food poisoning through safe food handling practices, the benefits of the food safety solutions presented were considered limited. Consequently, the perceived disadvantages loomed large; specifically that the treatment of the chicken carcass introduced what was seen as yet another layer of 'unnatural' processing techniques and use of chemicals.

Chicken roasting bags and rapid surface chilling. The proposals to buy raw chicken already wrapped in roasting bags to reduce campylobacter contamination via handling, and the rapid chill of the raw chicken so that bacteria were virtually eradicated, were positively received. This was because both these proposals were seen as safe and risk-free. Based on the materials presented, participants believed that neither used any chemicals, did not 'tamper' with the food, and used processes that were already used and known to be safe (i.e. roasting inside a bag and freezing).

However, one participant said that she would never cook food inside packaging, especially if it contained plastic and if her children were to eat it, due to a perceived contamination risk. One or two were concerned that consumers might lose their 'natural sense' of how to handle food and have less choice about the quantity bought, if chicken came ready-wrapped for cooking. They argued that there was a more sensible alternative to improving food safety, which did not rely on extra packaging or processes – consumers should simply cook chicken thoroughly.

"I'm quite impressed by this flash freezing of the surface of the chicken and what that does for the incidence of campylobacter. It struck me that the percentage reduction was so significant as to make it worthwhile ... but the idea of chlorine baths for chickens was a no-no." (London, Male)

Lactic acid wash and chlorine wash. Washing raw chicken in lactic acid received a mixed and uncertain response. This was because participants were unsure about the naturalness of lactic acid, and as chlorine was known to be a chemical it was seen as unacceptable where food was concerned. Although chlorine is regularly used for swimming pools and in household cleaning products this was not recognised by participants. Participants spontaneously suggested that citric acid would be acceptable as this was thought to come from lemons and limes, rather than industrial processes.

Because participants were unaware of how lactic acid and chlorine are currently used – and are generally concerned about issues they know nothing about – they tended to defer to the process that seemed to be the least invasive – in this case rapid surface chilling.

"The first two are [rapid surface chilling and roast in the bag] fine, the other two [lactic acid and chlorine wash] are using chemicals." (Cardiff, Female)

"There seems to be an awful lot of chemicals involved in the process, so we're nae sure about it. It might be okay, or it might not be okay." (Paisley, Male)

"Some people put chlorine into [the unacceptable category] because we didn't want our meat cleaned with chemicals." (Cardiff, Female)

"I thought it was okay. As long as it's getting rid of the campylobacter stuff. But initially, when it said 'lactic acid' I thought 'will that be okay?' But then, it's used in food already, and we're okay, so I'm okay with it." (Paisley, Female)

"I guess the natural citric ones sound a bit better ... I guess there must be natural alternative to that [lactic acid and chlorine baths], rather than just putting your chicken in bleach. You wouldn't do that at home, would ya?" (London, Female)

"It's good if you're using natural acids from lemons and things cos you're still not putting any chemicals onto the meat to clean it." (Cardiff, Female)

4.5 Impact of technical language and price on views about novel technology

For technological solutions that were either novel or unfamiliar to participants, the use of technical language had an important influence on their responses to solutions. As illustrated above, their lack of

understanding about lactic acid, chlorine and irradiation had a profound impact on how acceptable the solution appeared.

Consequently, participants themselves acknowledged that a change in wording may be as effective as awareness-raising in assuaging concerns about risk. It was important not to mislead or hide novel processes; there was a strongly held view that the public should be able to make informed choices about the food they eat.

Similarly, the potential cost of bringing novel solutions to market or the impact of additional processes on the price of food can have a negative effect on views. Participants therefore questioned whether it was worthwhile implementing interventions that would give rise to significant price increase as the market for that produce would be limited.

4.6 Monitoring and oversight of any new food technology

It was expected by participants that any food technology (and indeed food production in general) was independently monitored to ensure that safety standards were maintained and that new technologies were not causing any harm. When participants talked about the risk of harm, this went beyond whether the food produced was fit for human consumption. Monitoring of novel technology should take into account a range of possible outcomes including:

- Safety: monitoring long-term harm as well as short-term safety;
- Public health: novel foods or behaviour change also promote healthy eating;
- Ethics: taking into account views about welfare, fairness and 'playing god' – ensuring changes do not go beyond publicly acceptable boundaries;
- Fairness: any changes make 'good' food (healthy and sustainable) affordable for all and novel technology does not price out small businesses;
- Profiteering: ensure big business is not driving change solely to make profit;
- Climate / environment: safeguard against any knock-on effects on emissions, water, biodiversity and pollution.

When asked what type of organisations they would trust to monitor the impact of novel technologies, participants all said that it would have to be independent from the food industry (i.e. not funded by, or linked to, food businesses) because of concerns about changes being made purely for profit and not in the public interest. Some also said that they also had reservations about the Government performing this function because of the potential for lobbying by vested interests. When pressed for suggestions, participants thought that bodies like Which? (an independent organisation) or the Food Standards Agency (which was not seen as Government) would provide a non-partisan view.

"Sometimes [regulation] is ignored for profit and that comes back to who is filling the Government's purse and then they won't hammer them, they'll get away with it." (Paisley, Male)

4.7 Key findings

- Throughout the discussion it was apparent that few participants had any real understanding of the food system although there was a desire for transparency. There were more significant concerns raised about solutions that were seen as hi-tech, unnatural, used chemicals, or used unfamiliar language. Hi-tech solutions were often associated with the potential for unforeseen consequences and were therefore largely distrusted;
- In considering the potential value of the potential solutions to the challenges facing the food system, participants wanted a number of questions answered:
 - **Benefits** – does the solution address worthwhile food system challenges?

- **Risks** - has the solution been given a full risk assessment, including long-term risks to the environment and public health?
 - **Motivations for change** – is the solution being introduced for environmental or public good or for profit?
 - **Alternatives** – what are the alternatives and are these potentially safer or less costly to introduce?
 - **Implementation** – how easy is the solution to implement and do the costs of development justify the result?
 - **Market** – is there a market for the solution and will it be publicly acceptable?
- Participants recognised that novel technologies and production processes had the potential to address some of the food system challenges but they distrusted the food industry to implement these for the public good rather than purely for profit.
 - Views about the need for behavioural interventions had largely solidified. The perception, expressed at the end of Day 1 and the start of Day 2, that changing consumer demand was critical persisted throughout the discussion of the solutions.
 - Participants recognised that they were part of the solution and that awareness-raising of the issues facing food sustainability was required in order to drive behaviour change.
 - They also recognised that consumer purchasing power only had limited opportunity to drive change and that there needed to be a champion that voiced the consumer view. Government was seen as an unlikely champion because it was subject to lobbying by the food industry. The champion needed to be independent of the food industry and with a mandate to prioritise tackling food sustainability issues and drive solutions forward.

5. Action plans – what consumers said they wanted to happen

When asked to generate plans for change there was a strong emphasis on behavioural solutions, largely because participants believed that changing diets was not only necessary but also inevitable and potentially beneficial.

Behavioural interventions went beyond awareness-raising, with design levers (promoting easy alternatives), control levers (manipulating food prices and restricting what foods are on offer) and changes in food production and processing (with the appropriate safeguards) giving consumers easy sustainable alternatives.

While support for changing diets was strong, consumers were thought to be poorly placed to make better choices (due to lack of awareness / engagement with food sustainability and poor promotion of sustainable choices).

In considering how to drive change forward, participants thought that all parties in the food system had a role to play, including consumers, Government and the industry itself. But there also needed to be an independent body that provided oversight of the developments towards a more sustainable food system.

This section considers participants' closing feedback when asked what they wanted to see happen to tackle the challenges facing the food system. During the final afternoon session, small groups of participants were tasked with creating an 'action plan', of which there were two elements:

- to identify what actions they wanted to see implemented to address challenges to the food system that they considered to be the highest priority; and
- to identify actions that different parties involved in the food system should undertake, including caterers, retailers, manufacturers, farmers, Government and consumers.

Drawing on our learnings from the London workshops, where the action plan was not introduced until the participants were about to complete the task, in Cardiff and Paisley the action plan task was introduced at the start of the Day 1. This allowed participants much greater opportunity to think about what they had heard during the two-day dialogues and to formulate their views into how to meet the challenges facing the food system.

5.1 Views about how to address food system challenges

While some participants entertained a wide range of interventions, for many the focus was primarily on behavioural solutions that would minimise the pressure on the food system. This may be because it was easier for them to talk about; equally it may be because they could visualise the benefits and viability more readily compared with some of the more technological solutions. However, the fact that many participants had changed their views, and in many cases their food shopping behaviour, suggests that they believed that the general public could change too with the right persuasion and opportunities to make better choices.

Consequently, many participants began the action plan task with a strongly held view that people's diets had to change for three reasons: 1) it would be beneficial for people's health; 2) it would increase sustainability; and 3) food shortages in the future would necessitate change in any case.

5.2 Actions to affect a more sustainable food system

When thinking about approaches to support behaviour change, awareness-raising emerged as a key priority, and indeed was discussed throughout the workshops. Although this was not one of the food system challenges presented, discussion returned again and again to consumers' lack of knowledge and awareness of where food comes from – in particular, how it is produced and the impact of making certain choices on the environment and food sustainability.

Many participants felt that the loss of cooking and planning skills also meant consumers were more reliant on pre-prepared foods. They believed these were less sustainable because they were unhealthy and it was thought they used cheaper produce (which was likely to be produced less sustainably or potentially less ethically). As a result, participants believed that they, and consumers in general, were less able to make informed choices in relation to a range of issues including sustainability, health and wider ethical considerations.

However, participants also recognised that raising awareness was not always effective in driving behaviour change. For example, despite increasing awareness of healthy eating, obesity continues to rise. Consequently, their action plans also incorporated interventions to control or manipulate food choices (e.g. by making sustainable choices as easy and attractive as unsustainable choices, and using taxes and pricing to reward good rather than bad choices).

"Food prices and affordability, because if we can all work together ... then there wouldn't be so much waste." (Paisley, Male)

Finally, there was also support for driving change within the food system by employing more sustainable practices for farming and manufacturing foods. On the whole however, these changes tended to focus on ways to adapt existing methods to either be more natural or less wasteful, rather than what were seen as unnatural biotechnological solutions.

Participants were given total freedom to consider what food system challenges they wanted to address, who should address them and the responses they thought appropriate to deal with the food system challenges. In presenting their action plans, participants offered primary and secondary responses to food system challenges, the former having major support from participants, the latter considered to be more contentious or having less support by participants.

The following tables summarise the suggestions participants made, across the three locations, for solutions to drive more sustainable choices and changes to the food system to enhance sustainability.

Awareness raising and behavioural interventions: Participants were keen on solutions that enhanced consumer understanding of the challenges to the food system and behavioural interventions to effect change.

Challenge	Primary response to food system challenges	Secondary responses to food system challenges
Educate / raise awareness about food system challenges	<p>Teach children about the food system²², the impact of unsustainable choices and how to cook affordable sustainable food from scratch so they can grow up with good habits and can pass this knowledge on to parents</p> <p>Educate the public about food production processes – highlighting stand out messages e.g. water use</p> <p>Better labelling of sustainability and animal welfare</p>	
Encourage people to eat less meat	<p>Promote meat-free recipes</p> <p>Promote diets from the developing world – tackle ‘cultural’ resistance to more varied foods and less protein</p>	<p>Use ‘scare tactics’, such as the increased risk of bowel cancer</p> <p>Promote insects as an alternative protein source</p> <p>Raise awareness about lab produced meat so they can make an informed choice</p>
Climate change / the environment	<p>Promote sustainable alternatives to enable better choices e.g. bread made from chickpea flour</p> <p>Retailers only sell foods in season</p>	<p>Introduce sustainable alternatives to give people a choice, such as GM wheat / soya but ensure they are aware / educated to make an informed choice</p>
Reduce waste	<p>Introduce smaller pack sizes and portion packs that are of commensurate value with larger packs</p> <p>Reduce choice and variety</p> <p>Use freshness indicators rather than use-by dates</p> <p>Educate consumers about planned purchases (to avoid over-purchasing) and using leftovers</p>	<p>Tax waste (at all points in the food system)</p>
Promote healthy eating	<p>Promote low sugar alternatives</p>	<p>Using pricing to incentivise healthier foods and fines/taxes to dissuade unsustainable choices</p>

²² Not all participants were aware that food technology had been reintroduced into the curriculum, but importantly they thought education needed to cover sustainability challenges discussed during the workshops.

System changes: Participants largely supported change that introduced more 'natural' and less wasteful, practices.

Challenge	Solutions to apply	Solutions to apply with caveats
Beef production	Introduce Government targets to reduce meat production	
Climate change / environment	Use biological controls and precision farming to reduce use of fertilisers and pesticides	Import / export less Employ biotechnology to reduce the impact of food farming on the climate, if this does not damage the environment
Waste	Limit the amount of packaging used that is thrown away Introduce more biodegradable packaging	Use radiation to increase shelf life – some may buy it and it will reduce waste in store
Water	Introduce import restrictions from drought-prone countries	Investigate why / how water is wasted and ensure best practice is followed regarding use, re-use and preservation
Ethics	Introduce better animal welfare standards	Raise standards where this does not impact on costs
Farming methods	Precision agriculture – reduces wastage	
Food prices	Food must be affordable for all, especially staples Regulate if necessary	
Food safety	More information on packaging	Use environmentally safe pest control

5.3 What consumers want different parties to do

The second stage of the action plan task required participants to assign tasks to a range of parties involved in the food system. Ultimately, their responses show that all the parties involved in the food system were considered to have a significant role to play in addressing food system challenges and that they should do so in a range of ways (including themselves as consumers).

"Farmers, manufacturers, retailers, us, everyone's going to need to do their bit to reduce waste and do it without changing the emissions too much." (Paisley, Female)

As discussed earlier, there were many participants who expressed scepticism about the role that Government can play in monitoring the food industry, given the perceived lobbying influence of food manufacturers and retailers. However, it was clear that participants considered that Government had an over-arching responsibility to safeguard consumer interests across the full range of areas where participants wanted to see change implemented.

"The Government should be taking action to control the supermarkets, because we can elect the Government and we should be able control the Government but we can't control the supermarkets, the prices, the global economy." (Paisley, Male)

Below are outlined participants' views about the responsibilities of each of the parties involved in the food system.

5.3.1 Actions for food retailers

Participants considered that there were a range of ways in which retailers could play a part in meeting some of the challenges to the food system. These were:

- **Consumer awareness and diet:** Making it easier for consumers to buy healthy foods by: offering recipe cards for meat-free alternatives; placing healthy foods nearer to the tills (for healthy impulse buys); providing offers on healthy foods and reducing / removing offers (such as BOGOFs) on unhealthy foods; and providing better labelling so that consumers can make informed purchasing decisions on the basis of dietary information and information about country of origin / processing, water consumption and animal rearing.
- **Reducing waste:** by adopting 'freshness' indicators rather than 'best before' or 'use by' labelling; offering 'try before you buy' options in order to ensure that foods are not wasted; reducing stocks of perishable foods (such as baking bread only once or twice a day); selling fruit and vegetables that were 'ugly'; and making greater use of food banks for unsold food.
- **Tackling climate change / environment:** by stocking only seasonal foods, thereby reducing imports whose transport contributes to global warming; and buying locally in order to reduce their carbon footprint.
- **Ethical sourcing:** by sourcing produce only from suppliers that adhered to ethical codes of conduct. Ethical dealings with suppliers were also required, as there was a concern that many farmers would be put out of business.
- **Pricing:** encouraging healthy choices by reducing prices on healthy foods and increasing prices on unhealthy foods.

5.3.2 Actions for food manufacturers

The actions that participants thought food manufacturers should take were broadly in line with those for retailers. They included:

- **Consumer awareness / diet:** reducing portion sizes in order to reduce over-consumption; as well as clearer and more informative labelling (as for retailers) and changing packaging such that healthy foods have more attractive packaging than unhealthy foods.
- **Reducing waste:** As well as reducing portion sizes and selling 'ugly' fruit and vegetables, participants also wanted to see products that have less packaging and products using better (but natural) preservation techniques. In addition, manufacturers should provide less choice / variety of products as there was an assumption that the greater the variety the more was likely to be wasted.
- **Climate change / environment:** Similar to the actions for retailers, participants wanted to see less imported products, more local sourcing, and the use of more seasonal foods. In addition, manufacturers should look to reduce their carbon footprint, in part by reducing 'food miles' and partly reducing packaging.
- **Ethical issues:** In addition to greater emphasis on ethical sourcing of products, there was a desire for manufacturers to deal with suppliers in a more ethical way (i.e. by not squeezing farming profits).

- **Food safety:** Participants were keen for all new foods and / or processes to be independently and robustly tested before being sent to market. There was also a desire to see a reduction in additives and preservatives and for more natural methods to be used.

5.3.3 Actions for caterers

Again, there were similarities for the actions recommended that caterers take with those of manufacturers and retailers. These included:

- **Consumer awareness and diet:** Raise consumer awareness through better labelling of food in terms of country of origin, ingredients, etc., as well as discouraging over-consumption through reducing portion sizes and removing 'all you can eat' offers.
- **Reducing waste:** Suggestions for reducing waste included: reducing the varieties on menus; using kitchen leftover produce for soups (not leftovers from plates); using 'ugly' fruit and vegetables; and sending excess food to food banks more. In addition, there was a suggestion that caterers should charge consumers a 'leftovers' tax for any food that they order but do not consume.
- **Ethical purchasing:** ensuring ethical buying of products and introducing an ethical food sourcing mark.
- **Food safety:** caterers to continue to ensure that they operate under stringent (and monitored) food handling and preparation procedures.
- **Environment / climate change:** caterers to use less beef / red meat in their meals (so by reducing the supply, the demand – and beef-eating habit - can also be reduced).

5.3.4 Actions for farmers

Participants discussed a wide range of actions they wanted farmers to adopt in order to help address the challenges to the food system. These were:

- **Reducing waste:** Overall reducing farm-produced waste as well as using any waste products more efficiently.
- **Price:** A perceived need for greater collaboration between manufacturers, retailers and farmers to ensure fairer pricing and minimise farmers going out of business.
- **Farming methods:** A desire for farmers to be open to new farming techniques, sharing techniques and machinery with other farmers (to maximise efficiency), and to grow healthier foods (such as cereals rather than beef).
- **Food safety:** An overall desire for farmers to reduce their reliance on pesticides for cereal crops and the use of antibiotics for chicken and meat production.
- **Environment / climate change:** Farmers are tasked with reducing their overall carbon footprint in a range of ways; including more efficient farming practices and selling more produce locally.
- **Ethical issues:** Farmers are asked to continue to operate by treating animals fairly and ethically, with greater emphasis being placed on increasing the amount of land that chickens have to live and feed.

5.3.5 Actions for Government

Government was tasked by participants with a wide range of specific actions as well as having an overarching remit for ensuring that all the participants in the food system play an active part in working towards greater food security. Specific actions included:

- **Consumer education / diet:** Information campaigns about food sourcing, processing and production as well as taking the lead on ensuring that packaging is both environmentally friendly as well as providing information to allow informed consumer choice. Participants also wanted greater emphasis on food security in the National Curriculum on the assumption that teaching young people healthy eating behaviours early is easier than changing entrenched adult diets.
- **Reducing waste:** A need for an aggressive policy of tackling food waste throughout the food system by taxing producers, manufacturers, retailers, caterers and consumers for their waste.
- **Environment / climate change:** Participants wanted Government to build more reservoirs in order to conserve fresh water and to encourage farmers to reduce their chemical usage through precision spraying of crops and the use of rigorously tested biological controls.
- **Food safety:** Government to continue – and enhance where possible - its overview of food safety throughout the food system.
- **Farming methods:** Encourage farmers to reduce their chemical usage through precision spraying of crops and the use of rigorously tested biological controls, possibly through financial incentives or machinery sharing schemes.
- **Price:** Ensuring fair pricing across the food system and subsidising healthy / organically produced foods in order to encourage healthier diets.
- **Regulation:** Participants were concerned that the food industry was unlikely to change voluntarily and that regulation would be required. This was in terms of: price regulation on staple foods; regulated land use for beef cattle; food labelling; regulated advertising of unhealthy foods (ideally banning advertising); breaking the links between the food lobby and political party funding; taxing or fining manufacturers, retailers and caterers if they do not meet the regulatory requirements; and financially incentivising positive behaviour change for the consumption of healthy foods and introducing fines on food waste.

Although ethical food production was not explicitly referenced in relation to Government, it did emerge during discussion and was inferred in some of the actions they suggested, such as ensuring fair pricing.

5.3.6 Actions for consumers

Participants recognised that consumers too had a part to play in ensuring the security of the food system, although they recognised that they could not do this alone. They would need help from the Government and the various players in the food system as well as from the third sector. There were three areas where participants thought consumers could play their part:

- **Reducing waste:** Being encouraged to buy only what they need (and not be tempted by offers where some is likely to be wasted) and composting any kitchen waste.
- **Environment / climate change:** Accepting (and demanding) that retailers will stock only (or mainly) seasonal foods, foods produced with fewer emissions and not to demand out of season foods that will have been imported and incurred a large amount of food miles; and being encouraged to buy locally produced foods.

- **Consumer education / diet:** Encouragement to: cut portion sizes (to reduce obesity and the demands on the NHS); reduce unhealthy and comfort foods; reduce beef consumption, including using meat-free days, and eating alternative sources of protein; consider how the food that consumers eat and the choices that are made have a ripple effect across the food system (in terms of greenhouse gasses, embedded waster use, etc.).

6. Participants' responses on further reflection

The participants that were followed up two months after the public dialogue indicated that their earlier change in attitudes and behaviours regarding food purchases had been sustained and they were confident that they would continue. Typically, participants were buying less meat and had reduced the amount of waste they created. While participants said that they had not changed their food purchasing behaviour as much as they expected, primarily due to habit, they said they were now more engaged with environmental issues, they were planning meals to avoid waste and were buying only what they need.

There was a strongly held view that the challenges to the food system can only be addressed if all the parties – farmers, manufacturers, retailers, caterers, Government and consumers - play their part. The need to raise awareness about the challenges to the food system amongst consumers was an essential requirement.

During April 2015 the research team attempted to follow-up all those participants in the dialogues that had indicated a willingness to take part in future research. In total, contact was made with 20 of the dialogue participants by telephone. The purpose of these interviews was to determine the extent to which the shifts in attitudes and behaviours were still apparent more than two months after the workshops took place. Participants were given no additional information or any summary materials to recap on the two workshops.

6.1 Sustained impact of workshops on attitudes

It was very clear from these interviews that attending these workshops had had a sustained impact on participants' attitudes and behaviours. Of the 20²³ who took part, 17 said they had since changed their behaviour to make more sustainable choices and many said they were confident these behaviours would continue as they were already embedded within their eating routines - for some, change extended beyond eating habits to their wider behaviours and lifestyle.

"It definitely did make me change my habits. I'm eating less red meat, having meat free days, that's an easy thing to do." (London, Female)

"I want to buy as locally as possible. In the shops you've got semi skimmed milk and Welsh semi skimmed milk. I will pick up the Welsh one cos I live in Wales so hopefully it hasn't travelled as many miles as the other one. I also buy Welsh butter ... I didn't do that before, I didn't think about

²³ It was not possible to contact all of the dialogue participants. While the level of change that is seen from those followed up is encouraging, it is not possible to assume that those not contacted would show the same level of change, nor should this be taken as indicative of how the general public in general would respond.

that sort of thing. Going to that meeting sort of woke me up shall I say and I do a lot more thinking about my lifestyle in general.” (Cardiff, Female)

Of those three individuals who said they had changed their attitudes but not their behaviours, this was because these individuals said they were already eating sustainably beforehand. Although they said their behaviours had not changed significantly, the experience of participating had reinforced their views, heightened the urgency of the issue in their mind and made them more conscious of the impact of their own choices.

6.2 How participants had changed their behaviour and why

Reducing meat consumption (in particular red meat) and avoiding waste emerged as the key changes adopted. Reducing meat was motivated both by the impact on the environment as well as on the individual’s health - colon cancer was raised as a particular concern. One participant also described becoming ‘obsessed’ with bread and checking the bread bin to ensure no bread was wasted.

They had assumed that UK-grown foods were more environmentally friendly than those that were imported and so there was a focus on buying local or British produce and using farmers markets.

“I try to buy British as much as possible which is why I now very rarely go to a supermarket. I do my shopping as locally as possible ... I’ve done a lot of thinking since that. It taught me a lot, it brought a lot to my attention, put it that way.” (Cardiff, Male)

Several participants talked about being more prepared and planning ahead in order to reduce waste. This included, buying only the amount they needed, freezing leftovers and cooking exact amounts with no leftovers. There was also evidence that some participants were trying to cook more from scratch as they saw this as a healthier approach to diet. As a result of attending the dialogue, one Paisley participant had started weight loss classes and had attended a cookery class with her 10 year old son; this had resulted in cooking more fresh foods from scratch.

Many of the follow-up participants talked about the changes they had made in terms of making more conscious choices and only buying what they needed rather than succumbing to marketing, price promotions and packaging when shopping for food. This meant, in many cases, drawing up shopping lists beforehand and not deviating whilst shopping. The perception of being a conscientious and responsible consumer had clearly struck a chord for many participants, with only one saying there was little they could do as an individual to make a change.

“If I see anything suspicious like made in China or palm oil or all these nasties ... I put it back on the shelf. It’s as if I’m going, I’m putting on my knight’s armour and I’m going to struggle cos I know when I’m going to enter a supermarket or anything ... I’m going to have to go against what they want to flog me, impose on me.” (Cardiff, Female)

“It’s definitely a question of re-educating yourself. I do find myself wandering around [the supermarket] thinking ‘can I buy that? Should I buy that?’ Whereas before I would probably just run around, shoving into the basket anything I wanted to buy.” (London, Female)

“I didn’t really have much to do with food. I went to the supermarket, I bought my food every week and never gave it much thought but now I’m thinking about it. I’m thinking about what we buy and what we eat as well.” (Cardiff, Male)

For some participants, attending the workshop had prompted other environmentally friendly behaviours beyond eating habits. For example, one had started using the bus rather than her car, others talked about wasting less water.

"I'm spending less on diesel, I'm spending less on food ... I feel that I'm doing my bit ... trying to help a little bit." (Cardiff, Female)

All participants followed-up said that they had spoken to friends and family about what they had learnt in an attempt to encourage them to adopt more sustainable behaviours. There was also a sense amongst some individuals, particularly those who were already engaged with these issues, that they had a duty to educate people in their social group about food sustainability (although they and others were careful to say they were not *'bragging'* or *'being preachy'*).

"I feel I have a mission now to tell as many people as possible because it made me realise, looking at 17 people around me on that day, how little people knew about nutrition and meat consumption and water consumption and I have felt since then I have a mission here, not to be a preacher ... when and if I have an opportunity just to tell what I know and what I have experienced. That's my mission." (Cardiff, Female)

"Sometimes work in the breakfast club in school and I've been conscious we use cereal and toast and when the children are eating the toast I'll be like 'oooh don't waste it, it needed a bucket of water for that slice of bread!' So I have been telling the children. The bucket of water for a slice of bread is my line." (London, Female)

Although the majority of those followed-up said they had made a change, nearly half said they had not changed as much as they had expected. There were two reasons for this:

- habit; over time they had made some of the changes they had planned but not all as they found it difficult to break existing purchasing and consumption habits;

"I do think I changed less than I thought. You do kind of put it to the back of your mind a little bit ... It's not as pressing as it was then ... Maybe cos it's easy to carry on with old habits maybe and think there's so much that hit you that maybe it would be a huge change to make all the changes you felt you had to make whereas if you make 2 or 3 and stuck to that it's probably more [feasible]" (Cardiff, Male)

- as there were so many issues discussed during the workshops, it was difficult to make so many changes evenly and consistently.

6.3 Response to food sustainability challenges – on further reflection

It is clear from the behaviours that participants adopted following the workshops that waste and embedded water again emerged as key issues which had stayed with participants over the two months. This was tied in with a broader awareness of the impact that food has on the environment and consequently a perception that food sustainability was a complex and pressing issue. Even those who were already engaged with the issues, or understood the issues discussed said that hearing new information had heightened their engagement with sustainability.

"Information we already know about, you just get a bit lazy, as it were ... Once you've seen a few programmes on TV, or an article in a newspaper, you don't really follow the story ... You get a bit complacent and set in your ways when you're shopping. But new information puts it all in perspective and it did make me change my habits." (London, Female)

When participants discussed the issue of embedded water they often made connections to wider resources (and environmental harm) embedded in foods that then go to waste. Almost every participant said something to this effect, which goes some way to explaining why reducing waste had become such a priority for individuals seeking to develop more sustainable habits.

There was also an ethical aspect to this discussion, with one participant raising the issue of imported foods, referring to information presented during Day 1 about the issue of importing foods from drought-prone countries (although the participant had misremembered the amount of water required, stating a much higher quantity than was presented). They and others suggested that the 'actual cost' of food, in terms of embedded resources, is not reflected in the value consumers ascribe to the products (due to low prices) and consequently these foods go to waste in richer countries.

"How can a European be able to get 3 bath-fulls of water out of Kenya, to get green beans that we throw away? It's just because we've got money in our pockets to do that. That's misuse. The value isn't really there. The actual cost of the green beans is much higher. And if we all knew that, we'd treat them with more respect." (Paisley, Male)

"As a household, I think we've become more mindful of what we're throwing away ... it's difficult to cook for a family and keep everybody happy, but it shouldn't involve just throwing stuff away; because it has a bigger value than the 50p that you paid for it." (Cardiff, Male)

6.4 Response to food sustainability solutions – on further reflection

Given that many participants had experienced sustained shifts in eating habits over the two months since the workshops took place, it is perhaps unsurprising that the preference for awareness-raising and behavioural interventions endured. Even before discussion moved to actions for the future, awareness-raising was raised spontaneously by a few participants – this was both in terms of education in schools and coverage of these issues in the media.

6.4.1 Raising awareness

Reintroducing food education into schools was considered a priority for those not aware that this was already in place. Parents with school-age children mentioned that cooking lessons had helped to widen the types of healthy foods their child would eat, but there was no mention of learning about sustainability. When participants were told that food technology was now part of the national curriculum, they questioned whether the messages about sustainability were strong enough, as they had heard little about this compared with the messages that were communicated about the effects of smoking.

"[Educational messages regarding food in schools] it's not getting into the home ... It's not effective, it's not getting back [to parent]. Is it dramatic enough, is it honest enough? [Children] don't need things sugar-coated, they can take honesty." (Cardiff, Male)

When participants talked about education for adults, their focus was really on ensuring more media coverage of food sustainability challenges (i.e. the range of issues discussed during the workshops) as they believed that people would change their eating habits if they a) understood the magnitude of the issues involved and b) had clear guidance about what choices were sustainable. Consequently, in addition to raising awareness about the issues at hand, some participants argued that more needed to be done to change consumer expectations of foods being low cost and available all year round.

6.4.2 Production process and technology solutions to prompt behaviour change

Responses to the range of production processes and technologies had changed a little from the dialogue sessions, with some indication of participants being a little more open-minded. Whilst some participants continued to reject chemically-based or hi-tech solutions as unnatural, but more importantly unnecessary (if shifting habits was possible), others were more open to a range of approaches being employed, if properly tested.

"Well I was more open minded about it than I would have been in the past ... if there's something that needs to be done then we have to accept it rather than saying no" (Cardiff, Male)

The impact of food production processes on the experience of eating food emerged as an issue for some, and further reflects the perception that consumers should learn to value food and make the right choices rather than move towards 'unnatural' convenience foods.

"The ones (solutions) around irradiating food so it lasts for months, just seem so unappealing, we have moved so far away from the idea that eating is a pleasure now. It [eating] actually is a really great pleasure and a cultural indicator, so for everyone just to live on plasticity irradiated bread doesn't really solve anything. It's not really a solution - it would be crushing an amazing culture."
(London, Female)

Similar mixed responses to GM emerged, as in the workshops. Some said they understood the need for these technologies, given the range of issues and risks in the food system that they learnt about during the course of the workshops. Others still had reservations.

However, despite some resistance to novel technologies, participants acknowledged that more may be required than raising awareness to shift behaviours significantly. Again the concept of taxing foods to dissuade people buying the most unsustainable foods emerged spontaneously. There was scepticism that the public generally would make significant changes to their habits and therefore other levers may be necessary to prompt change. This view emerged both amongst those who had made changes they considered significant and those who said they found this difficult and had only made quite minor changes.

"People often choose to ignore information like that if they're not made to take action ... maybe we should be taxing certain foods maybe, that might prevent people, in a similar way to cigarettes..."
(Cardiff, Male)

6.5 Participation, media and change

Participants discussed the extent to which attending the workshops had changed their views. All said that they had learnt a lot and that the information had stayed with them, with one participant saying he was surprised by the impact attending the workshops had had.

"I'd no expectations of changing anything before the workshops, so it came as quite a shock. My expectations had been quite low really." (Cardiff, Male)

Many participants said they had become more engaged and more aware of issues relating to food in the media, although the information they remembered seeing was largely about healthy eating. A few said they had noticed coverage about giving up meat, which may have been in relation to the meat-free week which happened a few weeks before the fieldwork period. One spoke about meat-free week spontaneously himself, but had already given up meat for Lent which was happening simultaneously with the research. However, participants were surprised how relatively little coverage of food sustainability is given by the media and that despite these interviews taking place during the run-up to the election they had not heard any politicians talk about these issues.

"I'm quite up to date on current affairs, I read the paper and newspaper articles on Facebook and things and I haven't really seen anything. I think that's kinda why it was such a shock on the day, this information, it's just not talked about really." (London, Female)

"The election at the moment seems to be all about who's going to do this and that but nobody mentions the environment, things like the food production environment, that sort of thing. Nobody is saying what they might do. Even the Green party I haven't heard them much." (Cardiff, Male)

6.6 Views about responsibility to make the change

One reason why interventions to change behaviours were still top of mind for participants was that the perception persisted that the food system would only change when unsustainable production stopped being profitable. Therefore participants believed this required a shift in consumer demand.

"Ultimately they [food retailers and manufacturers] are profit driven, so I think consumers are the starting point in that rather than retailers. Retailers will do what is right for their shareholders."
(Cardiff, Male)

Consequently, when asked about who had a responsibility to ensure a more sustainable food system in the future, participants again raised consumers as having a central role. However, nearly all participants said that all parties needed to share responsibility, a perception which appears to have carried through and strengthened since the workshops.

"I think we've all got responsibility there and if we all do our little bit and come together rather than one blaming the other, it's easy to blame the manufacturers and say it's one or the other but I think we should all come together on this." (Cardiff, Male)

7. Reflections

Reflecting on the two-day dialogues, participants considered that it was difficult to make healthy and sustainable food choices because of a lack of transparency about food production methods and processes, contradictory and misleading information and marketing practices that seemed to favour unhealthy foods.

After their initial surprise at the nature and extent of the challenges to the food system, participants thought there were a number of priorities that should be addressed within the food system: climate change, biodiversity and embedded resources; greenhouse gas emissions; food safety and public health; waste; and ethical food production.

In considering acceptability of potential solutions to food system challenges, participants took into account: whether the solution addressed the priority challenges to the food system; whether other, usually low-tech, solutions could deliver the same level of benefit; would consumers buy the products; whether there were significant development costs which would impact on pricing; whether the solution was seen as profiteering or for the public good; and the potential for unforeseen negative consequences.

Participants expected all the parties in the food system to play their part in addressing food system challenges – retailers, manufacturers, caterers, farmers and consumers – with Government taking a leadership role in raising awareness amongst the public and regulating the food industry. As consumers have a limited ability to drive change, participants thought there needed to be an independent consumer champion to press for change and monitor the long-term effects on the food system.

This chapter brings together the key findings arising from the food dialogues, considering participants' unprompted awareness and beliefs about the food system, their views about the challenges to the food system and their responses to a range of potential solutions. The chapter then continues by reflecting on how participants thought that food sustainability might be promoted and their expectations about who should be responsible for driving forward change and the changes they thought were essential.

7.1 Awareness and beliefs about the food system

When discussing their approach to buying food and the decisions they make, it was clear for the majority of participants in the research that convenience and price were key influences. Although making healthy choices was described by many as a priority, contradictory and misleading information made it more difficult for consumers to make healthy eating choices, with marketing practices and price promotions on unhealthy foods tending to undermine healthy food choices.

This gave rise to discussions about the extent to which the UK consumer values food with many arguing that people in the UK have generally lost touch with where food comes from and have little understanding about how it has been produced. Consequently, issues relating to the environmental impact of food production and ethics (e.g. buying organic or free range) emerged as minority considerations for most people, although there were exceptions to this with some participants explicitly adopting healthy diets and buying organic and / or locally produced food.

Coupled with the view that consumers had become distant from food production, participants also thought that the food system had become very opaque as food was increasingly manufactured and retailed through very large businesses and that retail promotions often favoured unhealthy food choices.

It was also clear, through the discussions, that very few participants (except the very informed few or those that had some links with the food industry) were aware of the challenges facing the food system. Even those who took an interest in 'the environment' were often surprised to find that there was much more to know about the impact that the food system has on a wide range of issues.

While there was also some scepticism about whether there would ever be food shortages in the UK resulting from increased demand, patterns of food consumption, changing weather patterns and lack of water - and whether it was something 'we' should worry about - when presented with the range of challenges facing the food system, there was considerable surprise at the level of impact.

7.2 Informed consumer priorities

Initially, consumers had considered that price, convenience and to a varying extent 'healthiness' were their main priorities when buying food. However, after hearing about the challenges facing the food system, participants began to widen their perspective and considered there was an additional set of priorities that should be taken into account. Overall, these were:

- the impact of food production on climate change, biodiversity and embedded resources (including water use);
- the impact of climate change on food production;
- making it easier to eat healthily
- the level of waste in the food system by manufacturers, retailers and particularly consumers; and
- ethical issues of food production, in part the way in which animals were reared and in part the impact of taking scarce resources through imports from developing countries.

7.3 Responses to possible solutions to the food system challenges

When considering the range of potential solutions presented there were a number of factors that participants took into account when considering their acceptability. These were whether:

- the solution addressed the high priority challenges to the food system;

- another solution – usually less technological or more ‘natural’ – could deliver the same level of benefit;
- consumers would feel comfortable buying foods produced in the specified way;
- there are significant costs involved in the development of the solution and bringing it to market;
- the implementation of the solution was for the public good or the drive for profit; and
- the potential for unforeseen negative consequences in terms of food safety, public health generally, the environment or on small producers and retailers.

This meant that in considering the principle of the solutions presented, rather than solutions themselves, some were supported whilst others participants were very unsure about even though they might have been delivering the same outcome. So, for example, eating less meat was seen as preferable to using mechanically separated poultry (for health reasons) or lab produced meat (primarily for perceived safety reasons) as neither addressed the priority challenge of reducing overall meat consumption. Similarly, hi-tech solutions for minimising waste, such as irradiation of bread were seen as unnecessary when simple changes in behaviour (such as buying less bread or freezing) would suffice. However, hi-tech solutions were not rejected out of hand. The use of precision agriculture for example was well received as this clearly addressed the issue of waste and environmental damage.

7.4 Promoting a sustainable food system

Participants were initially largely unaware about the real costs of producing food, in terms of land use, embedded resources, environmental damage and the impact on developing countries. The deliberative process of providing wide-ranging and neutrally presented information about the challenges to the food system and some of the potential solutions engaged participants and provided them with the opportunity to view food buying from a wider perspective.

In their view, the relatively low price of food and people’s increasing distance from its production meant that food was not really valued. They therefore came to the conclusion that in order to start to address the challenges to the food system, they as consumers had an essential part to play, and that by demonstrating the wide ranging impact of food production this could drive a shift to more sustainable behaviours. This was evidenced by the change in attitudes and food buying behaviour that participants talked about as a result of being exposed to the first day of the dialogues. The follow-up interviews also demonstrated that these changes in attitudes and behaviour can be sustained over a longer term.

However, participants in the dialogues recognised that the amount of information about food system challenges to which they had been exposed was not the norm and that in the real world there would need to be changes involving all the parties in the food system.

From the participants’ perspective, raising awareness about the food system is a key requirement and should be provided in a variety of ways. This included greater emphasis on the challenges to the food system in the National Curriculum – capturing the imagination of young people who were seen as potential ambassadors of change – as well as the food buying population through broad coverage awareness-raising campaigns and more informative labelling at the point of purchase.

7.5 What were participants’ expectations?

Participants recognised that as consumers they had a part to play in addressing the challenges facing the food system. However, they recognised that they could not do this alone. From their point of view, farmers, manufacturers, retailers and caterers were all expected to play their part in addressing the food system challenges.

However, the food industry as a whole was not trusted to implement change for the 'greater good' and while there were concerns about Government being lobbied by the food industry, participants expected Government to take the lead in bringing about change.

Participants expected Government to:

- ensure that the food industry tackles the issues facing the food system by providing leadership and through greater regulation of farming, manufacturing and production processes;
- ensure that food products have more informative labelling so that consumers can make better informed choices;
- help consumers to make affordable sustainable food choices
- demonstrate how people can change their food buying behaviour so that it is more sustainable; and
- raise awareness of food sustainability issues amongst the public through general awareness-raising campaigns.

Participants thought that consumers only had a limited ability to drive change and that there needed to be an independent body that acted as a 'consumer champion' on their behalf. They expected that this champion would be an independent organisation and would:

- determine the best way forward to address sustainability issues;
- take into account consumer priorities and the need for radical change; and
- monitor the long-term effects of food system changes in terms of food safety, impact on public health, impact on the sustainability of farming and food production; and other ethical considerations.