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PANEL

OPM GROUP

Understanding consumer priorities for food innovation

A GFS Food Futures panel activity

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Executive summary

Background to the project

The Global Food Security (GFS) programme brings together the UK's major public funders of research into food security. A central part of the programme is to understand and respond to public views on global food security challenges and potential solutions. To help meet this aim, the GFS programme has commissioned a panel of 600 members of the public to take part in engagement activities, including deliberative and online activities exploring different aspects of food security research. The GFS programme will be using the findings to inform the direction of publicly funded food security research in the UK. The panel is co-funded by the Sciencewise[1] programme.

'Understanding consumer priorities for food innovation' (called here 'Food Innovation' or 'Innovation project') was commissioned in late 2015 with two aims:

- To identify consumer priorities for research and development in food innovation across the food chain, from both a consumer and citizen perspective
- To foster a more iterative exchange between consumers and the innovation cycle across the food chain.

These aims were broken down into four objectives:

- To increase the panel's understanding of food innovation in the context of food security
- To understand public attitudes towards different types of innovation
- To identify consumer/citizen-led priorities for new food innovation
- To understand the factors influencing prioritisation.

The project comprised both online and offline elements. The online elements included blog posts and an 'Innovation Challenge' conducted in three parts: with participants identifying food-related problems they had experienced, submitting ideas to solve those problems, and then voting and commenting on the ideas developed by workshop participants. The offline activities comprised two half-day workshops held in Harrogate and Dundee in February 2016, following the second phase of the Innovation Challenge. We used specialist input at several points, primarily during development of stimulus materials and by involving specialists as participants in the workshops.

[1] Sciencewise is the UK's national centre for public dialogue in policy making involving science and emerging technology issues

Main findings

Perceptions of innovation: At the start of the project, participants tended to define 'innovation' in terms of its novelty and originality. However, they also spoke about innovation as a way of combining learning from old processes with new techniques. Some participants noted specifically that to be 'innovative', a product or process had to be beneficial to society, to individuals or to the environment, and/or solving a problem or addressing an unmet need. Only a minority of participants equated innovation specifically with technological progress.

Attitudes towards types of innovation: At the start of the project, we had assumed that when submitting ideas for food industry innovation, participants would gravitate towards technological ideas. However, far fewer ideas involving technologies were submitted in the Innovation Challenge than we expected (only 24 out of the 176 ideas submitted were technologically focused, with the remainder focused on social, behavioural and policy interventions). It is likely that the most significant factor explaining this was participants' low levels of familiarity with technologies other than information and communication technologies (ICT). When participants were familiar with a technology and felt informed about it, their reactions towards it were more positive. While participants could quite easily identify benefits of production and processing technologies for specific groups (e.g. countries with growing populations, or people who do not have healthy diets), they seemed to struggle to identify benefits for themselves as individual consumers. They tended to think that technology used to add value and improve nutritional quality would increase costs for the consumer.

Participants were much more likely to gravitate towards social and behavioural innovations, which they felt are less likely to have unintended consequences, particularly in terms of detrimental impacts on physical health or the environment; that human control over the process is more secure; that funding is more likely to be transparent, if innovations are publicly funded; that approaches are more likely to be familiar and comforting, and that educational interventions can address the root causes of problems.

Some participants expressed optimism that social innovations would reduce the need for technological innovation (e.g. by creating healthier food habits, there would be less need for interventions such as food fortification). Others thought that social innovations could help prepare consumers for the more disruptive technological innovations (e.g. new growing and processing techniques) that they felt would be needed to secure global food security, by encouraging greater experimentation and more open mind sets.

Innovation priorities for Health & Wellbeing: the three problems participants thought were priorities for food innovations to improve health and wellbeing were changing food preferences and habits, the cost of healthy food, and the nutritional content of food – particularly around sugar and salt content in processed food. The majority of the ideas generated by participants for changing food habits related to interventions in the retail and consumption stage of the food chain, and were primarily social innovations; for example retailers promoting healthier food to encourage greater experimentation, increasing the cost of advertising for unhealthy food and using psychology to 're-programme' attitudes towards unhealthy food. Participants saw these ideas as beneficial for both manufacturers and

retailers, as they would help grow the market for healthy food. In contrast, participants' ideas for improving nutritional content were focused more on scientific, technological innovations in production and processing, suggesting that they recognised that innovations in this area could only happen in the earlier stages of food supply chain.

Innovation priorities for Sustainability and Ethics: the three problems that participants thought were priorities for food innovations to improve sustainability and ethics were reducing food and packaging waste, making industry practices more sustainable and ethical, and improving the livelihoods of farmers and others working in the food supply chain. Smart packaging emerged as the priority idea for tackling food waste for some participants. This was seen as more responsive than best before dates and more effective than public awareness campaigns at promoting rapid and widespread change. Some participants dismissed this idea: they felt it was gimmicky, would increase packaging and food costs, and further de-skill consumers. Although increasing the availability of sustainable food did not emerge as a priority problem in the first stage of the Innovation Challenge, we did explore it in the workshops. In Dundee, participants prioritised the idea of using renewables in farming to grow crops all year round, because they saw it as working particularly well in Scotland where food production is limited by light rather than by land availability. This idea was not prioritised in Harrogate because participants assumed that the set-up costs for farmers would be unfeasibly high.

Innovation priorities for Authenticity and Trust: the three problems that participants thought were priorities for food innovations to improve authenticity and trust were knowing what happens to food in the supply chain, misleading product claims and confusing product labelling. The lack of standardisation for nutritional content was prioritised as a particular problem, though participants had markedly different appetites for additional information. In terms of building trust, participants noted that the longer supply chains are, the less control they presumed there could be over the food passing through the chain – particularly in relation to food sourced internationally. The ideas generated by participants were all education or information interventions, ranging from making manufacturers listing all suppliers on packaging through to creating a food supply chain equivalent of the European Conformity (CE) product safety marks used in other industries. Workshop participants did not respond well to either of the two technological ideas tested (enabling consumers to track food/ingredients through the supply chain through sensors and providing ways for consumers to check that food is what it says it is on the label), due to the perception that these shifted too much burden of responsibility on the consumer.

Innovation priorities for Lifestyles: the three problems that participants thought were priorities for food innovations to improve lifestyles were meeting the lifestyle needs of demographic groups, food consumption becoming less sociable and the time it takes to prepare meals. In the workshops the needs of children and older people were prioritised as the most important lifestyle problem for innovation. The panel had mixed responses to the idea developed at the Dundee workshop for a range of meals adapted to the digestive and calorific needs of older people with more sedentary lifestyles; it was met with some derision, particularly among the older participants. This suggests that it is important for foods targeted at older consumers to enable and reflect more positive and aspirational attitudes towards age.

The time it takes to prepare meals emerged most frequently as a theme in the Innovation Challenge, but was not prioritised as the key theme during workshops. This is perhaps because while many people experience time pressures, the social stigma detectible during the workshops around convenience food made workshop participants reluctant to prioritise this theme.

Factors influencing innovation priorities

When analysing why participants prioritised one idea for food innovation over another, five factors emerge as having an influence on their decision-making. These were:

- Beneficiaries of food innovation – participants were more likely to prioritise ideas which were seen as having benefits for actors across the food chain, but only if they could first see a clear benefit for consumers and/or wider society.
- Certainty of benefit – technological innovation was perceived as more likely to have unintended or unpredictable consequences that could have a negative impact at the macro level e.g. on population health and the environment, compared to social innovation.
- Likely scale of impact – technological innovation generally seen as having greater reach and therefore more effective for tackling problems at a societal level. However if participants did not perceive the problem as relevant to themselves as individual consumers (e.g. if they felt they already had a healthy diet), they were less likely to support the innovation for their own food.
- Feasibility of the new food innovation being bought to market - participants were often unsure as to which ideas were more feasible, and were more likely to dismiss an idea if informed by specialists that the idea was unfeasible or costly.
- Balance of innovation types – hybrid ideas that bought together elements technological and social innovation were generally more favoured

We have found that participants in this project responded differently to technological innovation in the production and processing stages of the food chain, depending on whether they were considering the benefits for themselves as individual consumers, or the benefits for 'other people' (broadly defined by them as people in developing countries or people in the UK with unhealthy diets). They tended to be more accepting of technological innovations to solve the problems 'other people' experience, perceiving these as having greater scale, reach and speed, compared social and behavioural interventions. However social innovations are perceived as more familiar and trustworthy, having fewer risks and, because they tackle the root causes of problems, are felt to have more impact in the long run.

The relatively short timescales of this project may have impacted on participants' priorities, and their preference for familiar approaches; a longer deliberation period would have allowed participants to understand more about technological innovations and to explore them in more depth. Nevertheless, communicating to the public how technological and social innovations can work in combination to provide benefits relevant to people, both as consumers and citizens, may help increase public acceptability of new food innovation.

About this report

This report consists of eight chapters:

- Chapter 1 provides an overview of the Food Futures panel, the Food Innovation project and some of the principles that have guided our approach.
- Chapter 2 explores participants' perception of innovation and what makes a process or product 'innovative', along with the role of innovation in global food security
- Chapter 3 examines participants' broad attitudes to different types of innovation (technological and social)
- Chapter 4 - 7 summarises participants' priorities for new innovation across the food chain, both in terms of priority problems innovation should address as well as types of solutions (Chapter 4 focused on Health and Wellbeing, Chapter 5 on Sustainability and Ethics, Chapter 6 on Authenticity and Trust and Chapter 7 on Lifestyles).
- Chapter 8 identifies factors that appear to have influenced participants' prioritisation.

Chapter 1: About the project

A note about terminology

We use the following terminology in this report:

- When we talk about the complete public panel programme we refer to the **"public panel"**.
- **"Topic"** describes the main content focus of the project – in this case, innovation in the food system. Topics are specifically policy directed.
- **"Topic lead"** is the representative of the GFS partner organisation that suggested the topic. One way to describe the topic lead is as the person asking the question which the project explores.
- **"Project"** describes the implementation of a topic, using a method or methods.
- **"Method"** describes the approaches used to implement a project, for example, survey, blog, online forum discussion or workshop.
- **"Specialist"** describes people with specific knowledge and/or expertise who have contributed to the project, without also holding a formal role (e.g., on the Food Futures/GFS public panel Steering Group, Project Management Team or as an employee of one of the GFS partner organisations).
- **"Problem"** describes a specific food-related problem identified by a participant during the Innovation Challenge.
- **"Problem theme"** describes the summarised problems (the individual problems with common themes clustered by facilitators into a "problem theme").
- **"Problem space"** describes the broad areas used as a framework (Health and Wellbeing; Sustainability and Ethics; Authenticity and Trust; Lifestyles; and Other Types of Problem which was later dropped due to overlap with the four primary areas).

Quotations from participants' submissions online and from the workshops appear throughout the text and have not been changed other than corrections to punctuation for readability.

1.1. About the Food Futures panel

The Global Food Security (GFS) programme brings together the UK's major public funders of research into food security. A central part of the programme is to understand and respond to public views on global food security challenges and potential solutions. To help meet this aim, the GFS programme commissioned a panel of 600 members of the public to take part in engagement activities, including deliberative and online activities exploring different aspects of food security research. The GFS programme will be using the findings of the public panel to

inform the future direction of publicly funded food security-related research in the UK. The panel is co-funded by the Sciencewise[2] programme.

The Food Futures public panel is designed to enable both online and face-to-face engagement. The panel is managed through a software portal, which can host a range of different digital materials and activities. The panel is closed, with members recruited to a quota and all content is password protected, ensuring privacy for participants and enabling effective control and management of the sample. The panel is clustered in six locations around the UK, allowing for a diverse sample and providing opportunities for face to face activities.[3]

The panel consists of 600 participants, quota sampled to be broadly representative of the UK population. The sample does not perfectly represent the UK: ethnicity is representative of local areas, and there is a slight bias towards female participants, middle age groups and more educated participants. Participants are incentivised to take part in some of the panel activities, with the value of the incentive tailored to the specific method or topic. Not all activities are incentivised – for example, ongoing engagement that is not part of a project on a specific policy topic tends not to be incentivised.

1.1.1. Sciencewise Guiding Principles

The delivery of the public panel was guided by the Sciencewise quality framework and designed to align with Sciencewise Guiding Principles (both available online here). Both principles and quality framework aim to ensure that public dialogue is fair, effective and credible: whilst we used approaches other than public dialogue in the public panel, we sought throughout to retain this focus, and ensure fair, effective and credible engagement. You can read about learning from the public panel in the independent evaluator's report which can be found on the Global Food Security website, here.

1.2. About the Food Innovation project

The project 'Understanding consumer priorities for food innovation' (for brevity we refer to this as 'Food Innovation' or 'Innovation' project) was commissioned in late 2015. The aims of the project were to **identify consumer priorities for research and development in food innovation across the food chain, from both a consumer and citizen perspective, and to**

[2] Sciencewise is funded by the Department for Business, Innovation & Skills (BIS). Sciencewise aims to improve policy making involving science and emerging technology across Government by increasing the effectiveness with which public dialogue is used, and encouraging its wider use where appropriate. It provides a wide range of information, advice, guidance and support services aimed at policy makers and all the different stakeholders involved in science and technology policy making, including the public. Sciencewise also provides co-funding to Government departments and agencies to develop and commission public dialogue activities. www.sciencewise-erc.org.uk

[3] Locations are: Belfast, Cardiff, Dundee, Harrogate, London, Plymouth.

foster a more iterative exchange between consumers and the innovation cycle across the food chain. As the brief outlined:

'The reasons for consumers' beliefs, attitudes and behaviours do not appear to be readily engaged in setting R&D priorities. Whilst there are multiple studies on issues that concern consumers, or investigate attitudes and understanding of food safety, there does not appear to have been, in recent years, research into consumer-led innovations in the food industry.'

This aim was broken down into four objectives:

1. To increase the panel's understanding of food innovation in the context of food security

Innovation is an unfamiliar topic for many members of the Food Futures panel, as well as the wider public, and there can be a lack of understanding about what innovation is, how innovation processes work in the food system and of different types of innovation (technological and social). The first aim was educative: we sought to provide those involved in this project with information that would enable them to develop a more detailed understanding of these issues.

2. To understand public attitudes towards different types of innovation

This aim was about understanding panel members' attitudes towards different types of innovation (technological and social) and the factors influencing their attitudes.

3. To identify consumer/citizen-led priorities for new food innovation

With the third aim, we sought to go beyond existing research and dialogue work to understand panel members' priorities for new food innovation across the food chain, from both a consumer and citizen perspective.

4. To understand factors influencing innovation priorities

This aim was to identify influences on why certain innovations have been prioritised by the panel members and who they think benefits from new innovation across the food chain.

1.3. Involving specialists

As noted, we used a range of approaches to engagement in the Food Futures programme, but were guided throughout by the Sciencewise principles. These emphasise the importance of two-way conversations between publics and 'specialists', with expertise being brought into the

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room (real or virtual). Specialists act as both participants, joining the discussions and helping participants to engage with the content at hand, and hearing and learning from participants. The Innovation project involved a number of specialists from within the GFS programme, including the public panel steering group (shown left) and others recruited specifically for their expertise in food innovation.

As well as taking part in the online and offline phases of the Innovation project, specialists were involved in scoping and developing the stimulus materials. We involved specialists and stakeholders from a broad range of backgrounds, and with a range of views on the topic, including academics, third sector representatives and industry. Table 1 provides a list of specialists involved and the role they played.

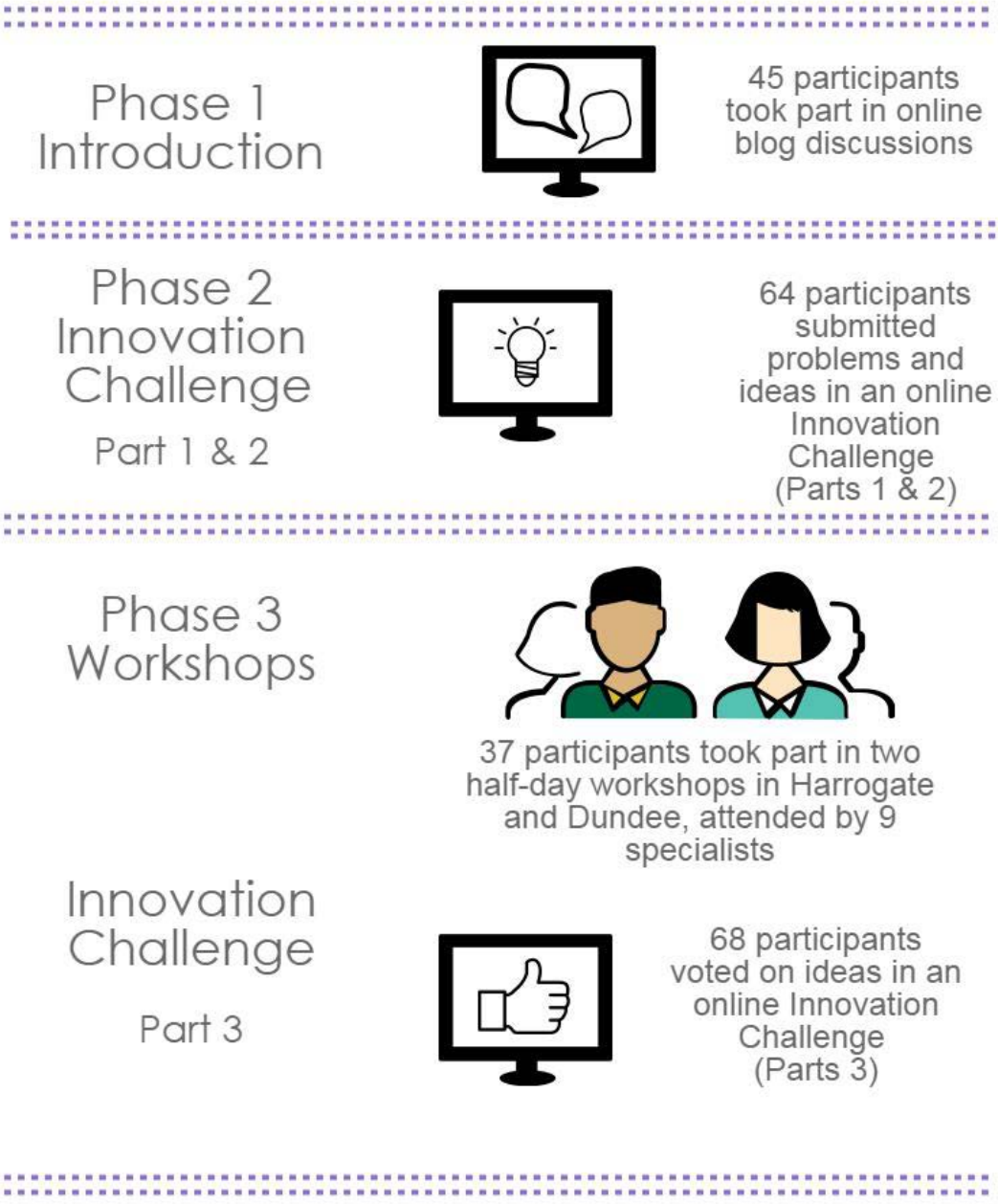
Table 1: Specialist involvement in the food innovation project

Specialist	Involvement
Professor Peter Lillford, University of Birmingham	Expert interview to inform problem framework
Simon Branch, Goldenfry Foods	Expert interview to inform problem framework
Patrick Mulvany, Food Ethics Council	Expert interview to inform problem framework
Stephen Parry, Knowledge Transfer Network	Expert interview to inform problem framework
Ian Noble, PepsiCo	Interviewed for stimulus video
Richard Bramley, farmer and NFU	Attended Harrogate workshop
Phillip Davis, Stockbridge Technology Centre	Attended Harrogate workshop
Iain Ferguson, Co-op	Attended Harrogate workshop
Teresa Belmar, Unilever	Attended Harrogate workshop
Gesa Reiss, North Yorkshire and East Riding Enterprise Partnership	Attended Harrogate workshop
Pete Ritchie, Nourish Scotland	Attended Dundee workshop
Dr. Catherine Tsang, Abertay University	Attended Dundee workshop
Dr. Alberto Fiore, Abertay University	Attended Dundee workshop
Serena Broadway, Knowledge Transfer Network	Attended Dundee workshop
Kieron Stanley, Defra	Attended Harrogate and Dundee workshops

1.4. Methodology

The Food Innovation project ran from January to March 2016 and combined a mix of on and offline activities, as shown in Figure 1 below. The stimulus material and process plans used throughout the project can be found in Appendix C.

Figure 1: Food Innovation project process



Each phase was designed to focus on one or more of the objectives. In Table 2 below we have indicated how the project phases map against these objectives.

Table 2: Phases and objectives table

Phases / Objectives	Consumer perceptions of innovation	Attitudes towards different types of innovation	Innovation priorities for global food security	Influences on innovation priorities
Introduction				
The Innovation Challenge				
Workshops				

Phase 1: Introduction

The Introduction phase was open to all panel members.[4] We wrote two blogs about innovations from across the food chain, to define and introduce the topic, highlight examples of innovations and to help readers start to explore the topic.

In the first blog we defined innovation broadly as 'something new that creates significant positive change'[5] and included a video highlighting three historical innovations named by the Royal Society as among the most significant in the history of food and drink[6]. These three innovations were: threshing (an innovation in production), fermentation (an innovation in food processing) and refrigeration (an innovation in distribution and consumption). By using historical examples of innovation, we expanded participants' understanding of what innovation means and its wider impacts through objects and processes that are commonplace today.

The second blog was more future-focused. We provided information about where new innovations can come from and gave examples of different types of innovation (broadly defined as 'technological innovations' and 'social innovations', which included regulatory and/or policy innovations, behaviour change and skills-focused and/or education interventions). We gave participants two case studies to consider, one making food last longer to reduce food waste, and a second looking at making diets healthier, and at some of the new

[4] See Appendix A for demographics of participants taking part in each phase of the Innovation project.

[5] This definition of innovation was agreed by the Food Futures project management team.

[6] https://royalsociety.org/news/2012/top-20-food-innovations/

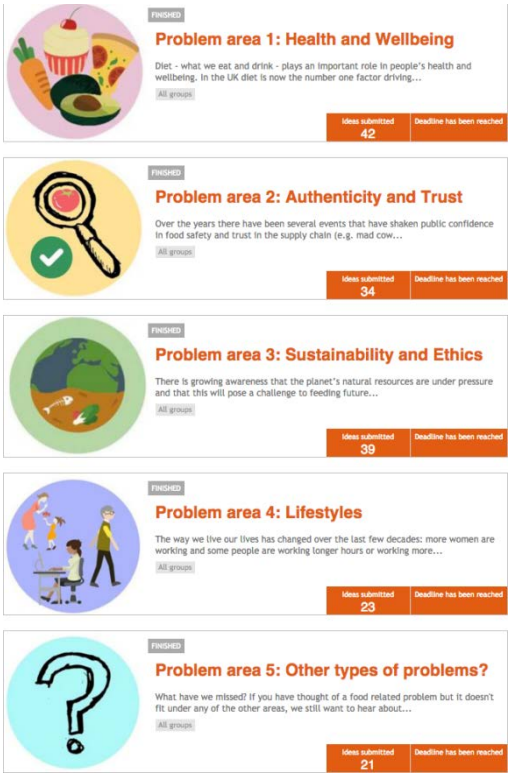
technological and social innovations being developed to tackle these problems. The purpose of these case studies was to show that problems might be tackled in a range of ways.

Phase 2: Innovation Challenge

In the second phase we ran an Innovation Challenge on the Food Futures Panel digital platform, which was open to all panel members and ran for three weeks.

- Part 1 of the Challenge phase presented five 'problem spaces': Health and Wellbeing, Authenticity and Trust, Sustainability and Ethics, Lifestyles and Other Types of Problem (see Figure 2 below for a screenshot of the problem spaces presented in Part 1). These problem spaces had been identified through expert interviews and desk research and framed in a way that was engaging to participants. Participants were invited to submit food-related problems or frustrations they had experienced in relation to these problem spaces, and to interact with other participants' submissions by 'liking' and commenting (the problems submitted, 'likes' and comments were used as a means of identifying participant priorities.) Forty-one participants submitted a total of 159 food-related problems. Twenty-one problems were submitted the 'Other' category, but on analysis these were redistributed by the facilitators to the four main problem spaces as they all related to these existing areas.

Figure 2: Screenshot of the Innovation Challenge (Part 1)



- In Part 2 of the Challenge phase, we presented participants with 'problem themes', which summarised the problems they had submitted in Part 1, grouped by theme. We took this approach because of the volume of problems submitted and the overlap between them: summaries reduced the amount of reading that would be required, enabling participants to contribute more easily and helped us to manage the process more effectively. Twenty-one problem themes were identified from the 159 individual problems submitted in Part 1[7]. Participants were asked to submit ideas for how innovation could tackle these problems and encouraged to interact with other participants' submissions through 'liking' and commenting. To

[7] The 21 problem themes are introduced in Chapter 4 – 7 of this report

enable testing on specific innovation ideas, the facilitators submitted eight ideas for participants to comment on.[8] Forty-two participants submitted a total of 176 ideas (excluding the eight ideas submitted by facilitators). See Appendix B for the ideas generated by participants.

- Part 3 of the Challenge phase was launched after the workshops had taken place and was not part of our initial design. Whilst we received a lot of comments, voting levels were lower than anticipated, so we added a third part to the Challenge, to help us understand more about the panel's priorities for innovation. In Part 3, we presented 12 ideas to the panel, on which they were asked to vote (by 'liking' for those they thought would make the biggest difference to global food security. Eight of these ideas were those that had been prioritised and developed in the workshops (see below), the remaining four were ideas selected by specialists at the Dundee workshop, including genome editing, added at the request of the BBSRC. Sixty-eight participants submitted a total of 208 comments.

Phase 3: Workshops

Two workshops were held with a cross section of panel members in Harrogate and Dundee, and each workshop lasted for half a day. A selection of the ideas for new innovation submitted by participants in the Innovation Challenge (see Chapters 4 –7 for details) was taken into the workshops to explore in further depth. We selected ideas that would include a range of social and technological ideas and represent interventions across the food chain (production, processing and packaging, retail and distribution and consumption, as visualised in Figure 3).

Figure 3: The food chain stages presented to participants

[8] The eight ideas submitted by facilitators were: genome testing, nutraceuticals such as 'brain foods', long life lasagna, personalised dietary advice, Scottish grown bananas, synthetic meat and zero-calorie cake. These ideas were identified through the scoping interviews with specialists, with the exception of genome editing which was identified by the BBSRC.

The workshop structure was the same in both locations and involved:

- An innovation show and tell: participants bought in an object from home that they thought was innovative and, in small table discussions, explained what made it innovative.
- An introduction to the problem spaces used in Part 2 of the Innovation Challenge (Health and Wellbeing, Authenticity and Trust, Sustainability and Ethics, and Lifestyles[9]): we used a carousel process where participants rotated round the spaces and voted for the problems submitted online that they thought were the biggest priorities.
- Appraisal of the ideas submitted online during the Innovation Challenge: participants worked in pairs and groups to prioritise and develop ideas, with the final task being for each group to 'pitch' the idea they had prioritised for the problem space they had been assigned to, helping us to understand their priorities for new innovation across the four problem spaces.

Specialists attended the workshops (see Table 1 at the beginning of this chapter for details) and were invited to engage with participants at their tables. Specialists and participants rotated throughout the sessions to ensure that participants were exposed to a range of perspectives. Facilitators were briefed to prompt participants throughout the morning to consider issues from a range of perspectives (consumer and citizen, types of innovation), at different scales (individual, national and global), and in relation to different steps of the food supply chain (including impacts on different actors – producers, manufacturers, retailers and consumers).

The outputs of the workshop were a prioritised shortlist of food-related problems and a prioritised shortlist of ideas for new innovation (see Chapters 4 – 7 for details of these shortlists). The shortlist of prioritised ideas from the workshops was used in Part 3 of the Innovation Challenge (see Chapter 8 for the panel's responses to these ideas).

1.5. Sampling, Recruitment and Rewards

In contrast with previous projects run on the panel, the online phases of the Innovation project were open to the whole panel, rather than participants being recruited to specific quotas. We took this approach to maximise the response rate during the relatively short time period of the project. Figure 4 below outlines the sampling and reward strategies used for the different project phases.

[9] As mentioned previously, we had originally included a fifth category called Other Types of Problem, but this was removed in Part 2 as problems submitted could be included within the other four existing problem spaces.

Figure 4: Sampling approach and reward strategy for the Food Innovation project. See Appendix A for achieved samples.

	Sampling approach	Reward strategy
Introduction phase	None – open activity	None
Innovation Challenge phase	None – open activity	Part 1 – 50p per problem submitted (limited to 4 problems) for first 200 participants Part 2 – 50p per idea submitted for first 200 participants (limited to 4 ideas). Four prizes of £50 for participants judged by specialists as submitting best ideas Part 3 - £2 for first 200 participants Digital badges as a social reward used throughout the Challenge
Workshop phase	Sampling for diversity rather than representativeness over the two locations	Reward of £50 for attending the half day workshop

The Innovation Challenge also made use of non-monetary social rewards in the form of digital badges. Six badges were created to reward: participation in the activity; interaction with the ideas of other participants, and; winning (idea with most likes and ideas selected by specialists). A leader-board showing participants with the most badges was displayed on the Innovation Challenge webpage and could be viewed by all participants.

1.6. Participation data

Figure 5: Participant numbers in the Food Innovation project phases

Figure 5 above shows the number of participants involved at each stage of the activity. There were a total of 113 participants involved, of whom 12 completed all three main stages, and 36 completed 2.

The demographic profile of participants is given in Appendix A. We have presented data for all participants who took part in the Food Innovation project, and, separately, for those attending workshops to identify any major differences between face-to-face activities and online activities.

The main differences are as follows:

- As a whole, the Food Innovation participants had qualifications of a high level (48% had level 4+ qualifications). In contrast, qualification levels were more evenly spread for workshop participants with higher representations of Level 2 and 3 qualifications (although the largest group remained level 4+ qualifications).

- There was a greater proportion of workshop participants in the 41-55 age group and 56-65 age group and a smaller proportion in the 18-25 age group and the 26-40 age group, in comparison to Food Innovation participants as a whole.
- Workshop participants were less ethnically diverse than Food Innovation participants as a whole (due to the less diverse profile of Harrogate and Dundee compared to other cities in the UK).
- There was a higher proportion of female workshop participants than female Food Innovation participants as a whole.

1.7. Analysis and reporting

We used a thematic approach to analysis, producing an overarching coding framework, specifying themes and sub-themes. As analysis continued, we modified the framework to capture emerging themes. Transcripts were read in full and we used Nvivo[10] qualitative data analysis software to support the analysis. This enabled us to interrogate the data further by running queries to explore initial coding rounds in more detail. The final report is designed to meet the Sciencewise 'Guidance for Final Dialogue Project Report', which you can view here.

Nature of data analysed: online and offline

One of the purposes of the Food Futures panel is to test the innovative methodologies offered by an online panel whose members can also be invited to for face-to-face activities. We used a mix of methods for this activity, yielding different data types:

- **Blog comments**: An asynchronous approach, with participants responding in their own time, to each other's comments and to prompt questions from facilitators. Comments varied in length but tended to express an opinion or point, with some supporting evidence or rationale.
- **Innovation Challenge submissions**: An asynchronous approach, with participants submitting problems or ideas within a specified timeframe. Participants submitted their problem or idea in response to a given subject, with a title and short description of the problem or idea.
- **Innovation Challenge comments and 'likes'**: An asynchronous approach, with participants writing comments in response to other participants' submissions and using the 'like' button to vote for the problem or idea (the only quantitative data collected in this activity). Comments generally expressed either agreement or disagreement with the original submission, suggested other ways in which the problem or idea could be framed or speculated on possible impacts of the idea.

[10] Vivo is a qualitative data analysis computer software package designed for use on qualitative unstructured data. http://www.qsrinternational.com/products_nvivo.aspx?

- **Workshops**: The only synchronous, real time approach used in the activity. The workshop data was captured by facilitators who used digital recordings to compile transcripts which are a mix of direct recordings of participant dialogue and reporting, by the facilitator of the discussion. This data set is the most detailed and voluminous, with around 20 hours of recording across the two workshops (the hours of recording was increased due to there being four facilitators present at each workshop).

The workshop notes offer the most detailed qualitative data. Qualitative data from online is a more useful guide to *what* participants raised, rather than *why.* This report is based on a cross-cutting analysis of all the data and most findings are based on several sources and appear consistently across them. Where findings are based on a particular data source this is noted in the text.

Chapter 2: Perceptions of innovation

This chapter explores the panel's perceptions of innovation in terms of how they defined innovation and their understanding of makes a product 'innovative', the actors they identified involved in the innovation process and the role of innovation in global food security.

2.1. Defining 'innovation'

As described in Chapter 1, in the first blog posted in phase 1 of the Food Innovation project, we gave a broad definition of innovation as 'something new that creates significant positive change'. We cannot determine if, and to what extent this definition influenced any understanding of innovation that participants had prior to the project.

In their comments on the blog pieces in the first phase, most tended to focus on the first dimension – that of 'newness' – in this definition, talking of novelty and originality – for example, doing something differently, or finding a bespoke solution to a problem. Many participants also spoke about innovation as a way of combining learning from old processes with new technologies. In these cases, innovation meant improvement to existing processes or products rather than a totally original idea.

Views on were mixed on the nature of innovation and whether it is revolutionary or iterative. Some participants felt that innovation in its truest sense has to result in something radically different or have life changing effects, but most conceptualised it as a more continual process of improvement, of updating or developing existing processes or products to be better in some way.

'Innovation to me means doing something in a new way that changes something for the better that can have a life changing effect on society.' (Female, 26-40, London, online blog)

'The renewal of the thought process, maybe a different slant on what is being done at the present.' (Male, 66+, Cardiff, online blog)

In discussing innovation and its meaning, most participants tended to focus on new processes, rather than new products. Examples included trying different ways to grow food, better management systems or faster ways of transporting and preserving foods. A few participants did seem to think of innovation in terms of new products which had been invented.

A few participants felt that innovation has to be beneficial to society, to individuals or to the environment, perhaps picking up on the second dimension of the definition, which refers to 'significant positive change'. Others framed it in terms of solving a problem or addressing an unmet need, and saw this as the starting point for innovation.

'I believe innovation is to challenge the normal and think about how to make something better in all manner from sustainability, to cost, health etc.' (Male, 26-40, Dundee, online blog)

'To be 'innovative' we have to tell ourselves that there is always a better way, and believe it. Although this isn't necessarily something that comes easy to all. Innovation is often the result of being faced with a problem.' (Male, 26-40, Harrogate, online blog)

Two participants specifically mentioned technology in their definitions of innovation, seeing innovation as a process of increased technological involvement and mechanisation of processes.

'I do find that 'innovation' tends to make me think about that we rely more on technology than people.' (Male, 41-55, Harrogate, online blog)

Participants were asked about their knowledge of new innovation in the food system. The majority stated that their knowledge only comprised what they had learned from participating in the Food Futures panel and expressed interest in learning more about new innovations. Others had heard or read about innovations such as vacuum storage of food, air fryer cooking and dehydrated foods.

We introduced the concept of innovation in a short video which covered some of the stories of food and drink innovations named by the Royal Society as the most significant. These included fermentation, threshing machines and refrigeration; selected to cover different stages of the food chain. The video prompted participants to consider technological and social innovation, the benefits and disadvantages of innovation and the impacts of innovation on different actors along the supply chain. Some participants were surprised at how early some of the innovations were, including refrigeration. Others felt that all innovations could have some negative impacts, with many people reflecting that whilst refrigeration had greatly increased how long food could be kept, it had also increased food waste in households because consumers were able to buy and store large quantities of food.

Actors involved in the innovation process

Although participants were not asked directly about the actors they thought were involved in the innovation process, some mentioned those they felt would be involved:

- Consumers and well known figures – demanding change or raising awareness of issues
- Businesses/manufacturers – providing technology and the financial means because they are able to profit from the innovation; responding to consumer demand
- Governments – playing a role in mitigating any negative consequences through regulation and legislation, and providing education through schools to spark the interest of future generations in solving food related problems

- Researchers and scientists – including NASA and similar space programmes playing a testing role
- Academics and universities – including students working with manufacturer sponsors to innovate

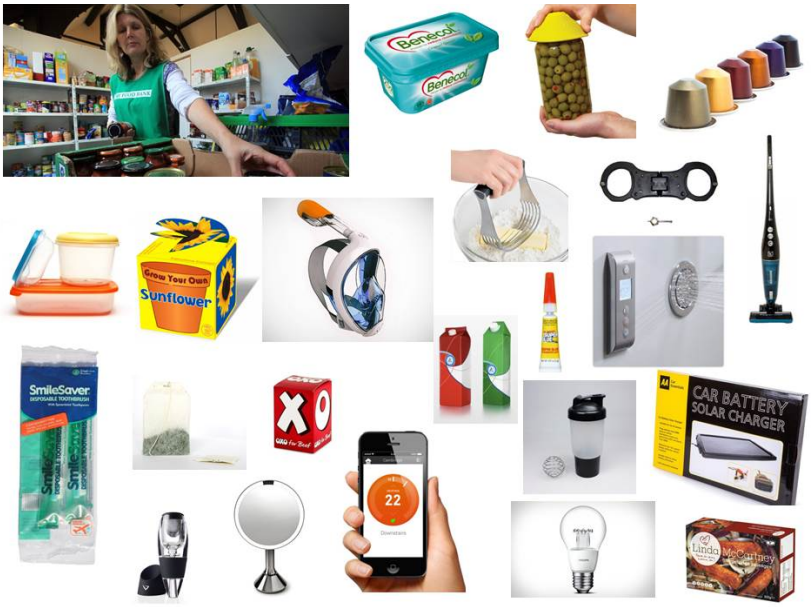
2.2. Perceptions of what makes a product or process 'innovative'

Participants who attended the workshop in Dundee and Harrogate were asked to bring in an object they felt was innovative and asked to explain what it was about their object that made it innovative (see Figure 6 below). Many gave a range of reasons: common themes included increased energy-efficiency (e.g. LED lightbulbs), use of renewable energy (e.g. solar panel) and waste reduction (e.g. fridge/freezer). This was in line with the conception of innovation as an iterative process, whereby a process is gradually made more energy-efficient or less resource-intensive over time.

Speed and convenience were common themes in participants' explanations of what makes an object innovative. Examples included relatively old labour-saving devices such as mechanical mixers, cordless vacuum cleaners, Oxo cubes, an icing extruder and a pastry-making gadget to avoid using your hands, all of which were seen as making household tasks easier.

Some participants had chosen objects which they felt helped them to get around a specific problem or challenge, whether experienced by an individual (e.g. a rubber grip to help open jars) or within an industry (e.g. Tetra Pak allowing practical transportation of liquids; rigid style handcuffs allowing a person of any strength to control a prisoner). Others felt that modifications to existing products, such as the addition of useful options or increased control over use made their objects innovative. These included electronic shower controls, a central heating thermostat which could be controlled remotely or an 'all singing all dancing' dishwasher with many different options.

Figure 6: Some of the innovative objects workshop participants bought in to share for the 'innovation show and tell' exercise



A few participants chose objects which they felt improved their eating and drinking experiences, whether aesthetically, in appearance or taste (e.g. a vegetable spiralizer which made raw foods and salads enticing, or a wine aerator device to improve the taste of wine) or ensuring consistency (e.g. microwave rice pouches).

Some participants felt their objects were innovative because they reduced negative effects (e.g. an e-cigarette seen as having a less negative impact on health than a regular cigarette, and a locally-sourced pearl barley risotto mix with the convenience of a regular ready meal, but sustainably sourced). Less commonly, some participants felt that their objects were innovative because they increased the amount of information you had access to (e.g. Apple iWatch or a sensor to assess quality of wheat crop – both ideas from a specialist) or had a social impact (e.g. a food bank redistributing surplus food as emergency provisions for people in poverty). One participant felt that their object (a chemical hand-warmer) was innovative because they found the technology behind it clever and interesting.

Some participants chose objects which they understood to be innovative because of their impact on society. These included motorised transport and the pen, which participants felt were innovative because they had opened up new possibilities and become a fundamental part of modern life.

Reducing cost was rarely mentioned as a reason for something being innovative, although this was discussed by some participants, including a wine aerator making cheap wine taste like expensive wine, or a stock cube enabling food to be made with less expenditure on fresh vegetables. However, cost reduction tended to be discussed as an additional benefit of an object, rather than its primary aim.

2.3. Role of innovation in global food security

During the workshops, participants were asked to consider which of the innovative objects they had brought in could have the greatest impact on how people in the UK purchase and consume food. As many of the innovative objects were relatively commonplace, participants tended to choose objects which they felt had been used by the largest number of people, or could be of use to many people. These included superglue, teabags and Tetra Pak. Some groups also considered innovations which they felt would solve some of their biggest concerns in the UK such as food waste and resource use, and chose items like packaging which increase shelf life, or precision farming techniques which reduce water used in agriculture.

Participants were also asked which of the innovative objects could have the biggest impact on global food security. In these cases, participants focused on efficient ways to ensure adequate nutrition to the entire global population. These included using solar panels to generate energy for cooking (and therefore reduce spend on fuel), stock cubes as a cheap form of nutrition and heating controls to keep food for longer so it doesn't spoil, thereby increasing the amount of food available.

In the online discussions, participants also considered the role of innovation in global food security. They were shown a series of technological and social innovations, including: smart

packaging; pulsed electrical fields; regulation to scrap 'best before' labels; food fortification; an electronic fork to track eating habits; and 'nudges' to consumers such as adding lines onto trolleys that indicate how much space should be filled with fruit and vegetables. They were then asked to consider the possible impacts of these innovations and who might benefit from them.

Impacts

Many participants identified impacts on consumers, discussing which innovations would help consumers to change attitudes and patterns of consumption. They focused on the need to promote eating more slowly, having smaller portion sizes, eating more 'imperfect' produce e.g. misshapen vegetables, eating less red meat, eating less processed food that is high in salt and sugar, and thinking more critically about 'best before' and 'sell by' dates. Participants felt that if consumers made these changes, it would lead to significant health benefits and would help to reduce food waste. The latter was of primary importance for many participants in the UK context where they felt food is undervalued and consumers make poor purchasing decisions.

'The general publics' attitude needs to change, we are all too lazy with our health and diet, the UK and Scottish governments spend millions on educating the public but WE don`t care, then WE complain about the N.H.S not being able to cope with all the associated illnesses and diseases brought about by our way of life and diet, WE need to do more, WE need to be more responsible and more proactive with our own health.' (Male, 41-55, Dundee, online blog)

However, some participants felt the impact of these innovations on consumer behaviours would be limited by consumer priorities when it comes to making decisions at the point of purchase, where low costs or convenience can trump other considerations.

There was some scepticism from participants that the innovations described (and the impact on consumer behaviour) were addressing what one participant referred to as 'first world problems' (i.e. problems affecting consumers in developed markets) and were not addressing the bigger challenges of feeding a growing global population in the context of climate change and limited resources.

'I'm not really sure any of these innovations will make a huge impact on global food security. All the innovations seem to be solving 1st world problems, when global food security is more to do with countries like India, Africa and China, where the population is larger than the food they can supply. These countries know how to use ingredients, it's getting supplies to them and making sure the land they have is used for their own food growth, not for us to have fine beans and roses all year round.' (Female, 26-40, London, online blog)

Other participants agreed that innovation has a bigger role to play in solving some of the problems in developing countries, rather than just the UK context. However, some participants felt that this role for innovation was limited by a lack of public or political will.

'The innovations which help to feed the hungry in developing and all countries would be the most beneficial. But I'm not convinced that innovations itself would solve that problem. It would need fair distribution, political will, justice! Ultimately, it would need a mass movement of consumers/ordinary people to demand this.' (Female, 41-55, London, online blog)

Some participants suggested that the role of innovation depends on the context. For example, if food shortages are a local challenge then the focus should be on increasing yields and efficiency, whereas in more economically developed countries where there is more food, the goal should be to reduce food waste – echoing similar findings from the other Food Futures panel projects where food security is perceived as less relevant to the UK. A few participants felt that innovation might also be about thinking in a more global and connected way. This would involve making changes to the food system e.g. fairer food distribution and consuming less in the affluent world and promoting greater awareness of global food security issues and our interconnectedness.

Who benefits?

Participants tended to conceptualise the benefits of innovation in terms of who benefits now, and who should benefit in an ideal world. They felt that innovation currently benefits retailers and supermarkets (in the form of increased profits); UK consumers (because prices are reduced, time is spared or preparing food is made easier); food manufacturers and businesses (in the form of process efficiencies); and producers.

However, some participants felt that innovation should benefit individual farmers more, as well as consumers in less economically developed countries (or just people generally).

'I think the developed world benefit from food innovations as mentioned above, I don't see much food innovation in poorly developed countries.' (Male, 41-55, Harrogate, online blog)

'Although the consumer should benefit more from innovations in food, I think that again will be the manufacturer who will really profit from this. Why else do they pour so much money into new techniques and processes?' (Female, 41-55, Cardiff, online blog)

'Everyone benefits from new innovations in food, growers, distributors, sellers, customers, governments, countries and the environment if carried out correctly.' (Male, 41-55, Harrogate, online blog)

'Who benefits? - manufacturers of equipment, supermarkets: because it creates more profit, ultimately, us because it makes food cheaper and more plentiful and available. I think that the producers may be the ones who benefit least.' (Female, 56-65, Harrogate, online blog)

Chapter 3: Attitudes towards types of innovation

This chapter provides a summary overview of the panel's attitudes towards different types of innovation, primarily to contextualise findings on the specific problems and ideas participants prioritised in the Innovation Challenge and workshops (covered in Chapters 4 to 7). We summarise the high level benefits and disadvantages that participants associate with different types of innovation which we have categorised broadly in two groups: 'technological innovations' (including scientific and technology solutions from across the food supply chain – also including new product development) and 'social innovations' (including policy and regulation, behavioural change interventions, skill development, marketing and education).

3.1. Technological innovations

We have adopted two strategies throughout the Food Innovation project to understand participants' attitudes towards technological innovations. The first strategy took an open, participant-led approach that involved participants submitting ideas for innovation. The intention was to observe the balance between technological and social innovation ideas submitted, and the kinds of technological solutions on which participants chose to focus. Participants were prompted by the online facilitators to consider different types of technological and social approaches and were given examples of each.

The second strategy was to ask for panel feedback on a small number of selected technologies. These were either introduced in the introductory blogs (for example smart packaging and new processing techniques such as pulsed electrical fields) or submitted by facilitators during the Innovation Challenge or in workshops, alongside social innovations (examples of technological innovation submitted by facilitators include genome editing, personalised dietary advice using gene mapping and nutraceuticals). These examples of specific technologies were drawn primarily from the Food and Drink Federation's Pre-Competitive Vision report[11].

At the start of the project, we had assumed that participants would focus on technological ideas due to the current social, media and policy focus on the 'disruptive'[12] role of new technologies in creating industry change such as online and mobile shopping, subscription delivery services and new growing or processing techniques. However, far fewer ideas involving technologies were submitted in Part 2 of the Challenge than we expected (only 24 out of the 176 ideas submitted were technologically focused, the remainder were focused on

[11] https://www.fdf.org.uk/events/Pre-Comp-Food-Booklet-Final.pdf

[12] "Different technologies exhibit different characteristics. Some characteristics are common between different technologies and consequently technologies can be grouped according their characteristics. One of those characteristics is the speed with which and extent to which a technology emerges and enables new applications. If a technology so emerges and as a result disrupts established boundaries of performance, cost or capability it may be labelled a disruptive technology."
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/312333/informatic-techtoolkit.pdf

social interventions). It is likely that the most significant factor explaining this is participants' **low levels of familiarity with non-ICT technologies**. When participants are familiar with a technology and feel informed about it (either through personal experience of how it works or through exposure to information/discussion about it), they seem to react more positively towards the technology. For example, we noticed that aquaponics was a technology frequently mentioned as a positive technology during the workshops and online– probably as a consequence of the panel's prior engagement with and enthusiasm for aquaponics during the Urban Agriculture project run in 2015. Mobile apps were also mentioned frequently, a technology that many participants are familiar with from their own lives.

"I think the way forward in this respect would be an app as most people now are familiar with these."(Female, 66+, Harrogate, Innovation Challenge)

Participants' general attitudes towards technological innovations are summarised in Table 3 below. The primary benefits of production and processing technologies were perceived as **increasing the scale of impact** (e.g. being able to feed/reach more people) but these benefits were countered by a fear of unnaturalness and unintended consequences. While participants could quite easily identify benefits of production and processing technologies for UK society or for specific groups (e.g. people in countries with growing populations, or people who do not have healthy diets), they seemed to **struggle to identify benefits for themselves as individual consumers.** They tended to think that technology used to add value and improve nutritional quality would **increase costs for the consumer**.

At the consumer end of the food supply chain, the technologies participants identified most spontaneously tended to be ICT-focused such as mobile apps which were regarded positively as **more modern and fun/interactive** – although potentially 'gimmicky' with no long lasting impacts.

Table 3: Summary of general attitudes towards technological innovation across the food chain

Stage in food chain	Positive aspects of technological innovation	Negative aspects of technological innovation
Production	• Scale of positive impact e.g. will be able to feed more people with technological innovation • Enables crops to be grown in UK all year round	• Involves 'messing around' with food or creating 'Frankenstein food' (in reference to GM) – not natural • Fears of unintended consequences • Mistrust of science/scientists and who is funding research – concern around vested interests • Cost of new production technologies

Processing	• Scale of positive impact e.g. food fortification reaching wider section of population • Would remove effort of people to eat healthily if food was fortified (not all participants shared this view)	• Fear of contamination, that processing technology involves chemicals • Interventions such as food fortification would reduce choice – accusations of 'nanny state' • Unfamiliarity with additive ingredients/processing methods leading to suspicion • Could make consumers less self-reliant (e.g. smart packaging)
Retail	• Makes stock control more efficient – less waste	• Would spend more time in-store if scanning products for nutritional information
Consumption	• Opportunities for linking data and information to increase information available to consumers (e.g. scanning apps for food labelling) • Making every day experiences more fun for children. Some participants felt technological solutions felt more exciting and modern • Can lead to positive behaviour change faster, compared to education which takes longer • Saves time (e.g. convenient pre-packaged food)	• Assumption that technological innovations would reduce social aspects of life/eating e.g. eating pills instead of sitting down for a meal • Perception that technological innovation would lead to more expensive products e.g. functional foods • Can be gimmicky (e.g. smart fork) – fads without lasting impact

3.2. Social and behavioural innovations

Participants were much more likely to focus on social and behavioural innovations, both in terms of the ideas submitted in the Innovation Challenge and when voting on the ideas in workshops. This is perhaps due to the perception that social and behavioural innovations are **less likely to have unintended consequences,** particularly in terms of detrimental impacts on physical health or the environment; that human control over the process is more secure; that funding is more likely to be transparent, if innovations are publicly funded; that approaches

are more likely to be familiar and hence comforting, and that educational interventions can address the root causes of problems.

Social innovations were felt to be less effective in terms of creating large-scale change at a population level, because of difficulties associated with scaling an intervention or reaching the target population most in need. However, the benefits of social innovations were thought to be longer lasting than those of technological innovations, which were sometimes perceived as faddish or quick fixes.

In Chapter 8 we look in more detail at how participants' perception of the relationship between social and technological innovations influenced their reactions and priorities. It is worth noting here though that participants favoured innovation ideas that combined the reach of technological innovation with the responsibility, certainty, control and familiarity associated with social innovations. While participants at the beginning of the process tended to take an either/or approach when submitting ideas (i.e. they were either technological or socially focused, but not both), in the phase three workshops the preferred ideas developed into pitches tended to combine elements.

While some participants expressed optimism that social innovations would reduce the need for technological innovation (e.g. by creating healthier food habits, there would be less need for interventions such as food fortification), others felt social innovations could help prepare consumers for the more disruptive technological innovations that they felt would be needed to secure global food security, though encouraging greater experimentation and more open mind sets.

"If we change in our eating habits it will prepare us for the new types of food we'll have to be eating more of in the future e.g. seaweed and insects." (Dundee workshop participant)

Table 4 below summarises the general attitudes towards social innovations across the food chain.

Table 4: Summary of attitudes towards social innovations across the food chain

Stage in food chain	Positive aspects of social innovation	Negative aspects of social innovation
Production	• Community gardens/encouraging community involvement in food production providing benefits for cohesion, mental wellbeing and connection with food	• More competition from farmers, low impact due to difficulty in scaling community gardens
Processing	• Increased transparency and traceability in food system would encourage	• Increased costs resulting from regulation/tax on manufacturers passed onto

	manufacturers to change their behaviour (will want to protect brand reputations) • Regulation on manufacturers (e.g. nutritional content etc.) will decrease consumer choice around unhealthy food making positive behaviour change more likely	consumers • Regulation decreasing consumer choice and forcing people to behave in a certain way • More information on packaging leading to information overload
Retail	• Increasing consumer exposure to new healthy foods (e.g. through retail promotion) –increase likelihood that consumers will accept new foods • Behavioural nudges (e.g. changing supermarket layouts) cheap and easy to implement	• Changes to supermarket layouts annoying for shoppers
Consumption	• Optimism that behaviour change in consumers could reduce need for technological innovation • Increases consumer self-reliance and skills • Less likely to increase food costs for consumers compared to technological innovation	• Limited reach or only reaching those who have most information/education about food issues already • Education as a 'slow burn' approach that can take years/generations for behaviour to change • Patronising (e.g. advice/guidance), assumptions made about people and their ability to make sensible choices themselves

Chapter 4: Health & Wellbeing priorities

This chapter outlines the health and wellbeing problems for food innovation to tackle that were identified by participants in the Innovation Challenge (phase two) and prioritised during the workshops (phase three), and describes the ideas submitted by participants for how to solve them. The chapter ends with an overview of the ideas for innovation prioritised by participants during the workshops. Throughout the chapter, we explore the reasons why participants prioritised particular problems and ideas and where in the food chain participants think new food innovation to improve health and wellbeing should be focused. The panel's responses to the specific ideas submitted by the facilitators for testing are highlighted in text boxes.

Figure 7: Screenshot of how the problem space was introduced in the Innovation Challenge

4.1. Priority problems for food innovation to tackle

Part 1 of the Innovation Challenge asked participants 'what problems or frustrations do you experience when trying to eat more healthily?' and invited them to submit problems on the web platform. Figure 7 above shows how the Health and Wellbeing problem space was presented to participants. Forty-four problems were submitted by participants - more than for any of the other problem spaces - suggesting that health and wellbeing is a particularly important area for the panel. The problems were clustered into seven themes, outlined in the table below. These themes are ranked in order of the number of votes received in the Harrogate and Dundee workshops, during which participants were asked to vote for the problem theme they thought was the biggest problem that food innovation should tackle.

The top three problem themes that emerged from the workshop voting were: changing food preferences and habits, the cost of healthy food, and the nutritional content of food – as outlined in Table 5 below. The sections below look at these problem themes in turn and summarise the ideas for food innovation submitted by participants to tackle the problem in

Part 2 of the Innovation Challenge (see Appendix B for full list of ideas submitted by participants).

Table 5: Results of participants' prioritisation for Healthy and Wellbeing

Problem themes generated by participants online	Number of problems submitted online relating to theme	Number of votes for problem in workshops	Number of ideas for innovation submitted online
Changing food preferences and habits	9	18	27 (+ 1 idea submitted by facilitator)
Cost of healthy food	10	10	14
Nutritional content of food	9	8	8 (+ 1 idea submitted by facilitator)
Skills and knowledge around healthy meal preparation	5	5	11
Confusing health information and labelling	5	2	6
Healthy foods less tempting	3	2	6 (+ 1 idea submitted by facilitator)
Visibility of unhealthy foods	3	2	7

4.1.1. Changing food preferences and habits

People's food preferences and habits were identified as a priority problem for innovation to tackle, because of the difficulty of changing habits once they are established, even when an individual is aware of the importance of healthy eating. Participants noted their own personal struggles or made reference to other sections of the population, particularly children.

Unhealthy food habits mentioned as problematic included snacking between meals or at night, skipping meals, eating chocolates brought into work by colleagues, comfort eating during

periods of stress or on 'bad days' and bingeing on unhealthy foods as a reward for previous healthy behaviour.

"I start missing the extra dose of salt or sugar or MSG and invariably end up bingeing on packets of snacks at least twice a week after all the efforts of cooking and eating healthy :-(" (Female, 26-40, London, Innovation Challenge)

Participants tended to attribute the difficulties of changing food habits either to a perceived deficit in themselves as individuals, such as lack of self-control or motivation, or to the addictive qualities of some unhealthy foods exploited by manufacturers to encourage repeat purchases.

"I know many processed foods have added salt or sugar so as to get consumers addicted to certain items. I occasionally fall in to the trap." (Male, 41-55, London, Innovation Challenge)

Participants who prioritised changing food preferences and habits as a problem for innovation at the workshops often did so because they viewed habits as the root cause of other health related problems. For example unhealthy habits in childhood were perceived as making an individual more susceptible to health problems in later life. By using innovation to encourage healthier food habits, participants saw an opportunity to improve the health of individuals and to change the food system more fundamentally through consumer demand, which they believed would prompt manufacturers and retailers to adapt their practices in order to remain competitive.

"I think changing habits is the most important problem because if you do this then everything else comes along with it, industry would have to follow, because of consumer power." (Harrogate workshop participant)

The ideas for innovation submitted by participants for changing food habits

Participants submitted 27 ideas online for how to change food habits through new innovation, the highest number of ideas submitted for any problem. The majority of these ideas related to interventions in the consumption stage of the food chain, suggesting that this is where participants feel innovation should be focused. The ideas are primarily social innovations, ranging from increasing the cost of advertising for unhealthy food to using psychology to 're-programme' attitudes towards

Personalised diets based on your genes:
Feedback on idea submitted by facilitators

Using nutrigenomics to provide people with personalised dietary advice. Two participants commented on the idea but disagreed as to its benefit. One participant was fairly dismissive of the idea saying that the advice would like be 'common sense', while the other was more positive and noted seeing this on the TV show Trust Me I'm A Doctor.

"Even if it did show that I could eat a lot of cake, I would still use my common sense and not indulge." (Female, 41-55, London, Innovation Challenge)

unhealthy food, such as finding ways to stop consumers viewing unhealthy food as something edible. Ideas for educational interventions to create healthy habits at a young age generally received the most support in the comments.

Only one technological idea was submitted that related to the consumption stage: an idea for an app to enable people to track their food consumption and habits. This idea did not receive any feedback from other participants, perhaps due to a lack of familiarity with self-monitoring technologies now available on the market.

A smaller number of the ideas submitted online focused on interventions in the processing/packaging and retail stages of the food chain. Two participants identified opportunities for manufacturers to create new ranges of health snacks and to make 'not so nice' healthy foods smell and taste like people's favourite unhealthy foods (such as making protein rich insects smell like Peri Peri chicken), an idea which received a couple of comments in support although one participant expressed doubt as to whether or not it would work. Other ideas included introducing regulation to stop manufacturers using ingredients or additives identified as being addictive.

Retail was identified as a stage in the food chain where innovation could help to change habits. Several ideas involved using retailers as a means of exposing consumers to new, healthier foods that they might not otherwise try through tasting demonstrations and giving away for free fruit and vegetables at checkouts that would otherwise be thrown away. Another idea was for retailers to create an aisle stocked with unhealthy options and label it 'Unhealthy Aisle' as a way of naming and shaming those who visited it.

4.1.2. Cost of healthy food

The cost of healthy food compared to unhealthy options was one of the most frequently prioritised problems, although there were relatively high levels of disagreement between participants as to whether healthy food did actually cost more.

> ***"I disagree [that healthy food costs more] – I think the cost of healthy food has come down a lot over the years. It's about trying to be clever about where you buy food and how you make it." (Dundee workshop participant)***

Amongst participants who prioritised the cost of healthy food as a problem, the foods that were perceived to cost more included:

- **Fresh food such as fruit and vegetables** – participants noted that an individual apple could cost the same as a chocolate bar, which did not always make intuitive sense given the perception that 'less work' is needed to grow an apple compared to the sourcing of ingredients and processing required to produce a chocolate bar.
- **Ingredients for cooking from scratch** – cooking meals from scratch was generally regarded as healthier than buying convenience foods, but perceived by some participants as requiring 'lots of different ingredients' that can cost more and lead to food waste.

"If you're making a meal you need to buy lots of different ingredients, but you can get a ready meal for a lot less, maybe it's full of salt and sugar and not very good for you but it's more convenient and you only have to buy one thing. There's not many healthy options where you can just go and buy one thing." (Dundee workshop participant)

- **Superfoods and organic produce** – a relatively high number of problems submitted in relation to the cost of healthy food mentioned 'superfoods' such as chia seeds or organic foods. The rationale for organic food being healthier was the lack of chemicals and greater content of natural nutrients. However, there was some skepticism expressed in relation to superfoods and organic as marketing 'fads'.

"Superfoods like chia seeds and coconut oils are really expensive, they cost a lot more. Healthy food requires a slightly higher grocery-shopping budget." (Harrogate workshop participant)

The ideas for innovation submitted by participants to reduce cost of food

No technological ideas were submitted. Ideas spanned across the food chain and involved ideas for innovation in the production stage that would encourage more people to grow food themselves, subsidies for producers and other financial incentives such as tax breaks. Ideas relevant to the distribution stage of the food chain included increasing the distribution and access to local food markets and retailers selling boxes of misshapen vegetable cheaply. At the consumption stage of the food chain ideas included making unhealthy food more expensive, making bulk and cooking from scratch easier and encouraging people to eat less (which was felt would have the additional benefit of reducing obesity).

4.1.3. Nutritional content of food

Improving the nutritional content of food was the third frequently prioritised problems, with participants particularly concerned about the high levels of sugar and salt in processed food and drink. While a number of participants in the workshops said they did not always check the nutritional labelling, those who did expressed surprise at the use of and levels of sugar and salt, particularly in foods marketed as healthy or savoury foods.

"Sometimes when I am on the go and trying to eat healthily I will look towards buying a "healthy" pre-made meal from the supermarket. The sugar and salt intake in these "healthy" meals are beyond ridiculous. A meal from Marks and Spencer's the other day tasted like someone had dropped a whole tub of salt into it." (Male, 18-25, Harrogate, Innovation Challenge)

"Savoury foods such as baked beans, ready-made sauces and tinned soup often contain sugar. It would be particularly helpful to…draw everyone's attention to sugar in savoury food." (Female, 66+, Dundee, Innovation Challenge)

When asked during workshop discussions why they thought sugar and salt were used in food processing, most participants said that manufacturers added these to improve the taste of their products. A couple of participants noted that sugar and salt, along with additives, play an additional role in preserving food.

Participants felt that it would be easy for manufacturers to replace sugar and salt with healthier alternatives, and that they were not doing so because of a concern that consumers would react negatively to what could potentially be a poorer tasting product. Indeed, a number of participants noted that they had tried products with reduced salt/sugar and reported enjoying the product less.

"I'm quite sure that manufacturers can find a cheaper, well maybe not cheaper, but a healthier alternative – I don't see why they have to put in sugar. Saying that I have tried a product without any salt or sugar in it and thought it wasn't as tasty so there's also that." (Dundee workshop participant)

These participants sympathised to some extent with manufacturers, recognising that efforts to reduce unhealthy ingredients may impact negatively on product sales. However it was generally felt that while there is a role for 'junk foods' as part of a balanced diet, manufacturers do have a social responsibility to improve the nutritional content of their products over the long term.

Participants who prioritised improving the nutritional content of food over other problems did so primarily because they believed this would have the greatest impact on population health (in the UK and globally). Participants generally saw improving population health as a problem relevant to 'other people', as many participants felt that they were capable of improving their own diets themselves.

The ideas for innovation submitted by participants to improve nutritional content

Eight ideas for innovations to improve nutritional content were submitted online. In contrast to other problems in both Health and Wellbeing and the other three problem spaces, the majority of these ideas were skewed towards scientific, technological and product innovations. This suggests that technological innovations are to a degree more expected (although not necessarily accepted) as an approach to improving the nutritional content of food. In addition, the ideas were concentrated around the earlier stages of the supply chain:

- **Production** – two ideas around using genetic modification were posted: one involving the use of genetic modification (GM) to increase the nutritional content of crops and a second involving the development of GM crops that can cure or control health diseases. No comments from other participants were left on these two ideas. However during the Dundee workshop, participants working on the problem of improving nutritional content considered the use of GM as one way to do this, after a specialist had mentioned it as a technique. These participants also considered food fortification and felt that while they did not know enough about the realities of GM (one participant noted that she still thought of 'two headed monsters'), the consensus they

came to was that safely improving the nutritional content of crops was preferable to adding nutrients during processing because the end product was more 'natural'.

"The food we feed our genes can control whether we get diseases[13] …could genetically modified food be made to cure or control health issues or diseases? If food could be modified to not only not cause health problems but maybe help people suffering from certain things then that would be beneficial all round. Less spend on health care and medications, for us personally and governments." (Female, 26-40, Dundee, Innovation Challenge)

- **Processing** – one participant submitted the idea of replacing sugar with substitutes such as stevia or maple syrup, and others commented that they had noticed some manufacturers doing this already. However awareness of products such as Coca Cola Life which uses stevia was low at the workshops (this product was included in the stimulus material). Workshop participants were generally in favour of the idea in principle, but were concerned with taste and negative effects, with several mentioning the risks associated with aspartame. The natural quality of substitutes such as stevia was generally appreciated once it was explained it came from a leaf, but others were confused as to the benefits given that sugar is also a natural ingredient from a plant.

Nutraceuticals – 'brain foods': *Feedback on idea submitted by facilitators*

Food formulated to help specific diseases such as Alzheimer's. Four participants wrote comments, responding that it was a 'potentially exciting' idea but noted that adoption may be low due to people being 'short sighted' and not concerned about preventing disease or their future health. They were concerned about the veracity of the health claims and felt EU regulation was reassuring. Another participant assumed it would be in a pill format, which would make it not seem like real food.

- Another idea submitted online to do with processing was for 'cheap and cheerful' products with added health benefits such as Flora Pro Active spread that are less expensive than current options.

"I feel that any improvement in the nutritional value of food would have to be within the reach of the not so well off. Myself included! Using Flora Pro active in place of butter is an expensive replacement. So reducing the cost of food that has health benefits must be a priority as well."(Female, 66+, Harrogate, Innovation Challenge)

[13] Participant posted a link to the following article in her online submission: https://wddty.com/news/2016/02/the-food-we-eat-changes-our-genes.html

- **Distribution** – only one idea was submitted relating to distribution and this was for distribution processes that minimise the depletion of nutrients in fresh food while the produce is being transported. The participant did not give details for how this might work.

Ideas for social innovations to improve the nutritional content of food included consumer action to demonstrate to manufacturers that consumers want sugar/salt reduced (as the participant put it "how will they know if we don't tell them?"), and a Question Time style TV programme for consumers to quiz a panel of food industry representatives.

4.1.4. Skills and knowledge around healthy meal preparation

A recurrent theme, expressed particularly by older participants, was that people have become less skilled around cooking as a result of the increase in choice available to consumers. This view was challenged by a range of participants who pointed to the increase in cookery programmes on TV, the rise of the celebrity chef and the growth of pop-up restaurants as indicators of a younger generation interested in food and cooking.

Participants felt generally that skills and knowledge levels, particularly with regards to meal planning, differs significantly across all social groups and that the prevalence of and interest in cooking programmes does not necessarily reflect increasing knowledge of or skills in food preparation.

"Yes there's loads of cooking programmes on TV now, but a lot of these are how to make a beef wellington, not how to boil an egg. They're for people who already know how to cook." (Harrogate workshop participant)

When submitting problems to do with skills and knowledge around meal preparation, participants were significantly more likely to raise it as an issue experienced by other people, not themselves. While this might be due to a bias in participant recruitment towards those with a greater interest in food, it suggests a tendency for people to distance themselves personally from the problem of not knowing how to make healthy meals.

Participants were more likely to talk about finding it difficult to be inspired to cook healthily and their confusion about knowing what foods to eat, given conflicting and changing dietary advice.

Participants who prioritised skills and knowledge around healthy meal preparation did so primarily because they thought it was an easier problem to tackle than changing food habits.

"If you know how to make a healthy meal it's just a simple thing to help people with, as opposed to the much bigger task of changing habits." (Harrogate workshop participant)

The ideas for innovation submitted by participants to increase skills

Five ideas were submitted online for how new innovation could increase consumers' skills and knowledge around meal preparation. Most of these focused on the consumption stage of the

food chain and included social ideas such as a 'Rent a Granny' scheme to connect the younger generation with older people to show them how to cook, with the dual benefit of helping older people from feeling socially isolated - an idea which during Part 3 of the Challenge was generally negatively received by older participants due to the naïve assumptions made about older people:

"This made me laugh so much...a lot of assumptions being made (e.g. elderly equates to lonely) and raises a lot of questions. Can all 'old grannies' cook well? (You've never met my mother!) I think it is a little patronising - "Come round and cook us a meal and we'll stop you feeling lonely". As an O.A.P. myself - I have enough to do!!!" (Female, 56-65, Harrogate, Innovation Challenge)

Technological ideas at the consumption stage included apps where consumers can enter ingredients or scan products to receive a list of recipes, and apps that talk consumers through step-by-step preparation of healthy meals. Ideas relating to other parts of the food chain included recipe cards in supermarkets and meal kits containing all ingredients required to make a specific meal.

4.1.5. Confusing health information and labelling

Five problems were submitted in relation to the nutritional labelling of food products during the Innovation Challenge, although in the workshops it was very rarely prioritised as a key problem.

The specific problems submitted included:

- Nutritional labelling being confusing and hard to understand, particularly in relation to sugar, salt and fat content
- Lack of information about the potentially harmful effects of ingredients especially additives and E-numbers and why these ingredients were being added to food.

"One of the biggest problems in trying to eat healthily is hidden sugar as well as the sugar in obviously sweet foods and drinks. The % of sugar is on the packaging but who keeps a tally of the % in everything consumed." (Female, 66+, Dundee, Innovation Challenge)

"Foods marked healthy still have ingredients that I can't pronounce or make head and tails of!! Isn't healthy food supposed to be real food instead of numbers??" (Female, 26-40, London, Innovation Challenge)

The limited attention given in the workshops to nutritional labelling is perhaps because labelling was one of the problems covered in Authenticity & Trust as well, where it emerged as one of the biggest priorities. Participants may have therefore decided to prioritise one of the other health related problems.

Of the two workshop participants who did prioritise nutritional labelling as an important problem for innovation, both qualified it by saying that it was part of a bigger problem of not knowing how different food products fit into a healthy diet. This suggests that while the nutritional labelling of individual products is one issue to be addressed, a more complex issue is enabling consumers to gain a complete picture across the multiple products they consume on a daily basis.

The ideas for innovation submitted by participants to make nutritional labelling less confusing

The six ideas submitted involved policy interventions such as standardised nutritional labelling that would be the same across manufacturers, along with packaging alterations such as visualising sugar/salt content in spoonful's rather than grammes, larger font sizes and explanations on packaging explaining what additives have been added and why.

The remaining ideas were focused on technological innovations for retail. They included screens that would give shoppers more information if they scanned a product (the participant who submitted this idea noted that her local supermarket enabled people to scan wine bottles) and scanners on shopping trolleys that shoppers could use to find out immediately how healthy the product is that they were thinking of buying. Participants did not consider whether this idea could be taken further, for example by using the scanner to give shoppers suggestions options for healthier alternatives.

4.1.6. Healthy food less tempting than unhealthy options

Only two problems were submitted in the Innovation Challenge around the temptation of unhealthy foods, and only two participants in the workshops prioritised it as a problem for new innovation. This was despite the fact that during workshop discussions participants generally agreed that finding unhealthy food more tempting than healthy food was a problem they could relate to personally.

Both problems submitted online related to snacking, with unhealthy snacks perceived as both cheaper and more satisfying than healthy options. Healthy snacks mentioned by participants included fresh and dried fruit, nuts, products bought in health food shops and homemade snacks. One of the responses online suggested that healthy snacks use less visually attractive packaging than unhealthy options.

"I find it tricky to find snacks which are tempting enough to keep me away from the pile of communal choccies and sweets which are always near my desk!" (Female, 26-40, Cardiff, Innovation Challenge)

"So true, coffee and a few biscuits is so much more tempting then healthy stuff." (Female, 26-40, London, Innovation Challenge)

The main barriers discussed by participants to increased consumption of healthy snacks included taste and cost. Workshop participants thought healthier snacks are more expensive

not only due to the use of more costly ingredients but because they are consumed by fewer people and therefore have to be sold at a higher price by retailers.

"I suppose bought snacks are cheap because the ingredients are cheap. Perhaps health shops would have something better but, as you say, they will be more expensive. Perhaps the prices would come down if more of us bought them." (Female, 56-65, Harrogate, Innovation Challenge)

The tempting nature of unhealthy food was not prioritised as a problem in the workshops despite participants' experience of this, because they saw it as linked to the bigger problem of changing personal preferences and habits. The pleasurable experience of unhealthy foods and snacks in terms of taste and sensation was perceived to be a reward that in turn created unhealthy habits and cravings.

"Some of the unhealthy foods just taste too good – and that good taste creates the reward that people crave, so that's what creates the bad habit." (Harrogate workshop participant)

The ideas for innovation submitted by participants to make healthy foods more tempting

Of the six ideas submitted online, half related to product development in processing and half related to social interventions in retail. Product development ideas included formulating food so that it is more attractive (e.g. more colourful) or more interesting (one participant mentioned Bounce Energy Balls), as well as a healthy cake range made out of vegetables such as beetroot.

The retail based ideas looked at demand, rather than supply: participants focused less on making the product itself more tempting and more on the use of behavioural nudges to tempt shoppers into making healthier choices, such as placing healthy snacks near checkouts and interspersing health products among unhealthy products in store aisles (e.g. putting bananas next to chocolate bars) – an idea dismissed in workshops as participants felt that most people go into a shop with specific items in mind and would not 'see' the bananas even if placed right next to the chocolate.

Zero calorie cake: *Feedback on idea submitted by* ***facilitators***

A concept for a cake with no or very low calories was tested by Foresight's Food Chain and Crops for Industry Panel in 2000 (report title: 'Preparing for the Future: Food Chain and Crops for Industry Panel Report), which one of the experts interviewed suggested we test again to see whether public attitudes had changed. Despite the introduction of zero-calorie products in other categories since 2000, participants appeared unexcited by the concept – saying that they'd prefer to eat the real thing in moderation, would worry about additives and suspected it would have poor nutritional content. An industry specialist at the Harrogate workshop also noted that a zero calorie cake is unfeasible.

The workshop participants in Dundee who worked on the problem of making healthy food more tempting felt that the problem should be reframed as 'making unhealthy food less tempting'. However they conceded that manufacturers of unhealthy food would be unlikely to do this.

4.1.7. Visibility of healthy food

Five problems were submitted in relation to the visibility of healthy food in shops and supermarkets during the Innovation Challenge, although in the workshops it was very rarely prioritised as a key problem.

The specific problems raised included:

- Placement of unhealthy snacks near to till areas
- Placement of unhealthy foods on promotion in prominent positions such as near store entrances and at the ends of shopping aisles
- The amount of shelf space given to unhealthy products.

The visibility of healthy food in shops was rarely prioritised as a problem in the workshops because participants either disagreed that the problem existed (a number of participants noted that fresh fruit and vegetables are often the first thing seen when walking into a supermarket) or that they had already noticed improvements made in recent years, such as the removal of chocolate bars from till areas in some supermarkets.

A number of participants noted in workshops that they felt a bigger issue for retailers was the choice of foods promoted through offers, due to a perception that unhealthy foods were more often promoted than healthy options.

"How foods are promoted and what foods are on offer, that's a bigger issue I think." (Harrogate workshop participant)

The ideas for innovation submitted by participants to make healthy foods more visible

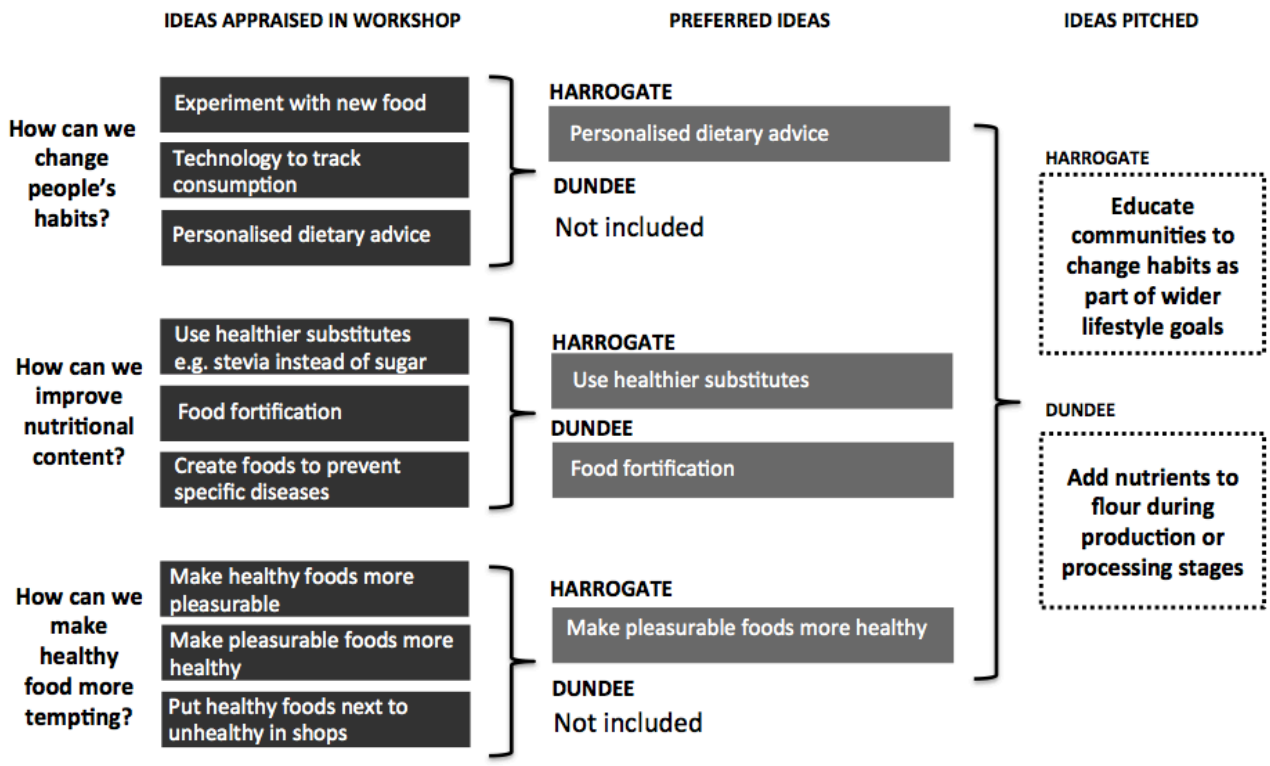
All seven ideas submitted online related to retailers. They included behavioural nudges such as changing the layout of stores so aisles are ordered by nutritional content with unhealthy food at the back of the store, and colour codes to show which aisles are most/least healthy. Other ideas focused on policy interventions such as regulation against supermarkets pushing discounted unhealthy food and more promotional offers for healthy foods.

4.2. Priorities for food innovation to improve health and wellbeing

This section summarises the responses of participants in the phase 3 workshops to the ideas we had selected for discussion from those submitted in Part 2 of the Innovation Challenge. The three problem themes we selected to take into the two workshops were: changing people's food habits, improving nutritional content and making healthy food more tempting. These themes were selected because they covered different areas of the food chain. In the workshops, participants on the table working on health and wellbeing worked in pairs and each pair was given one problem theme to work on (not all three problems were considered in each workshop due to some tables having only two pairs of participants). The pair's task was to appraise the three ideas selected from responses to Part 2 of the Challenge, looking at what they liked and disliked about the ideas, and which actors across the food chain they thought would benefit. The pairs then fed back the key points from their discussions and the table selected one problem and one idea to develop into a pitch – a process designed to understand participants' priorities for food innovation and the rationale behind their preferences.

Figure 8 below summarises the prioritisation process for the health and wellbeing ideas across the two workshops, and the final pitch ideas proposed at each workshop.

Figure 8: Prioritisation process of Health and Wellbeing ideas



4.2.1. Priority ideas for changing people's habits

This problem theme was considered in the Harrogate workshop only, because there were insufficient participants to allow for three pairs working on each problem space. The idea of increasing people's motivation to try and experiment with healthier food was liked because it was felt that people tend to like trying new things. Participants thought that getting retailers to promote healthier food would encourage greater experimentation, and have benefits for retailers and manufacturers by helping to grow the market for healthy food. This was preferred over the second idea of enabling people to track and monitor their own food consumption, an idea dismissed as being too time consuming and potentially leading to information overload. The participants also described it as potentially encouraging "obsessive" behaviour.

Participants preferred idea was giving people personalised advice on what they should eat, which was seen as a way of getting the right food to those with illnesses. Participants presumed that personalised advice would be of greater relevance to people with illnesses (e.g., diabetes and Crohn's disease) rather than for people without existing health problems. The response to participants towards genome mapping as a way to personalise dietary advice, which was included in the idea presented to participants was largely positive, although it was noted that it sounded expensive. However they identified a risk that even if people were given personalised advice, it might not lead to an actual change in behaviour. As one participant noted "you can give people advice but whether they take it is another matter". They therefore felt that the idea of giving people personalised advice could be improved by linking it to broader lifestyle goals because "food is about lifestyles, it should be about what you want to achieve in life."

4.2.2. Priority ideas for improving nutritional content

This problem was discussed in both workshops. In Harrogate the idea to improve nutritional health of foods by replacing unhealthy ingredients with healthier substitutes was initially prioritised because they felt that it would be easy for manufacturers to do this (e.g. substituting or reducing sugar content with alternatives such as stevia), as well as being easier to implement than a sugar tax. The pair appraising this idea thought it would be easy for manufacturers to substitute ingredients due to there being many alternative available to them and that consumers would appreciate more options (e.g. reduced sugar, no sugar), in the same way that there are different types of oil and different types of milk available now. They cautioned that the consumer would need to understand what the replacements are, as substitutes are likely to be unfamiliar ingredients.

However the specialist involved in this discussion - an industry representative – described how it is difficult for manufacturers to replace ingredients with healthier substitutes and that products using sugar alternatives that are already in the market, such as Coca Cola Life, have not performed well because consumers do not like the aftertaste. The group in Harrogate decided not to prioritise the idea of using healthier substitutes into a pitch, despite their initially positive reaction to the idea.

Participants in Dundee working on the same problem also decided not to prioritise the use of healthier alternatives as an idea, but for different reasons. As in Harrogate, they liked the idea at first because of the use of natural alternatives to sugar. However they felt that processing would make the product less healthy, cancelling out the initial benefit of replacing sugar with an alternative: they thought that all processing led to products becoming less healthy – "processed food sounds like it's made on a big production line for cheap with additives for longer life". The specialist sitting at the table noted that processing techniques do not necessarily make food less healthy, to which one participant responded saying that they had heard of different ways of processing tea: one which uses chemicals and one which uses filtration. The participants agreed that the filtration processing sounded healthier and that it would be their preferred technique as a result. A general observation that we made throughout the food innovation project was that participants regularly associated processing with chemicals.

An additional concern for participants was that if manufacturers replace sugar with stevia, there could be a risk that consumers start thinking of this as a health product. They felt this would not be correct, having been informed by the specialist sitting with them that stevia does not have any particular health benefits. This perhaps indicated a distinction in consumers' minds between 'health food' and 'healthy food'.

The participants in Dundee instead prioritised the idea of fortifying everyday foods with vitamins and minerals because it "improves diet for everyone". While this idea was not liked in Harrogate because of the negative impact on consumer choice (as one participant noted, "some people don't like being dictated to – it feels a bit prescriptive" and mentioned that it was analogous with fluoridating water), the scale of the positive benefit was liked in Dundee – particularly because it would have an impact on the parts of the population who "don't care what they eat" (which they noted was a large part of the population). The Dundee participants were however concerned that it could lead to negative impacts for consumers who did already eat healthily, as they might end up ingesting too many vitamins/minerals than was good for them. However this was felt to be a low risk due to the likely small amount of fortification involved in a single product.

Participants in both Harrogate and Dundee dismissed the idea of creating foods that can help prevent specific diseases, saying that disease was a complex issue with many contributory factors, and that because diseases were often genetically pre-determined it would be difficult to prevent them through food (although they thought food could help slow diseases down). In both locations, participants decided not to prioritise this idea as it was too targeted towards people with genetic predispositions to certain diseases – and would therefore not have as big an impact on the whole population as the other two ideas.

4.2.3. Priority ideas for making healthy food more tempting

This problem theme was considered in the Dundee workshop only, because of lower participant numbers in Harrogate. The first idea of making healthy foods more tempting was dismissed as participants thought that this was likely to make the food unhealthier because it would "end up being more processed". The second idea of making tempting, unhealthy foods

healthier was liked better and described as a good idea, but participants felt that it might lead to a situation where no one is being satisfied (i.e. that people who already eat healthily would be unlikely to eat this kind of product and that people who eat unhealthy foods enjoyed the experience and would likely react negatively to a change in taste). The participants thought instead that a better idea would be to make unhealthy food less tempting and less pleasurable to discourage people from buying it.

Chapter 5: Sustainability & Ethics

This chapter outlines the sustainability and ethics problems for food innovation to tackle that were identified by participants in the Innovation Challenge (phase two) and prioritised during the workshops (phase three), and describes the ideas submitted by participants for how to solve them. The chapter ends with an overview of the ideas for innovation prioritised by participants during the workshops. Throughout the chapter, we explore the reasons why participants prioritised particular problems and ideas and where in the food chain participants think new food innovation to improve sustainability and ethics should be focused. The panel's responses to the specific ideas submitted by the facilitators for testing are highlighted in text boxes.

Figure 9: Screenshot of how the problem space was introduced to participants in the Innovation Challenge

5.1.1. Priority problems for food innovation to tackle

Participants were asked online "what problems or frustrations do you experience when it comes to making sustainable and/or ethical food choices?" Figure 9 above shows how the Sustainability and Ethics problem space was presented to participants. Forty-one problems were submitted, the second highest after health and wellbeing. The problems were clustered into five themes, outlined in Table 6 below.

The top three problem themes that emerged from the workshop voting were reducing food and packaging waste, unsustainable and unethical industry practices and improving the livelihoods of farmers and others working in the food supply chain.

Table 6: Summary of prioritisation results for Sustainability and Ethics

Problem themes generated by participants online	Number of problems submitted online relating to theme	Number of votes in Harrogate and Dundee workshops	Number of ideas for innovation submitted online
Food and packaging waste	15	25	13 (+ 1 idea submitted by facilitator)
Unsustainable and unethical industry practices	10	10	3 (+ 1 idea submitted by facilitator)
Livelihoods of farmers	3	7	6
Growing population and availability of sustainable food	7	5	2 (+ 1 idea submitted by facilitator)
Where food is produced	6	0	7 (+ 1 idea submitted by facilitator)

5.1.2. Food and packaging waste

Food waste emerged as the number one priority problem in relation to Sustainability and Ethics, with fifteen problems submitted in the Innovation Challenge and the most votes in the workshops. Four of these problems related specifically to packaging and the lack of smaller sized portions for people living in single person households.

Specific issues surrounding food waste highlighted as problems included:

- Consumers not knowing how to reuse leftovers (e.g. reusing chicken meat and carcasses leftover from roast dinners)
- Consumers throwing food away if it has passed the 'use by' or 'best before' dates on packaging, even if the food is still safe to consume
- Consumers taking food for granted (due to its relative cheapness and the perception that it is in plentiful supply in the UK) and therefore not valuing it, leading to complacency

- Pack sizes aimed at families which can lead to food waste if bought by smaller households, particularly for fruit and vegetables that can no longer be bought loose
- Excess packaging and environmental impacts of plastic packaging
- Retailers throwing away surplus food that could still be safely consumed
- Retailers encouraging consumer food waste through 'buy one get one free' deals
- Retailers rejecting misshapen fruit and vegetables.

"Food waste feeds into all the other issues – if we wasted less food then we wouldn't need to produce more, farmers would make a better living and environmental impacts would be reduced." (Harrogate workshop participant)

The factors influencing participants' decision to prioritise food waste at the workshops included the growing visibility of the issue of food waste in recent media coverage, its perceived relevance to the UK, and its impact at both individual household level (cost of food wastage) and at societal level.

The ideas for innovation submitted by participants for reducing waste

Of the 13 ideas submitted online by participants, for how innovation could help reduce food and packaging waste, only one was technologically focused and was about retailers using more precise stock control and ordering systems. Around half of the ideas submitted focused on consumer education at the consumption stage of the food chain, particularly around being able to tell when food is off, to reduce dependency on use-by dates on packaging.

The other ideas focused on retailers. There was strong support for social initiatives such as regulation to ban retailers from throwing away food, which a number of participants had heard was being done in France, and giving unsold food to food-banks or to communal fridges in the streets for homeless people.

The idea of smart/intelligent packaging that changes colour to indicate freshness was submitted by facilitators but received little response in the Challenge. People who participated in the earlier blog discussions had mixed responses to the example of smart packaging that was included as one of the case studies in the second blog. Responses are summarised in the text box to the right.

Smart packaging that changes colour to indicate product freshness:
Feedback on idea submitted by facilitators

Reactions were cautiously positive. Positive reactions included it being simple and easy as a visual tool and more responsive to actual product freshness than use-by dates, which would help reduce waste. Negative reactions included a perception that consumers would find it more confusing than use-by dates, that it would be difficult to judge unless they had something to compare the colours to, potential problems for people with colour blindness and sight impairment. and doubt as to its accuracy.

"I am immediately drawn to the intelligent label as this looks the clearest and simplest to use. The intelligent labels will help people waste less food and only throw it away when it has gone off, a lot less waste should be produced as a result." (Male, 26-40, London, online blog)

"I'm not sure the colour indicator on packaging would work, even when it changed shade, you still wouldn't be 100% sure." (Female, 26-40, London, online blog)

5.1.3. Unsustainable and unethical industry practices

Ten problems were submitted in the Innovation Challenge relating to the theme of unsustainable or unethical food industry practices. There was a diverse range of specific problems raised, which included:

- Resource use, particularly the amount of water used in farming (including meat industry) and the supply of water in areas of water shortage
- Use of pesticides and fertilisers and their impact on bee populations
- Use of palm oil
- Animal welfare
- Using more renewable energy sources in production
- Environmental impact of Western consumption on developing countries where food is grown
- Lack of incentives for producers to act sustainably
- Difficulty of knowing what is the most ethical choice e.g. whether it is better to support UK farmers or low income farming communities in developing countries.

The theme of unsustainable and unethical industry practices was the second most prioritised problem in the workshops after food waste, primarily because of the scale of impact that industry practices can have on the planet. However, participants appeared to struggle to connect to the issue personally – perhaps as a result of it feeling it was not something that they themselves could make a difference to as illustrated by the quote below.

"I've heard that meat production is very resource intensive. It's one of those things that I'm aware of but it doesn't seem that it's something I could personally impact, if I went vegetarian it wouldn't make a difference, a bit like climate change." (Harrogate workshop participant)

The ideas for innovation submitted by participants to make the industry more sustainable/ethical

A few online participants were particularly against the meat industry due to vegetarianism and/or an awareness of the environmental impact of the meat industry. Most, however,

seemed to feel little connection with farming practices and this, together with the complexity of the problem is perhaps why only three ideas were submitted, two of which were policy ideas spanning across the food supply chain.

These ideas included government procurement requiring contractors to adhere to sustainability standards and a joint effort between countries to make the food industry more accountable to consumers.

"The only way this could be achieved is by countries agreeing together to tackle this, it would have to start with one country taking the lead supported by the others. The only way to make these huge industries more accountable for sustainability is by joint unilateral action". (Male, 41-55, Harrogate, Innovation Challenge)

Comments on this latter idea suggested that a global response was particularly important giving the changing environmental context within which the food system operates.

"Some really important points here - natural disasters are getting more and more common, and linked with food shortages, this seems to be getting worse. World leaders need to start taking responsibility." (Female, 41-55, Harrogate, Innovation Challenge)

The third idea was educating consumers about industry practices. The facilitators submitted an idea specifically on synthetic meat in Part 2 of the Challenge but it did not receive any comments. New sources of protein as an idea was submitted instead in Part 3 and received many more responses, summarised in the box to the right.

New sources of protein: *Feedback on idea submitted by facilitators*

Examples given included synthetic meat, insects and seaweed. One of the most divisive ideas submitted for the panel's consideration, although the need case for new sources of protein was rarely challenged. Those who were supportive of new protein sources thought that over time attitudes would change and that consumers would become more positive if they saw others eating these new types of protein. It was also thought that rather than marketing new proteins as 'pretend meat' or substitutes, it would be better to market them on the basis of their nutritional properties.

Negative reactions were generally either a result of participants thinking consuming less meat would be a better solution than the expense of developing synthetic meat or that it would be difficult for consumers to get over their initial disgust.

"I would prefer to eat insects than grown in lab meat. I think working hard to promote a less meat heavy diet would be the most straightforward way to reduce pressure on good production." (Female, 18-25, Belfast, Innovation Challenge)

"I am not keen on eating insects but an alternative source of protein could benefit the global community. And in powder form it would be easier to stomach!" (Female, 56-65, Dundee, Innovation Challenge)

"This is categorically not the way forward. Weetabix have just brought out a new product called Weetabix Protein. Maybe other manufacturers should take note. Insects? Forget it!!!" (Male, 66+, Harrogate, Innovation Challenge)

5.1.4. Livelihoods of farmers and others working in the food chain

Three problems relating to the livelihoods of those working in the food chain were submitted in the Innovation Challenge. Participants made little distinction between farmers and agribusinesses. These problems were:

- Potential negative impact of reduced sugar consumption on farmers growing sugar
- Impact of supermarkets' efforts to increase their profit margins on UK milk producers
- The livelihoods of those working in other parts of the supply chain that may not benefit from Fair Trade initiatives (e.g. shipping labourers).

"Your ethical product or fair trade product may treat the farmer more fairly, but how sure can we be that the whole supply chain follows the same fair trade policies?" (Male, 41-55, Harrogate, Innovation Challenge)

Participants in the workshops noted that consumer attitudes towards food were likely to be having a negative impact on the livelihoods of UK farmers, particularly in relation to commoditised products such as milk and imported foods, which they felt had changed consumer expectations of how much food is supposed to cost.

"People have got used to cheap imports; things like clothes are cheaper now. It's become a disposable society; people think you should be able to get things cheap." (Dundee workshop participant)

In the workshops, participants mentioned an additional problem of younger people not wanting to work in agriculture. The problem of livelihoods was prioritised by seven participants at the Harrogate workshop – influenced, perhaps by the presence at this workshop of a farmer who was a National Farmers Union representative – but not prioritised at all in the Dundee workshop. This may also be because participants felt that food waste was a bigger priority and that it would have the secondary benefit of increasing farmers' livelihoods (specifically as a result of being able to sell their misshapen crops to supermarkets).

The ideas for innovation submitted by participants to improve livelihoods

All six of the ideas submitted online were ideas for policy and business model innovations. At the production stage of the food chain, these ideas included making it illegal for foreign fishing boats to fish in British waters, subsidies for British farmers and encouraging farmers to diversify their businesses. In the retail stage, one idea was to increase the opportunities for consumers to buy direct from farmers, cutting out the retailers. In the consumption stage

ideas included increasing the costs of food - the example given was milk - to reflect the real costs of production.

5.1.5. The availability of sustainable food

Seven problems were submitted in the Innovation Challenge relating to the theme of increasing the availability of sustainably sourced food; the majority related to increasing production of food in the UK as opposed to other countries where populations are growing. Specific problems submitted included:

- Unproductive use of land which could be used to grow food (such as gardens, parks, vacant plots) and fields being used for solar panels rather than cattle grazing
- Eating goat meat and other animals currently reared in the UK only for their milk
- Unfair and unequal distribution of food globally.

At the workshops, there were instances where specialists encouraged participants to approach the problem differently. For example one group of participants in the Harrogate workshops felt that it was important to educate children not to expect food to be available all year round and to be more aware of the seasonal nature of British grown foods. The specialist in the Harrogate workshop, who had a background in developing horticulture technologies, challenged the view that seasonal food is better and made the point that indoor farming means food can increasingly be grown all year round with less use of chemicals on crops, cancelling out the use of water and energy in greenhouses. Participants responded positively to the alternative view provided by the specialist.

When considering the availability of food globally, a number of participants felt that the wider issue of population growth was a concern for policy makers.

"I think we're often looking at this the wrong way, instead of saying we need to increase the food, shouldn't we reduce the population?" (Dundee workshop participant)

The ideas for innovation submitted by participants to increase the availability of sustainable food

Only two ideas were submitted by participants online for innovation to increase the availability of sustainable foods, perhaps due to the complexity of the problem. The two ideas submitted and the comments received on these ideas covered a range of issues at the production stage and included increasing the amount of food grown all year round in the UK, using land owned by the Church for farming and increasing the number of communal gardens for food production.

Genome editing: *Feedback on idea submitted by facilitators*

A decision was made by the project management team to submit genome editing as an idea in the Challenge and to explore it further at the workshops only if prioritised by participants. A lack of voting meant it was not taken forward into the workshops but was instead included as one of the 12 ideas submitted back to the panel in Part 3 of the Challenge. Of the 14 comments we received on genome editing, 5 were positive, 6 were negative and 2 were uncertain. The comments frequently made reference to 'modified' or 'GM' suggesting participants conflated genome editing and GM. This may be because they had either not fully read or understood the information provided by facilitators (the information provided included text about genome editing written by the BBSRC and a web link to a Guardian article on the topic), or because of a deeper suspicion about science in general and 'messing with nature'. All participants responding positively to genome editing had talked about GM previously on the panel, but only one of these participants had been positive about GM in their earlier comments.

Positive attitudes included:

- Belief that GM techniques like this will be increasingly necessary in the future in order to provide enough food for a growing planet
- Belief that people should accept GE as a new innovation because it needs to be given a chance, in the same way that medical interventions that seemed scary at first ended up saving many lives
- Genome editing being more positive than GM because it is enhancing a natural product unlike GM (this was the only response that specifically considered genome editing in relation to GM).

"I know it all sounds scientific but if everybody thought the same way we would not have electricity heart transplants etc. Give it a chance." (Male, 56-65, Belfast, Innovation Challenge)

"Surely Genome Editing would be the way forward because all you are doing is enhancing a natural product, as opposed to GM, which is not." (Male, 41-55, Harrogate Innovation Challenge)

Negative attitudes included:

- Scepticism as to why this is needed given then high levels of food wastage
- "Scary" because well-meaning scientists may be wrong
- Modification as unnatural
- Uncertainty around impact, implications and who is funding research into genome editing and why
- Doubt as to whether it can work given seeds would still need to be planted in the ground where it can pick up impurities (assuming that not all crops can be grown in perfect lab-based conditions)

"I'm not really comfortable with messing with DNA (modified, edited much of the same really), even if produced I would not buy it. However if it was a choice of famine or genome edited food, then the food would win." (Female, 26-40, London, Innovation Challenge)

"I find this frightening because I am worried that the scientists, no matter how well meaning, may be wrong. Who is funding the research and why?" (Female, 66+, Harrogate, Innovation Challenge)

5.1.6. Where food is produced

The problems prioritised by participants

Six problems relating to where food is grown were submitted in the Innovation Challenge. These problems focused on:

- Transporting food over long distances
- Knowing which foods are in season (as these are likely to be British grown)
- Increasing the amount of food produced in the UK to reduce imports.

"Why is there so much food being flown around the world? This seems to go on 7 days a week, 365 days a year, so imagine the carbon footprint of all this flying asparagus etc.!" (Male, 56-65, London, Innovation Challenge)

One participant online noted that consumer demand for healthy 'superfoods' such as quinoa could undermine the quest for sustainable foods if the former involves importing food into the UK.

"They talk sustainability and then go flying/chasing quinoa all over the world. I am tired of these food fads and superfood ideas that come by every couple of years." (Female, 26-40, London, Innovation Challenge)

There was little awareness among participants online or in the workshops that food such as tomatoes grown in countries like Spain can be more sustainable than food grown in heated greenhouses in the UK. As a result, most discussions around this problem focused on reducing air miles and importing less food – although in the workshops it was recognised that this might reduce consumer choice, as there could be fewer types of food available if the UK was more self-reliant.

Scottish bananas: *Feedback on idea submitted by facilitators*

A concept for growing varieties of banana usually imported in Scottish greenhouses, tested by Foresight's Food Chain and Crops for Industry Panel in 2000 (report title 'Preparing for the Future: Food Chain and Crops for Industry Panel Report'). One of the specialists interviewed suggested we test this again to see whether public attitudes had changed. Only two comments were received but both were positive, agreeing that it was a good use of new technology and that it would likely taste the same.

"Yes I would buy them. With the technology we have now this could be possible and why would they taste any different. This is also something our milk producing farmers could diversify to." (Male, 56-65, Belfast, Innovation Challenge)

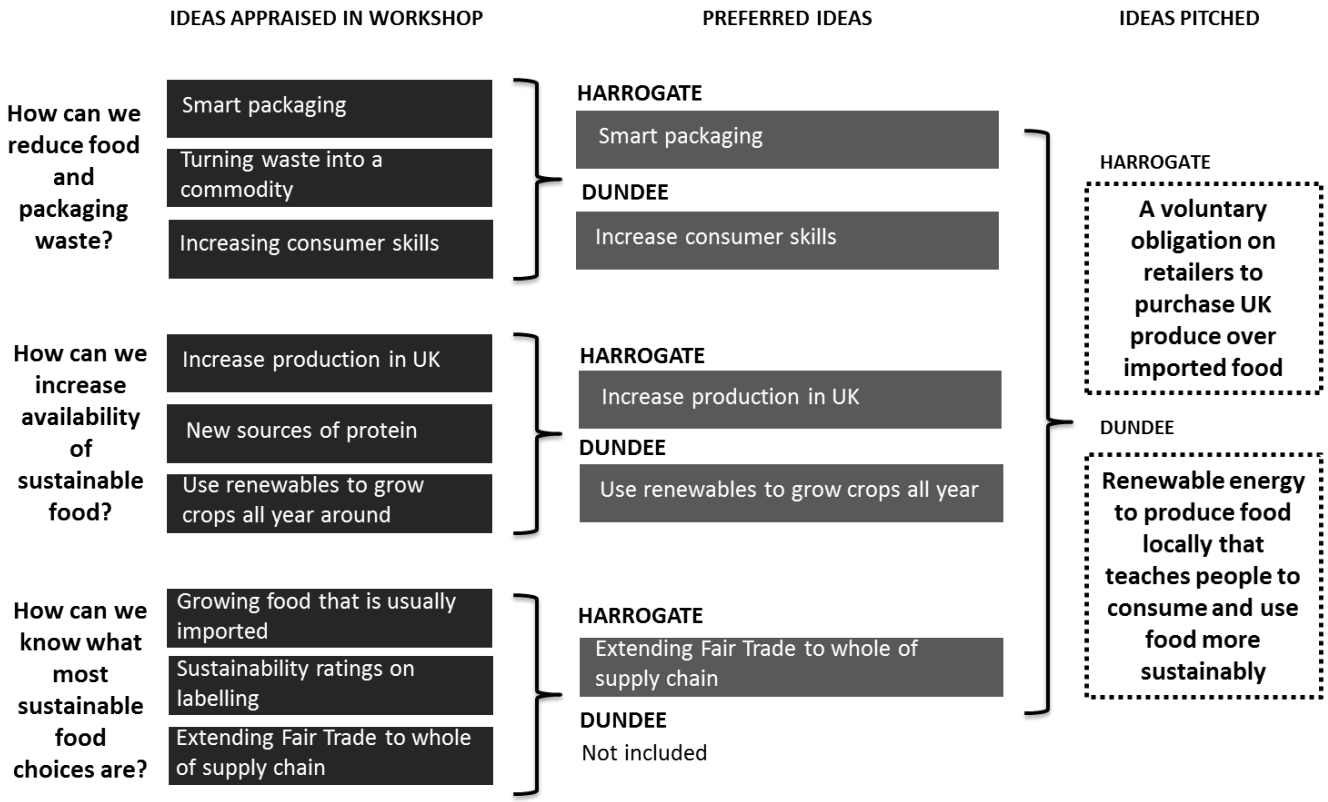
The ideas for innovation submitted by participants for where food is grown

Of the seven ideas submitted, two related to production technology with ideas around using technology to grow crops in the UK that are usually imported and increasing investment in new technologies that can grow food all year round. The other ideas were policy interventions around making it mandatory for imported food to display carbon footprint on packaging and taxing imports based on their carbon footprint.

5.2. Priorities for food innovation to improve sustainability and ethics

This section summarises the responses of workshop participants to the ideas we had selected from Part 2 of the Innovation Challenge (see Chapter 1 for a description of the selection process). Figure 10 below summarises the prioritisation process for the sustainability and ethics ideas across the two workshops, and the final pitch ideas proposed at each workshop.

Figure 10: Prioritisation process for Sustainability and Ethics ideas



5.2.1. Priority ideas for reducing food and packaging waste

This problem theme was covered in both workshops and the ideas given to participants to appraise were: smart packaging that changes colour to indicate when food is off (an idea submitted by facilitators), turning food waste into a useful commodity and increasing the ability of consumers to tell when food is off e.g. judging for themselves through looking and smelling the product (both participant generated ideas).

Smart packaging emerged as the prioritised idea in the Harrogate workshop, because participants felt it would be more responsive to actual product deterioration than use by dates and would therefore be a more effective. Smart packaging was preferred over the idea of educating consumers how to tell when food was off because it was felt it would more quickly lead to change among more people (given the time and resource it would take to implement a public awareness campaign). However the opposite conclusion was reached among the Dundee participants, who described it as the least important idea because it would increase packaging, make consumers even less skilled ("people are already too reliant on use-by dates so this would make things worse"), too gimmicky and would likely increase the costs of food because manufacturers would probably pass the cost onto consumers.

Turning food waste into a useful commodity was not prioritised in either workshop, but participants reacted favourable towards the idea, saying that it was "common sense" to do this as most food processing results in by-products, and this is something that they try to do in their personal lives, for example by turning food waste into compost, or using leftover chicken from roast dinners in new meals. There was also a perception that the food industry is already doing this, in that it was assumed a lot of processed food would be using up vegetables and meat products that would otherwise be discarded, perhaps in cheap processed food or animal feed, and that farmers dig unsold crops back into the field.

5.2.2. Priority ideas for increasing availability of sustainable food

This problem theme was also covered in both workshops and the ideas given to participants were: increasing production in the UK, using renewables in farming (both participant generated ideas) and new sources of protein (an idea submitted by facilitators).

In Dundee participants prioritised the idea of using renewables in farming to grow crops all year round, because they saw it as working particularly well in Scotland where food production is limited by light rather than by land availability, although the lack of seasonality in food was raised as an issue in relation to all year production.

This idea was not prioritised in Harrogate due to participants assuming the set-up costs involved for farmers would be unfeasibly high. Instead they prioritised increasing production in the UK, particularly after the specialist sitting at the table (a farmer) told them about a decline in UK production since 1988, of which participants had not been aware.

"People need to be educated on the issue – I was shocked to see how little of the UK food consumption is produced here, and that it's declining." (Harrogate workshop participant)

The benefits of increasing production were seen to be supporting local economics, reducing transportation and increasing self-sufficiency, which they thought would make the UK more resilient in case of a big event such as war. Participants also felt that food produced in the UK would be cheaper, on the grounds that transporting food over long distances is the most costly stage of the food supply chain. Participants were informed by the specialist that this was not necessarily the case and the specialist noted too that if food costs did go up as a result of increasing production in the UK, this would make UK food prices more comparable to those in other countries. Despite this information, the participants struggled to accept that the idea they wanted to pitch (regulation forcing retailers to purchase British sourced food when that option was available) was likely to lead to increased food prices for UK consumers. However, they did decide to modify their idea, relaxing mandatory regulation to a voluntary choice for retailers.

The third idea of new sources of protein received mixed reactions and was not prioritised. Participants were more in favour of eating seaweed and insects than synthetic meat, although noted that they preferred the idea of insects being used in animal feed rather than for direct human consumption. Even in this scenario however participants said that labelling meat as 'insect fed' was likely to put consumers off – preferring instead that seaweed was fed to animals as a source of protein. This is a clear example of the discrepancy between how people can positively react to ideas as citizens – the recognition that new sources of protein would likely be much more sustainable – but be unwilling to translate this into their choices as consumers.

"If the packaging said 'fed on maggots; you wouldn't buy it, but it's like reclaimed meat, you don't know so you buy it." (Harrogate workshop participant)

5.2.3. Priority ideas for making sustainable/ethical food choices

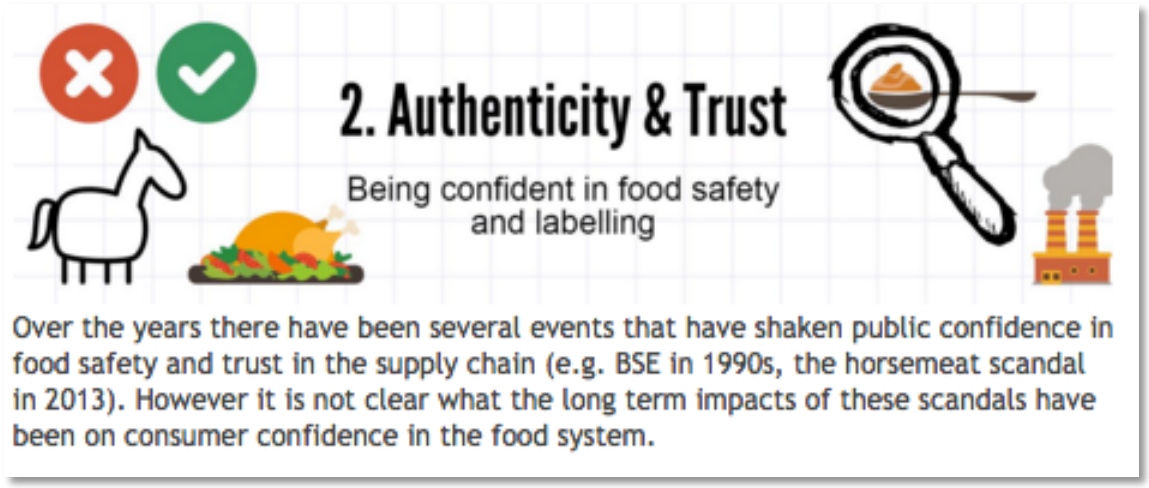
This problem theme was covered in Harrogate only because there were insufficient participants numbers in Dundee to have three pairs working on each problem space. The ideas given to participants were: growing food that is usually imported (an idea submitted by facilitators), sustainability ratings on labelling and extending Fair Trade certification to other parts of the supply chain (both participant generated ideas). The latter idea was prioritised, although it was interpreted as meaning that Fair Trade should be applied to British producers, not just overseas producers in developing markets. This interpretation of the idea was liked because it was felt it would benefit small farmers in the UK (rather than just farmers abroad). The specialist pointed out that small farms do not necessarily mean "good farms" as they can be inefficient, so participants suggested instead that the Fair Trade for UK idea apply to independent producers or those who met certain ethical production and/or labour standards.

The idea of including sustainability ratings on packaging was rejected, being seen as yet another thing to read, while growing food in the UK that was usually imported (e.g. bananas) was liked in principle but disregarded because it was felt that the increased costs for consumers and producers outweighed the benefits.

Chapter 6: Authenticity & Trust

This chapter outlines the authenticity and trust problems for food innovation to tackle that were identified by participants in the Innovation Challenge (phase two) and prioritised during the workshops (phase three), and describes the ideas submitted by participants for how to solve them. The chapter ends with an overview of the ideas for innovation prioritised by participants during the workshops. Throughout the chapter, we explore the reasons why participants prioritised particular problems and ideas and where in the food chain participants think new food innovation to improve authenticity and trust should be focused. The panel's responses to the specific ideas submitted by the facilitators for testing are highlighted in text boxes.

Figure 11: Screenshot of how the problem space was introduced in the Innovation Challenge



6.1. Priority problems for food innovation to tackle

Participants were asked online "what problems or frustrations do you experience when it comes to knowing that the food you buy is safe to eat and/or trustworthy?" Figure 11 above shows how the Authenticity and Trust space was presented to participants. Thirty two problems were submitted. The problems were clustered into four themes, outlined in Table 7 below.

The top three problem themes that emerged from the workshop voting were: knowing what happens to food in the supply chain, misleading product claims and confusing product labelling (this overlaps with the problem identified in Health and Wellbeing of confusing nutritional labelling).

Table 7: Summary of prioritisation results for Authenticity and Trust

Problem themes generated by participants online	Number of problems submitted online relating to theme	Number of votes in Harrogate and Dundee workshops	Number of ideas for innovation submitted online
What happens to food in the supply chain	10	15	5
Misleading product claims	10	12	7
Confusing product labelling	8	11	10
Access to product information	4	9	5

6.1.1. What happens to food in the supply chain

Ten problems were submitted in the Innovation Challenge relating to the issue of what happens to food in the supply chain, with the majority of these problems centred on issues of trust, control and food safety.

Underlying these problems was a feeling that the complexity of food supply chains can make it difficult for consumers to trust the food they buy, compounded by the perceived lack of connection between the consumer and the producer/manufacturers of food. Meat and eggs were the foods most frequently mentioned by participants as the foods most important to be able to trust.

> ***"I think if you buy fresh meat and fruit/veg it's easier to believe they aren't filled with God knows what, but unless you were to track it from planting to the shelf you can't really know what extra additives it contains or what chemicals have been used on it." (Female, 26-40, Dundee, Innovation Challenge)***

Several participants noted that the longer supply chains are, the less control they presumed there could be over food passing through the chain. This was particularly true when it came to food sourced internationally, with several participants both online and in the workshops saying that food from the UK probably has a more secure supply chain.

One of the participants concerned with the length of supply chains described how this prompted her to source local meat whenever possible, as a way of ensuring the supply chain her food passed through was as short as possible.

"I take the 'local solution' fix rather than fixing the overall problem. Because I'm not sure about a lot of suppliers/supply chains, I eat very much more locally now." (Female, 41-55, Belfast, Innovation Challenge)

In addition to the length and complexity of food supply chains, a number of participants were also concerned about the profit motives of large companies operating in the supply chain.

"I don't generally trust what I hear from large companies or corporations as it's in their best interest to manipulate consumers into believing what they want them to." (Female, 26-40, Dundee, Innovation Challenge)

Some participants expressed more positive views on the role that brands play in establishing trust: for example, a couple of participants in the workshops noted that they were less likely to check packaging labels if they are familiar with the manufacturing brand.

Participants assumed generally that there are checks and balances in place to ensure food safety and compliance, but were not always sure what standards are guaranteed by the trade bodies and trust marks referred to on some food packaging, or the countries to which these apply (e.g. the Red Tractor, Rainforest Alliance, Soil Association and Red Lion marks).

The ideas for innovation submitted by participants to know what happens in the food chain

Five ideas were submitted online for innovation, spanning all stages of the food chain except the production stage. The ideas were all policy and education/information interventions. Policy ideas included creating the food supply chain equivalent of CE marks used in other industries to ensure standards and suitability for the market, and increasing the transparency of the supply chain by making manufacturers list all suppliers and information about additives and length of time between production and distribution on product packaging. Education interventions included retailers launching marketing campaigns to let consumers know what standards they expect of their suppliers.

6.1.2. Misleading product claims

Ten problems were submitted in the Innovation Challenge relating to misleading product claims. These problems covered a number of claims felt to be misleading including:

- **Health claims** – particularly in relation to the marketing of healthy products, for example Nutribars were mentioned by one participant as an example of a product marketed as healthy but containing high levels of sugar. Claims such as 'no added sugar' were also highlighted as misleading by participants who noted that levels of naturally occurring sugar could be high in fruit-based products. There was less

discussion of health claims made by functional food[14] products (i.e. foods that have targeted and additional health benefits), although this was an issue raised in the Dundee workshop in relation to the specific product of Benecol's spread, which claims to reduce cholesterol (a participant had bought this product in as part of the innovation show and tell exercise). These participants were reassured when a specialist described how EU legislation limited what claims a manufacturer could make and that the participant's own positive experience of the product as an alternative to statin pills justified the claim in her mind.

"Misleading product claims like 'low fat' but then have really high sugar. They trick people into thinking they are doing well when they are not." (Dundee workshop participant)

- **Provenance claims** – these included clearer country of origin labelling rather than just where products are processed, as well as manufacturer's use of fictional places such as Marks & Spencer's branding of 'Lochmuir' salmon.
- **Ingredient claims** – unsurprisingly participants frequently mentioned horsemeat as a particular low point in the practice of suppliers and manufacturers misleading consumers. Other ingredient claims mentioned included white fish, turkey ham and reconstituted meat. In all cases participants assumed suppliers and manufacturers made false ingredient claims in order to save money.

"White fish is an area where false claims are made. I was aware that some products that are supposed to have cod actually have some other type of white fish. All the time producers will try to cut corners." (Harrogate workshop participant)

There was some difference in opinion between participants as to where responsibility lies in relation to misleading product claims. While many participants felt that existing British and EU legislation provided a safeguard that should be enforced more strongly across the supply chain, others felt that consumers also had a responsibility to educate themselves about their food.

"With all these things it's about understand all the hidden caveats it's your responsibility to read the packaging and to educate yourself about it." (Harrogate workshop participant)

The ideas for innovation submitted by participants to stop misleading product claims

The seven ideas submitted online all involved social innovation in the form of policy interventions in the **production** and **processing** stages of the supply chain. These policy ideas included introducing Food Agency certification of foods, stricter enforcement of existing

[14] See the European Commission leaflet on functional foods for more information: http://www.eurosfaire.prd.fr/7pc/documents/1276590504_functional_foods_en_publi_ce.pdf

legislation, penalties and enforced shutdown of manufacturers found to make false claims, voluntary pledges to avoid jargon on packaging and banning ambiguous and unclear product claims. One participant felt that intervention in the consumption stage of the food chain would be beneficial in the form of educating consumers to take more personal responsibility for reading labels and understanding the food system.

6.1.3. Confusing product labelling

Eight problems were submitted in relation to confusing product labelling. These problems centred around:

- **Lack of standardization,** particularly in manufacturers' use of traffic light labelling, making it more difficult to compare products. Participants who raised this as an issue were not sure why it would be difficult to create and enforce a standardised system across food packaging, noting that universal symbols had been achieved in other areas of life such as road signs.

"There seems to be a liberal interpretation with some manufacturers as to how best to use the food 'traffic light' system." (Male, 41-55, London, Innovation Challenge)

- **Confusing nutritional labelling**, particularly around nutritional information being difficult to visualise and it being hard to weigh up overall product healthiness when, for example, a product is labeled as low fat but with high amounts of sugar.

"Sometimes you can't separate the information from the marketing. The two things can become blurred." (Harrogate workshop participant)

- **Country of origin labelling** not distinguishing between the country where food is grown or reared and the country where food is processed. This was mentioned in relation to both fresh produce such as meat as well as processed goods involving lots of ingredients.

"Whitby Scampi isn't from Whitby they just put on the breadcrumbs in Whitby. It should just say scampi." (Harrogate workshop participant)

The appetite for information on packaging, and the level of detail desired varied considerably between participants, with some saying that they would like more information while others felt this would lead to information overload for the consumer (along with an excess of packaging to provide enough space for all of the information!).

Despite the differences between participants in terms of appetite for additional information, making labelling less confusing was prioritised as a key problem as it would help consumers 'struggling to make the right decision'.

"Confusing labelling is the big one for me – if you can get this one right then everything else is covered." (Harrogate workshop participant)

The ideas for innovation submitted by participants to make labelling less confusing

Participants in the Innovation Challenge submitted ten ideas for innovations to make labelling less confusing, more than the number of ideas submitted for any of the other Authenticity and Trust related problems. The majority of these were centred in the **processing/packaging** stage of the food supply chain and included standardising traffic lights on food packaging, printing explanations of trust marks on packaging, making existing information easier to visualise (such as spoonfuls instead of grammes) and providing more information about what additives and e-numbers have been added and why.

6.1.4. Access to product information

Four problems were submitted in the Innovation Challenge in relation to missing or hard to find information that participants felt would be beneficial to include on packaging. This information included:

- Lists of suppliers who have been involved
- Countries of origin and countries of processing
- Fertilizers and chemicals used in production and processing
- Animal welfare standards

In addition, a small number of participants felt that while there had been improvements made in terms of the quantity and quality of information on food packaging, food bought in restaurants, pubs and food service establishments did not always provide customers with sufficient information about the food served.

"I tend to buy most of my food from the local market so feel fairly secure in it's background, however there are very few restaurants / pubs in the area I live which are organic or ethical in comparison to other parts of the country (London, Brighton etc.). It would be great if eateries gave more detail about the products they use." (Female, 26-40, Cardiff, Innovation Challenge)

The role of trust influenced participants' prioritisation of this problem, with some participants saying that they if they trusted a brand, they would take less notice of product information because they would trust the manufacturer or retailer to have made decisions with their customers' best interests in mind.

The ideas for innovation submitted by participants for increasing access to information

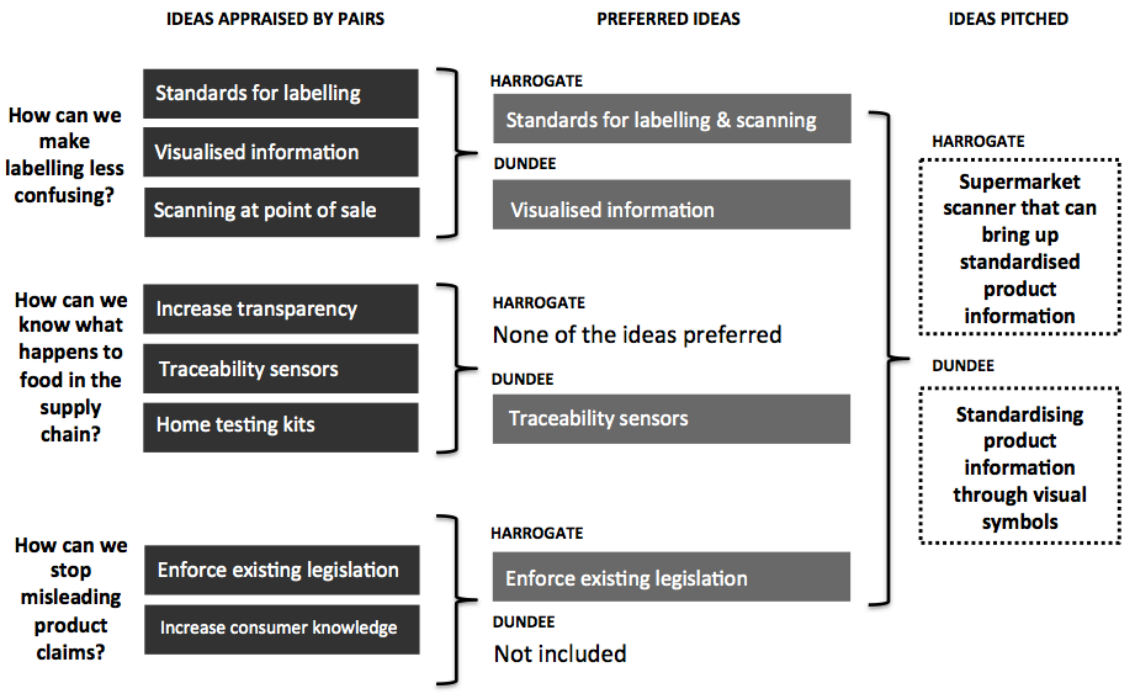
Interestingly the five ideas submitted online all related to technological innovation, in contrast to the tendency towards social innovations displayed by participants across most of the other

problems. This is perhaps indicative of participants' greater familiarity with information/communication technologies. Ideas included QR codes on packaging and menus which give additional information to consumers when scanned, apps or information screens in retail that can be consulted for additional information at the point of sale and information on manufacturers' websites.

6.2. Priorities for food innovation to improve authenticity and trust

This section summarises the responses of workshop participants to the ideas we had selected from Part 2 of the Innovation Challenge. Figure 12 below summarises the prioritisation process for the authenticity and trust ideas across the two workshops, and the final pitch ideas proposed at each workshop.

Figure 12: Prioritisation process for Authenticity and Trust ideas



6.2.1. Priority ideas for making labelling less confusing

In the Harrogate and Dundee workshops, participants discussed three ideas during the idea appraisal exercise: standardised labelling, making product information easier to visualise and scanning packaging at the point of sale to access additional information (all ideas generated by participants in the Innovation Challenge). Participants at the Harrogate workshop preferred **standardisation of traffic lights** as a solution to making labelling easier to understand, saying that the traffic light system is clean, accessible to all ages and user-friendly, whereas they quickly started seeing problems around **visualising nutritional content** through spoonfuls raising specific questions such as what size of spoon would be used.

"Not a great idea as you can't have a spoonful of fat so it's only sugar that is covered." (Harrogate workshop participant)

The Harrogate participants felt no one would benefit from visualising nutritional content in spoonfuls – it would be a 'waste of time' for manufacturers and retailers, and confusing for consumers, whereas standardisation however would have clear benefits for consumers by making information more accessible and saving them time by making it easier to compare products. Manufacturers were also felt to benefit because they would become 'aware of the need for improved nutritional content'. In contrast the Dundee participants prioritised the idea of visualising information as it was felt to be universally beneficial for all types of consumer (e.g. children, illiterate, people who do not speak English etc.).

The idea of increasing access to information through **enabling product scanning in retail** to bring up additional product information was particularly liked in Harrogate – where participants described it as a modern solution, being quick and easy and a way to engage children while food shopping. Participants thought that a scanning device attached to trolleys would be better than a mobile app as it would be more accessible.

6.2.2. Priority ideas for knowing what happens to food in the supply chain

Participants in both workshops also considered ideas for knowing what happens to food in the supply chain, the selected ideas being: increasing transparency by giving information about supplies (a participant generated idea from the Innovation Challenge), enabling consumers to track food/ingredients through the supply chain through sensors and providing ways for consumers to check that food is what it says it is on the label (both technologically focused ideas introduced by facilitators for testing).

Despite emerging as the most prioritised problem theme in the workshops, participants in both workshops did not respond particularly positively to any of the ideas – with the overall perception that the ideas shifted too much burden of responsibility on the consumer. It was felt that the three ideas would only really appeal to consumers who are particularly anxious and/or very interested in where their food comes from. This suggests a mismatch between the priorities of participants when wearing their 'citizen' vs. 'consumer' hats, in that participants felt the problem was important for establishing societal trust in the food chain, but not one that particularly engages the day-to-day concerns of consumers.

Practical concerns were also raised: it was felt that while greater transparency of the food chain was a good thing, **listing all suppliers on packaging** would lead to information overload for consumers. Similarly allowing consumers to **track food through the food chain** was not perceived to be a cost-effective solution for any of the actors in the supply chain (and if done via QR codes would require consumers to have access to a smartphone), and that providing ways for consumers to **check their food through home kits** would be too time consuming (one participant described it as akin to privatising public health).

The reactions to the selected ideas suggest that from a consumer perspective, it may be beneficial for these ideas to be re-prioritised towards other stages of the food supply chain rather than the consumption stage, where they currently sit. Or in other words, for retailers and manufactures to do the tracking/testing themselves and communicate the results to consumers, rather than enabling or expecting consumers to do it themselves.

6.2.3. Priority ideas for stopping misleading product claims

Due to participant numbers, the problem theme of misleading product claims was only considered in the Harrogate workshop. The ideas selected to take into the workshop were: enforcing legislation more strongly against manufactures found to be making misleading claims and increasing consumer knowledge about food (e.g. education about additives and E numbers) – both participant generated ideas for the Innovation Challenge. Participants responded most positively to **stronger enforcement of legislation** because it would "force large companies to be more honest and open" which was felt to be important for increasing consumer trust in the food system. It was also felt that this idea would reward "honest manufacturers" and would encourage companies to protect their reputations.

Chapter 7: Lifestyles

This chapter outlines the lifestyle problems for food innovation to tackle that were identified by participants in the Innovation Challenge (phase two) and prioritised during the workshops (phase three), and describes the ideas submitted by participants for how to solve them. The chapter ends with an overview of the ideas for innovation prioritised by participants during the workshops. Throughout the chapter, we explore the reasons why participants prioritised particular problems and ideas and where in the food chain participants think new food innovation to improve lifestyles should be focused. The panel's responses to the specific ideas submitted by the facilitators for testing are highlighted in text boxes.

Figure 13: Screenshot of how the problem space was introduced in the Innovation Challenge

7.1. Priority problems for food innovation to tackle

Participants were asked online "what problems or frustrations do you experience when it comes to fitting food shopping and meal preparation into your lifestyle?" Figure 13 above shows how the Lifestyles problem space was presented to participants. Nineteen problems were submitted, the least in any of the problem spaces, suggesting that this area resonated least with the panel. The problems were clustered into four themes, outlined in Table 8 below.

The top three problem themes that emerged from the workshop voting were: meeting the lifestyle needs of demographic groups, food consumption becoming less sociable and the time it takes to prepare meals.

Table 8: Summary of prioritisation results for Lifestyles

Problem themes generated by participants online	Number of problems submitted online relating to theme	Number of votes in Harrogate and Dundee workshops	Number of ideas for innovation submitted online
Needs of demographic groups	2	18	17
Food consumption becoming less sociable	3	13	10
Time it takes to prepare meals	7	9	5 (+ 1 idea submitted by facilitator)
Difficulty planning meals	5	1	5
Fitting grocery shopping into lifestyles	2	0	2

7.1.1. Needs of demographic groups

Only four participants in the Innovation Challenge submitted problems with reference to the food-related needs of specific demographic groups. Three related to older people in single person households, and concerned food waste. The fourth related to the difficulty of finding healthy, convenient food to feed children while on the go. No problems were submitted that referred to demographic groups with specific dietary requirements, suggesting that this was not a problem at the forefront of participants' minds.

In the workshops, when the problem of demographic needs was presented directly to participants, in relation to the needs of older people and of children, participants prioritised this as the most important lifestyle problem for innovation. The demographic needs identified by participants at the workshops included:

- Older people finding it difficult to prepare food (participants noted a range of ages that they felt this applied to)
- Single person households finding it difficult to find pre-packaged food in single portions (leading to food waste and higher expenditure on food)
- The importance of food and food shopping as social activities for older people post retirement
- Food solutions for older populations such as 'meals on wheels' feeling out of date with the more positive, physically active identities that many older people now have

- Providing healthy food for children
- Growing number of food intolerances and allergies among children
- Fussy children and encouraging children to expand their repertoire of foods.

The ideas for innovation submitted by participants for demographic targeting

The needs of an ageing population was not included as a theme in Part 2 of the Innovation Challenge as it had not emerged as a distinct problem in Part 1, other than as a food waste issue. We did include this as an idea for the workshops, and will discuss it in more depth at the end of this chapter.

The health needs of children was included in Part 2 of the Challenge and 17 ideas were submitted by participants online. This is a relatively high number compared to the number of ideas submitted for other problems, suggesting that it is a priority issue for the panel and one to which participants, particularly those who are parents, can relate.

The ideas submitted focused mainly on social interventions that would make healthy eating more exciting for children such as making it easier for children to be involved in cooking, initiatives like 'Fruity Fridays' in schools and vegetables cut into fun shapes.

7.1.2. Food consumption becoming less sociable

While only three problems relating to food consumption becoming a less social activity were submitted in the Innovation challenge, the theme emerged as the second highest lifestyle priority for innovation in the workshops. This may be because it is quite different from the other types of lifestyle problems submitted, which focused more on convenience, speaking instead to the social role of food in consumer's lives.

The specific problems submitted were:

- Families and friends eating together less at home, resulting in less bonding and lower wellbeing particularly for families
- Colleagues not eating together at work.

During the workshops the majority of participants agreed that in an ideal world families should sit down and eat meals together, but accepted that the reality of family members' clashing timetables makes it difficult. Participants noted that social norms differed by type of occasion, with food often playing an important role in special occasions such as Sunday lunches, birthdays and parties. In more mundane, everyday situations food is seen more as 'fuel'.

"It's too easy to think of food as fuel, it should be an occasion" (Harrogate workshop participant)

Participants described negative consequences to thinking of food as fuel, suggesting that it reduces the value people place in food and reduces it to a commodity. One of the specialists at the Harrogate workshop prioritised making food more sociable as a problem for innovation to

tackle because it would encourage people to think more about their food, such as where it comes from and how it is prepared.

Participants who prioritised sociability as a problem for innovation did so because they felt it could potentially have a positive impact on healthy eating as people would not snack as much if there were sitting down to three square meals.

The ideas for innovation prioritised by participants to make food more sociable

All but one of the ten ideas submitted were social innovations. These ideas clustered around the production and consumption stages of the food chain:

- **Production** - making allotments more social, shared spaces for the community and encouraging developers to include community gardens in their project plans.
- **Consumption** – cooking clubs (like supper clubs but focused on cooking), encouraging families to eat meals together, discouraging the use of technology at the dinner table and having 'thank you' lunches to show appreciation for colleagues and paid for by employers. The one technology based idea was for an app that connects neighbours and local communities to share food experiences.

7.1.3. Time it takes to prepare meals

The time it takes to prepare meals emerged most frequently as a theme in the Innovation Challenge with seven problems submitted by participants. This was not prioritised as the key theme during workshops. Two things might explain this. First is that while many people experience time pressures, there is some social stigma detectible around convenience food, which may have made workshop participants reluctant to prioritise this. Second the older age profile of workshop participants may mean that fitting meal preparation around work was less of an immediate concern for them.

The specific time-related problems submitted online included:

- Time it takes to cook meals from scratch
- Time it takes to prepare vegetables
- Coming home tired from work and not having time to cook meals in the evening
- Working parents finding it difficult to cook meals from scratch, as this can then reduce the amount of time families have to eat together and fit in other activities such as homework and after school activities
- Perception that vegetarian meals take longer to prepare than meat based meals.

In the workshops, there were occasions when participants expressed sometimes strong moral judgments about convenience food and found it difficult to relate to the struggles that some households face when it comes to cooking from scratch. This meant that there was some disagreement between participants when discussing how big a priority this problem was for innovation – with those participants who did not prioritise it describing it as a 'perceived problem, not a real problem'.

"Why would you buy a pre-prepared pizza when you have flour and water at home? Packaged/prepared food should not be seen as the norm, they be seen as the exception. It should be a luxury to have food processed for you." (Harrogate workshop participant)

Participants who did prioritise reducing the time it takes to prepare meals did so because of the benefits that the instant satisfaction of convenience meals can bring, particularly when feeling tired or stressed, as well as the increased time it creates for people to do other things that are important to them.

The ideas for innovation submitted by participants for reducing time of meal preparation

Five ideas were submitted online and all but one involved ideas for product development or cooking technologies. The product development ideas submitted are already in the market and mainstream, such as ready chopped vegetables and meal kits. Many participants, online as well as in the workshops, drew attention to the benefits of slow cookers and pressure cookers as technologies that enabled them to cook from scratch in a time efficient way, for example by setting the slow cooker before leaving for work. A number of participants felt that it was unnecessary to buy convenience foods because meals could be cooked in bulk at the weekends, and they submitted ideas for making bulk cooking easier.

Long-life lasagne: *Feedback on idea submitted by facilitators*

Foresight's Food Chain and Crops for Industry Panel in 2000 tested a concept for a long-life lasagne (report title 'Preparing for the Future: Food Chain and Crops for Industry Panel Report'). One of the experts interviewed suggested we test this idea again to see whether public attitudes had changed.

Only one comment was received which responded negatively to the idea, both because of the assumed use of preservatives and also because of the perception that fresh is better.

"I'm not sure of this! Would they have to use preservatives? If they didn't include any nasties, then perhaps I would consider but it doesn't sound too enticing. But maybe it's because I like fresh food!"

(Female, 41-55, London, Innovation Challenge)

7.1.4. Difficulty planning meals

Five problems were submitted around the theme of meal planning, although none of these submissions were expressed as a problem directly experienced by the submitting participant. In all cases, participants described solutions they used to overcome the problem, for example by cooking in bulk at the weekends and freezing portions, or using slow cookers in the morning before going to work to prepare the evening meal.

"I was brought up to plan the meals for the week and bulk bake and freeze, this is an easy way with slow cooker and freezer working full time, it provides a good wholesome meal and

buying in bulk can save money too, we need more education, I can't say I have ever seen a cookbook for bulk cooking." (Female, 41-55, Plymouth, Innovation Challenge)

Meal planning was prioritised as a problem for innovation by just one participant at the workshops, who voted for it due to the difficulty she experienced as a working parent having to prepare and stagger different meals for children depending on their ages and after school activities.

"I can relate to this, I'm tired, have three jobs and kids eating at different times of the day. It's always a struggle but I can manage it if I plan every week in advance." (Harrogate workshop participant)

The ideas for innovation submitted by participants for making meal planning easier

Of the five ideas submitted by participants online, only one was a product/distribution innovation – a home delivery of meal boxes containing ingredients for specific meals (the participant noted that she used the Hello Fresh meal delivery service). Other ideas included recipe cards and recipe signage in retailers and recipe books for quick meals. One participant described a DIY innovation of planning her meals around supermarket deals and promotions.

7.1.5. Fitting grocery shopping around lifestyle

Only two problems were submitted in the Innovation Challenge that related to food shopping, and no participants at the workshops prioritised it as an issue. This was primarily because they felt that there had already been substantial innovation over the last decade that had made food shopping easier and more flexible, with the most frequently mentioned innovations being online shopping, the extension of retailers' opening hours and the expansion of smaller bricks-and-mortar retail stores opened in urban areas by supermarket chains.

"I see this as a non-problem. It's easier than ever to shop there are shops everywhere such as Tesco Metros, Sainsbury's Local, you can shop any time of the day." (Dundee workshop participant)

The two problems submitted online in relation to food shopping were:

- Finding the time to go to the supermarket during the week
- Having to shop at more expensive convenience stores if unable to do weekly shop at the supermarket during the weekend.

Several participants who do their grocery shopping online reported additional benefits beyond the convenience of buying online, such as finding it easier to plan meals and track weekly expenditure on food.

"The biggest issue for me is simply finding time to go to the supermarket and buy the items I require. I now have an on-going shopping list with Ocado which allows me to edit my

households needs/wants whilst also keeping track of budget." (Female, 18-25, Harrogate, Innovation Challenge)

The ideas for innovation submitted by participants to make grocery shopping easier

Just as the number of problems submitted was low, so too was the number of ideas, suggesting again this was not a priority area for participants.

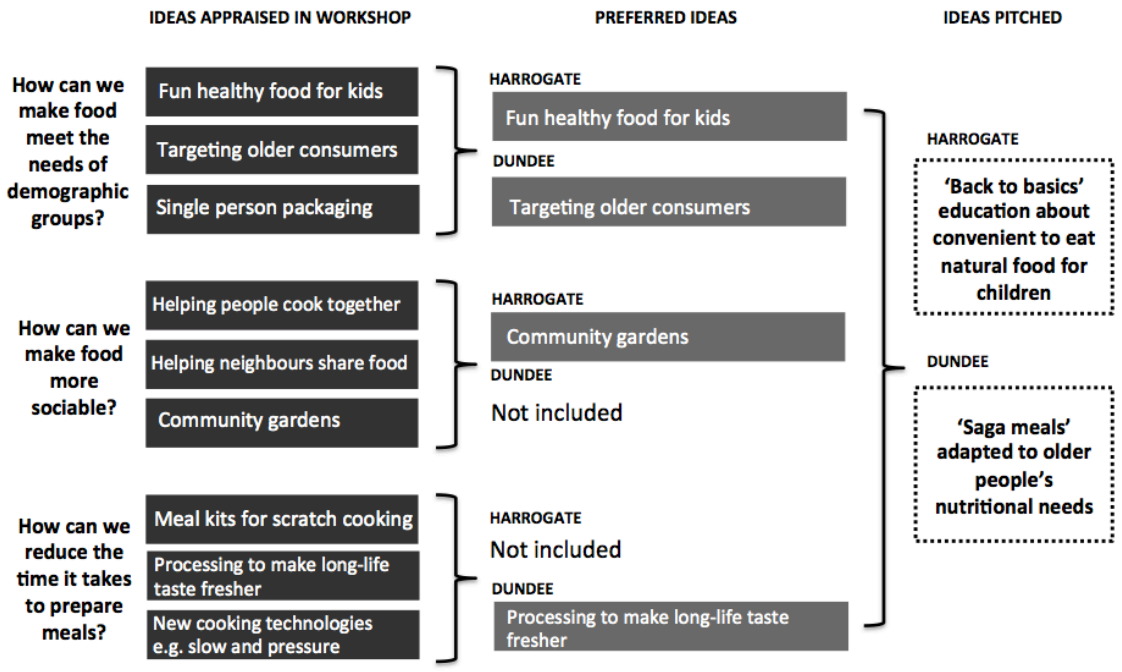
The most interesting idea was submitted by one participant who questioned the assumption that fresh equals healthy, an assumption which she saw as leading people to go food shopping more frequently in order to purchase fresh food. Instead she suggested showing how healthy meals can be made from long-life and store cupboard ingredients (such as kimchi and rice), which would reduce the number of shopping trips for fresh food – making grocery shopping easier to fit into people's lifestyles. When asked by the facilitator why she thought fresh was assumed to be healthier, she replied:

"I don't think there is any real logical reason why fresh is thought of as best. I guess in the past fresh really did mean fresh but these days it's not always true. The fresh fish at the supermarket counter sometimes states it's previously been frozen. Fresh produce is transported around so much, who knows exactly when it was picked, as they are so packed with pesticides they can stay 'fresh' for weeks." (Female, 26-40, London, Innovation Challenge)

7.2. Priorities for food innovation to improve lifestyles

This section summarises the responses of workshop participants to the innovation ideas to improve lifestyles we had selected from Part 2 of the Innovation Challenge. Figure 14 below summarises the prioritisation process for the lifestyle ideas across the two workshops, and the final pitch ideas proposed at each workshop.

Figure 14: Prioritisation process of Lifestyle ideas



7.2.1. Priority ideas for making food meet the needs of demographic groups

This problem theme was included in both workshops, with participants working on the problem considering the following three pre-selected ideas: fun and healthy convenient foods for children, single person packaging (both participant generated ideas from the Innovation Challenge) and targeting the nutritional and lifestyle needs of older consumers (an idea introduced by facilitators).

Participants in Harrogate prioritised the idea of making fun and healthy convenient food for children because it was felt to solve a real problem that parents face and was seen as having longer-term benefits for population health and the food preferences of the next generation. However use of the word 'convenience' in the idea made participants cautious due to their seemingly deep-rooted association of convenience with unhealthy processed food. They emphasised in their pitch idea the use of natural food and consumer education. When prompted on what role technology would have in their idea, the participants suggested that it would be minimal, because it could introduce chemicals into the children's food. The specialist sitting at the table, who had a background in the development of horticulture technology for use in indoor farming, noted that technology is not always about chemicals, but the participants still remained cautious about the role of technology in their idea and continued to emphasis the idea of 'natural' (i.e. non-processed, non-additive) food.

In Dundee the participants appraising the idea of fun and healthy convenient food for children were positive about the idea in terms of the fun element, noting that this was important for encouraging behaviour change in children. However, as in Harrogate, the participants reacted against the use of the word 'convenience', taking this to mean that the food would be pre-

packaged, which they saw as potentially having a negative impact on children's attitudes towards food in general. Instead the participants suggested the idea should be changed to emphasise fun ways of teaching children how to prepare foods. The participants did note that making fun and healthy convenient food for children could have significant benefits for all stages of the food chain, such as increased footfall for retailers, more demand and profit for manufacturers, and more incentives for producers to grow healthier crops.

The Dundee group prioritised the idea of foods targeting the health and lifestyle needs of older consumers. The primary benefits they saw in this idea were that it could provide an alternative to pills or medication, which were felt to be an unattractive side to getting older and the emphasis on prevention, saying that this would help "get to the root cause rather than the symptoms". The product they developed for their pitch idea was a range of 'Saga meals' adapted to the digestive and calorific needs of more sedentary lifestyles. When the table presented this idea to the other participants at the Dundee workshop, the idea was met with some derision, particularly among the older participants – in response to the perception that all older people have sedentary lifestyles.

This suggests that it is important for foods targeted at older consumers to enable and reflect more positive and aspirational attitudes towards their age. Other negative responses to the idea included the risk that pre-prepared food would reduce opportunities for social interaction, such as having people around for dinner and cooking for friends. There was also a perception that could make older consumers "lazy" – in their own eyes or in the eyes of others. The Dundee participants working on the idea felt there would be benefits for all actors in the supply chain – particularly for manufacturers who would benefit from it being an added value product and serving a growing market. While it was felt that products targeted at older people would offer more choice to a consumer group that is often ignored by marketers, the risks were that it would be expensive and, if marketed badly, entrench negative perceptions of ageing.

While the issue of single-person sized packaging was not prioritised as the pitch idea at either workshop, participants in both locations responded positively to the idea. They liked it as a way of helping to reduce food waste, making it easier to store food in smaller kitchens, and offering more variety in diet to consumers by increasing purchase frequency: – "you don't have to use up the big quantities you've bought".

However they disliked that it would likely increase packaging waste, which participants in Dundee called the 'M&S effect' of selling small bags of vegetables rather than individual or loose pieces of unpacked produce; that it would cost more than bulk buying, and would make food less sociable due to the single portions. The perceived benefits for actors in the food chain included less over-production for farmers due to there being less food waste, lower transport costs for manufacturers (although participants noted that single servings might have a negative impact on manufacturers' ability to take advantage of economies of scale), and faster turnaround for retailers as a result of single servings being bought more frequently.

7.2.2. Priority ideas for making food more sociable

This problem theme was only included in the Harrogate workshop due to participant numbers (there were not enough participants to have three pairs working on each problem space). The three ideas selected for participant appraisal were: helping people cook together, apps to help neighbours share food and community gardens – all ideas generated by participants in the Innovation Challenge. None of the ideas emerged as a clear winner. Helping people cook together was liked because it would provide the additional benefit of educating people about what goes into food, but it was thought that cooking clubs sounded expensive, unless they could be funded by community groups, and might not be regular enough to make a difference. The idea of an app to connect neighbours to share leftover meals was liked as it would help promote community cohesions and networks, but would likely not be used by older consumers due to the app-based nature of the idea. People liked the idea of community gardens used for collective growing too, but thought it would be difficult to scale and hence was unlikely to have wider benefits for society. Participants also noted that it could impact negatively on producers' incomes if more consumers were growing their own food.

7.2.3. Priority ideas for reducing the time it takes to prepare meals

This problem theme was only included in the Dundee workshop due to participant numbers (there were not enough participants to have three pairs working on each problem space). The three ideas given to participants were: enabling people to buy meal kits to make cooking from scratch easier, enabling people to make use of new or different cooking techniques such as slow and pressure cookers (both participant generated ideas from the Innovation Challenge) and using new processing techniques that make food last longer while retaining a fresh taste (an idea submitted by facilitators). None of the ideas emerged as a clear winner.

Cooking from scratch meal kits (participants mentioned both fresh and dry kits) were liked because they would reduce waste and if they came with recipes were seen as a good way of teaching people how to cook. The negative comments related to likely cost. A couple of participants had tried services such as Hello Fresh[15], but the majority had not come across the concept of home delivered meal kits. The participants saw an opportunity for these meal kits to be sold direct to consumers from farms, which they thought would be beneficial to consumers in reducing the price and increase their access to fresh food, as well as beneficial to producers as it would be a new market.

Participants struggled with the idea of using new processing techniques that make food last longer while retaining a fresher taste. Examples provided to participants included a long-life lasagne and 21 day old orange juice that still tasted fresh. From a citizen point of view they could see benefits such as reducing waste for retailers because it would have a longer use-by

[15] Hello Fresh is a company providing subscriptions to 'recipe boxes' of ingredients for specific meals delivered to homes https://www.hellofresh.co.uk/

date, as well as less waste for consumers who would save money as a result. However, from a consumer point of view they reacted negatively to the idea.

"I can't get my head around how it is possible, it doesn't feel like you'd be eating something fresh or healthy, it feels unnatural and wouldn't feel fresh even if it tasted like it was." (Dundee workshop participant)

This suggests that in order to be accepted as an innovation, the benefit of fresh taste may not be the most salient benefit to communicate to consumers, given that it seems participants would conceive it as "unnaturally" fresh (assuming they knew the product had been processed in this way). Explaining the processing technique might help demystify products, as would communicating the benefits for value and reduced wastage across the food supply chain.

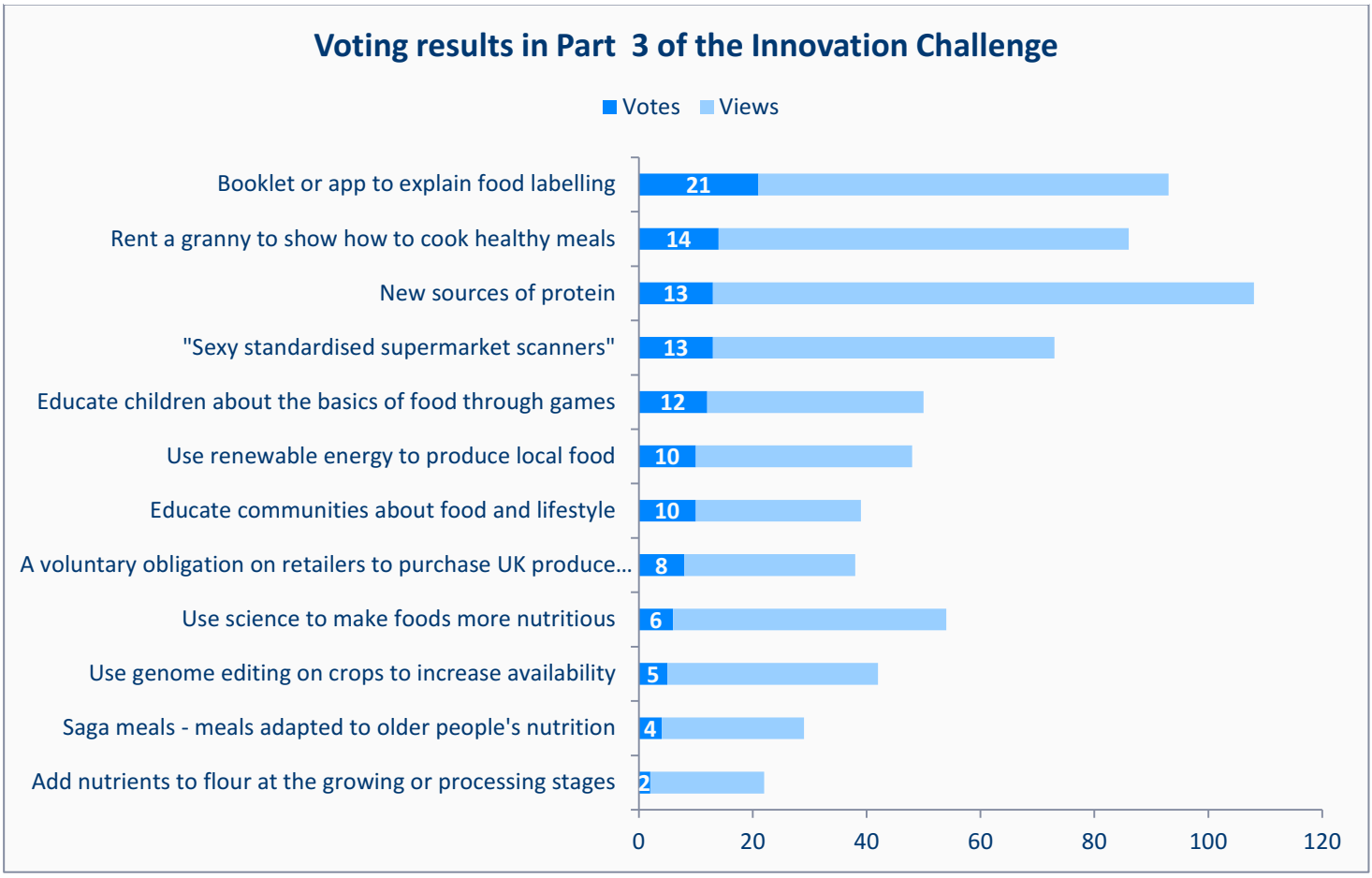
Chapter 8: Factors influencing prioritisation

This chapter looks across the four problem spaces to provide a cross-cutting view of the factors that have influenced participants' decision-making around which ideas they consider priorities. The chapter begins by looking at the voting results from Part 3 of the Innovation Challenge and then explores five factors that we have identified as key influences on the panel's priorities for new innovation throughout the activity phases.

8.1. Voting results from the Innovation Challenge

The last part of the Innovation Challenge asked participants to vote for which of the 12 selected ideas they thought would make the biggest difference to global food security (see Chapter 1 for how these ideas were selected). Eight of these ideas were those pitched by participants at the Harrogate and Dundee workshops, three were chosen by specialists at the Dundee workshops and BBSRC asked for genome editing to be included in voting due to the lack of engagement with the idea earlier in the Innovation Challenge. Figure 15 below presents the voting results, along with the page views for each of the ideas (68 participants took part).

Figure 15: Voting results, Part 3 of the Innovation Challenge



8.2. Factors influencing innovation priorities

When analysing why participants prioritised one idea over another, five factors emerge as having an influence on their decision-making. These are:

- Beneficiaries of food innovation
- Certainty of benefit
- Likely scale of impact
- Feasibility and likelihood of the new food innovation being bought to market
- Type of innovation and balance of technological and social approaches.

8.2.1. Factor 1: Beneficiaries of food innovation

When we asked participants at the beginning of the innovation topic who they thought benefited from new food innovation generally, some were optimistic that new innovation could, and should, benefit all actors in the food system – although that some actors might benefit faster than others.

"The benefits from new innovations must benefit us all eventually! I guess the people who make the ideas a practical possibility must be the first to benefit." (Female, 66+. Harrogate, online blog)

"Everyone benefits from new innovations in food, growers, distributors, sellers, customers, governments, countries and the environment if carried out correctly." ((Male, 41-55, Harrogate, online blog)

Other participants noted that in practice, the benefits of new food innovations are unlikely to be evenly distributed. Participants tended to view producers as benefiting least from new food innovations, due to the perception that profit is more likely to accrue at the later stages of the food supply chain with manufacturers and retailers rather than farmers (participants were largely unaware of agribusinesses).

"Who benefits from new innovation? Manufacturers of equipment and supermarkets: because it creates more profit, ultimately, us because it makes food cheaper and more plentiful and available. I think that the producers may be the ones who benefit least." (Female, 56-65, Harrogate, online blog)

Consumers in the UK, producers and consumers in developing countries and the environment also emerged as actors who might benefit least, depending on where participants saw the balance of power lying. For example, some participants felt that consumer demand plays an important role in influencing the market, whereas others were more cynical about the power of consumers to affect change.

"If you dig deeper and look at long term and short term affects and realize one of these always suffers – either the environment or the producers or the consumers." (Female, 26-40, London, online blog)

"Although the consumer should benefit more from innovations in food, I think that again will be the manufacturer who will really profit from this. Why else do they pour so much money into new techniques and processes?" (Female, 41-55, Cardiff, online blog)

Participants were more likely to prioritise ideas for food innovation which were seen as having benefits for actors across the food chain, but only if they could first see a clear benefit for consumers and/or wider society. For example one of the participants who voted for the idea pitched at the Harrogate workshop of a voluntary obligation on retailers to source locally grown food described it as an idea in which "everyone wins", due to his perception that it would have a positive benefit on the livelihoods of producers, the reputations of retailers and growth of the local economy.

"Brilliant as it promotes home grown supports our rural economies and makes our retailers look as if they actually care, everyone wins" (Male, 41-55, Harrogate, Innovation Challenge)

Table 9: Benefits for actors across the food chain identified by participants

Who benefits	Benefits identified	Disadvantages identified
Producers	• Improved reputation • Diversified business	• Lower incomes • More responsibility • Costs of technology
Manufacturers	• Improved reputation • Higher profit margins • Greater efficiency • Higher demand for products • Lower transportation costs	• More responsibility • Reduced sales • Less economies of scale
Retailers	• Improved reputation • Improved sales / more footfall • New markets to compete in • Less wastage • Longer product shelf-life	• Costs of technology • More responsibility

	• Faster product turnover • Increasing time shoppers spend in-store	
Consumers	• More informed • Healthier • Save money • Save time • Increased choice • Increased safety • Less wastage	• Higher food costs • More time spent shopping • Information overload • More responsibility • Not all consumers benefitting equally

Table 9 above outlines the benefits of innovation identified by participants for actors across the food chain. On the whole, participants found it easier to identify the benefits for consumers and society associated with social innovations compared to technological innovations. This is perhaps due to the perception that technological innovations were likely to be developed and owned by actors who may have vested interests, making the identification of who benefits more complex. This was particularly the case for technological innovations being developed further down the food chain at the production and processing stages furthest from consumers – for example genetic modification and processing techniques.

"There could be widespread abuse of GM methods by vested interests, especially those companies testing products in poor, developing nations." (Female, 41-55, London, Innovation Challenge)

8.2.2. Factor 2: Certainty of benefit

For some participants, the scale of the global food security problem meant that they prioritised ideas that they felt would be more likely to quickly achieve impact. This was mentioned in particular by those who had responded positively to genome editing as an idea (although it is important to remember the low number of responses received), as well as those who were concerned about environmental change.

"I agree with the comments on GM foods but I wonder if that is the way we will need to go in the future with a growing world population and bigger consumption in the western world. Education does seem to be working but as with this tack it takes time. ." (Female, 56-65, Dundee, Innovation Challenge)

"This (climate change) is a problem that will only grow so scientists and producers need to be constantly innovating." (Female, 41-55, London, Innovation Challenge)

While participants felt in general that the benefits of technological innovations could be realised more quickly due technology being easier to scale than social interventions, they were more likely to perceive technological innovation as having unintended or unpredictable consequences that could have a negative impact at the macro level e.g. on population health and the environment. Being reassured that there are no side effects was mentioned several times as critical for acceptance of an approach. For example participants expressing hesitation about the idea of using science to improve nutrition felt that if they knew for certain that there would be no negative impacts, they would generally be supportive of the idea, as they could see that there would be substantial positive benefits for the population if food could be made more available and more nutritious.

"If there are no side effects which can be conclusively proven, then to ensure the world has sufficient food I would not be opposed to the input from science to sustain the food sources" (Female, 18-25, Harrogate, Innovation Challenge)

"I'll wait for the evidence and sincerely hope it proves that there'd be no negative impacts as this would be a good way forward. But as I said, I'll wait for the evidence first before opting for this." (Female, 41-55, London, Innovation Challenge)

However, a minority of participants responded to the hesitancy of other participants by noting that some risk-taking was necessary as otherwise the benefits of new technological innovations would never be realised.

GE "I know it all sounds scientific but if everybody thought the same way we would not have electricity heart transplants etc. Give it a chance. Lots of people have survived and still are through scientific innovations." (Male, 56-65, Belfast, Innovation Challenge)

Compared to technological innovations, social innovations were perceived as being slower to achieve impact but with benefits that were more likely to be sustained over time. For example, one participant who had voted online for the idea of educating communities about lifestyle and food pitched in the Harrogate workshop described it as 'slow burner' approach that would change consumers' habits in the long run.

"This is a 'slow burner' approach and might take a while but with a coordinated and sustained campaign changing people's ideas and reinforcing it over time is a good approach." (Male, 41-55, London, Innovation Challenge)

8.2.3. Factor 3: Balance of innovation types

When submitting ideas in the Innovation Challenge, participants tended to focus on one type of innovation (i.e. their ideas were technologically focused or socially focused, with little integration between the two types). However during the workshops when participants developed the ideas to pitch them, we started seeing the ideas becoming increasingly hybridised. For example, the idea of the "sexy standardised supermarket scanner" pitched at

the Harrogate workshop to solve the problem of confusing product labelling integrated the "sexiness" and excitement of technology with the governance and clarity of standardised traffic lights. Participants voting online also recognised that the idea would need both approaches to achieve significant impact.

"Surely in this app age, the nutrition side could be added to the scanners. But for this to work best we need standardised traffic light so the consumer can quickly tell re the amounts of e.g. sugar in the product." (Male, 41-55, Harrogate, Innovation Challenge)

The lack of integration between innovation types may explain why some of the ideas pitched by participants at the workshops failed to resonate with the panel when presented back. For example, the idea for meals targeting the nutritional needs of older people was met with mixed reactions. Those who liked the idea thought it would be beneficial as it would be increasing choice for older consumers whose bodies might process food differently: technological innovation could make it easier for their bodies to digest and gain nutritional value from food. Participants in the older age groups saw the idea as patronising. This suggests that without marketing that reflects more positive images and attitudes towards ageing and older people, this product idea is likely to be contentious.

"I think this is a really good idea, especially as they can find it harder to absorb food as easily as younger people." (Male, 41-55, Harrogate, Innovation Challenge)

"This is a horrific idea. It assumes that all elderly people want to eat " ready meals" when I know many very elderly people (well into their 90's) who prefer to buy fresh meat and fresh vegetables and who enjoy filling time cooking nutritious and delicious meals." (Female, 66+, Harrogate, Innovation Challenge)

8.2.4. Factor 4: Scale of impact

The scale of positive impact that a new food innovation was perceived as having in terms of how many people would benefit was a key influencer in how participants prioritised ideas.

For example at the Dundee workshops, the participants who pitched the idea of making flour more nutritious chose flour because they believed it to be a widely consumed food, thereby ensuring that their idea would benefit the most people. This was felt to be important not only as it would reach consumers who may not already eat healthily but also because it is a cheap commodity and therefore more accessible to people on low incomes. While the idea did not receive many votes when it was presented to the panel online, those who did vote for it highlighted that its scale was what made them vote for it.

"They did this during the Second World War and it improved everyone's health. It's a great idea and has been shown to work and people wouldn't even have to think or try too hard to improve their diet." (Male, 41-55, London, Innovation Challenge)

"It wouldn't have to be flour it could be anything, adding nutrients to crop seeds would mean that people who can't afford to have a varied diet could still get a varied vitamin intake. I vote for this idea." (Female, 26-40, Dundee, Innovation Challenge)

However while the scale of impact was attractive for some participants, others reacted negatively to the "nanny state" interventionism that they perceived as inherent in the idea.

"I'm afraid I do not like all these ideas of interfering with our food. I do not want to be treated like an infant and have other people assuming they know better than I what I should be eating. I do not want to live in a 'Nanny State'." (Female, 66+, Harrogate, Innovation Challenge)

This suggests a tension and difference between how participants prioritise ideas when wearing their consumer 'hats' versus when wearing their citizen 'hats'. We noticed more broadly that technological innovations were generally more accepted when framed as helping other people, for example fortifying food to help consumers who do not eat healthily, or consumers in developing markets, for example, genome editing to feed people in countries with a growing population. However it seemed that participants were not always ready to accept the same innovations in the food that they themselves would eat.

"I am not keen on eating insects but an alternative source of protein could benefit the global community." (Female, 56-65, Dundee, Innovation Challenge)

A small number of participants noted that more targeted, personalised interventions may be more effective than mass scale interventions, due to the different nutritional requirements of individuals. While there was little discussion around personalising food for individual consumers and it did not emerge naturally as either a problem or a need, it was mentioned by one participant in response to the idea for standardising nutritional labelling.

What is a 'bad'/'red light' amount of fat or carbs for an 8 year old child might not be for an adult male gym bunny…So how would we decide whose statistics to base a traffic light system on? Better that we all educate ourselves on our own personal needs then find products that are appropriate in my opinion. (Female, 26-40, Dundee, Innovation Challenge)

Innovations targeting the health needs of a specific consumer group, such as the "Saga meals" idea pitched at the Dundee workshop, was the closest participants got to personalisation. As discussed, reactions to this idea were mixed with some participants liking the idea because it would help older people specifically while others thought that this would make the benefits unfairly inaccessible.

"Why only tailor meals for older people when teenagers, children etc. would benefit, perhaps age appropriate meals would work." (Male, 56-65, Dundee, Innovation Challenge)

"Why should it just be targeted to older people? If it is good enough for "THEM" why not the rest of us?" (Male, 56-65, Belfast, Innovation Challenge)

8.2.5. Factor 5: Likelihood and feasibility of new food innovation

Workshop participants were often unsure as to which ideas were more feasible, and the specialists at the workshops played an important role in sharing their perspectives on whether or not ideas where actually feasible. This influenced participant priorities to a degree, for example after being told by a specialist that a zero-calorie cake would be unfeasible, the participants stopped considering it as an idea.

Other factors influencing perceptions of the feasibility of an idea, included whether participants had noted the idea already being implemented out in the 'real world'. For example participants who voted for the "sexy standardised supermarket scanner" noted that they had seen retailers already using handheld scanners and that therefore this made it likely that the idea was feasible.

"Yes I like this, I know that Waitrose have the handheld scanners that let you pay as you shop so I don't see why this can't be adopted by other retailers." (Female, 26-40, London, Innovation Challenge)

The likely cost of an idea was another important factor in how some participants judged its feasibility, though the question of where funding would come from and who would pay for it was not always considered: it was commonly thought that ideas could be paid for through government subsidies or through the proceeds of taxation, such as a sugar tax. Some participants assumed that the costs of technological innovation would be passed down the supply chain, resulting in higher prices for food. However others were more optimistic that as long as the technology would be scalable it would be possible to reduce costs.

"Although I do like the idea, who would pay for the initial cost of turbines and solar panels?" (Female, 26-40, London, Innovation Challenge)

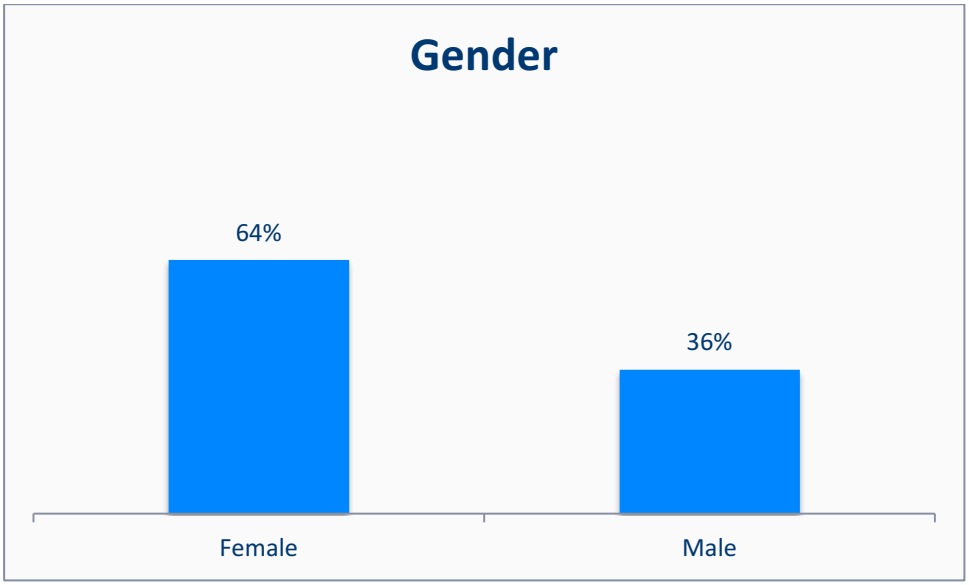
"I know there is development for the use of drones and computer aided machinery in large farms which is working on a large scale. These developments are expensive but when they are put into mass production the cost reduces dramatically and maybe farmers could be given help to use these ideas." (Male, 56-65, Belfast, Innovation Challenge)

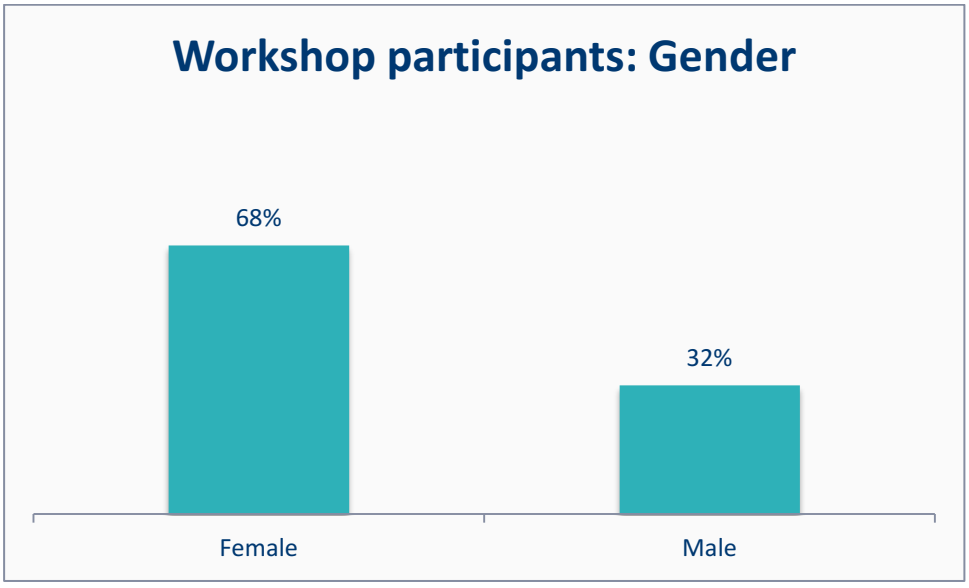
Appendix A: Demographics

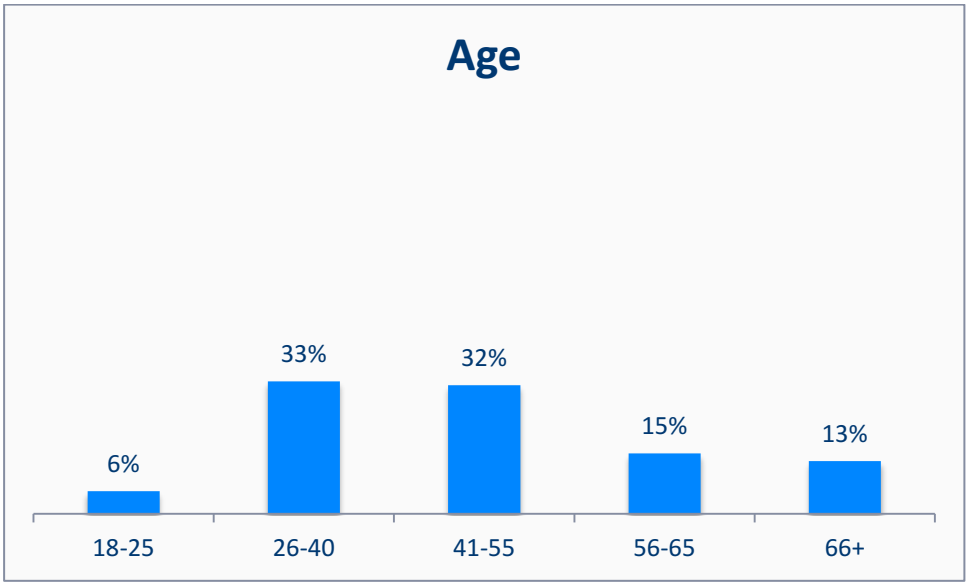
Graphs are presented for the main demographic groupings. We have presented this information for:

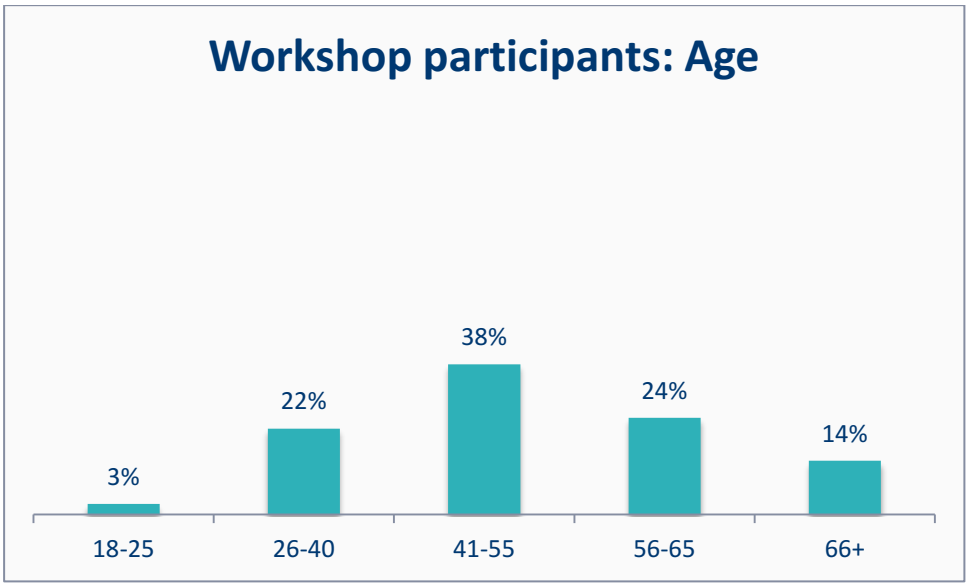
a) All participants who took part in any section of the Food Innovation project

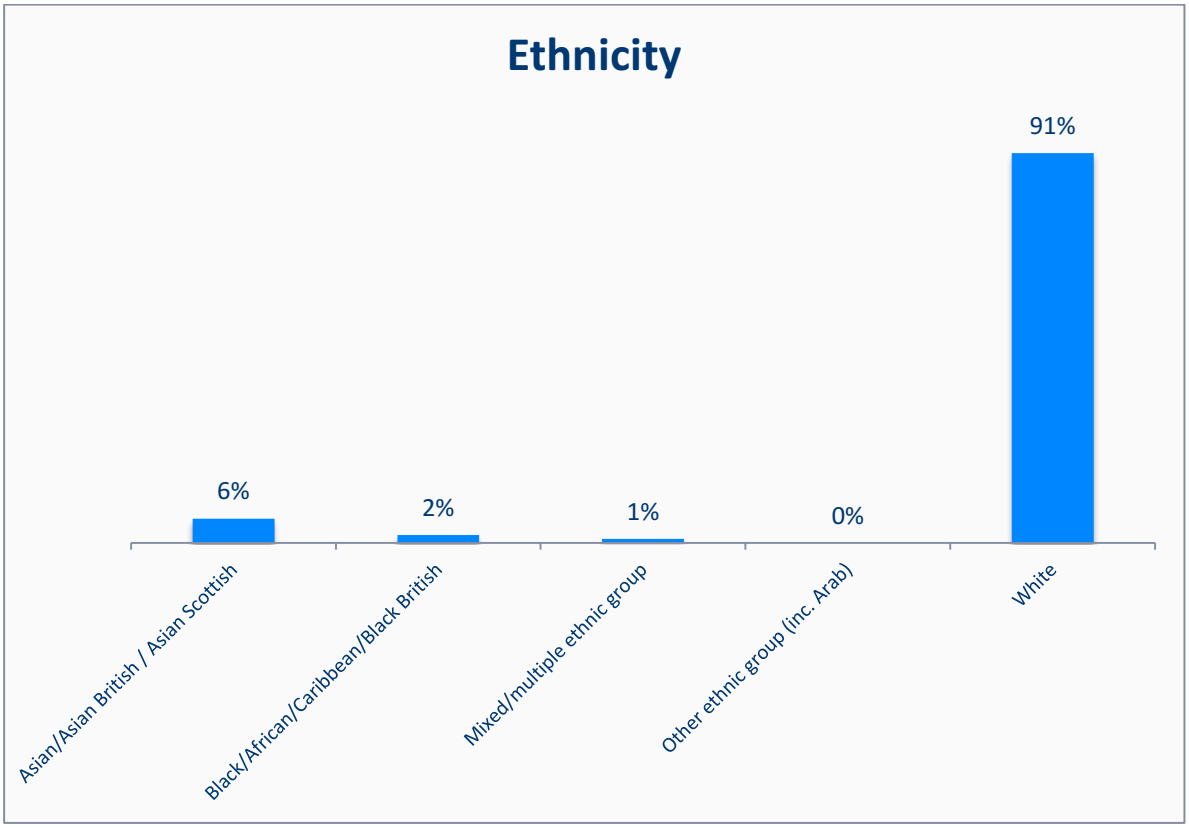
b) All participants who attended a workshop (in order to demonstrate any differences in our samples for face-to-face activities)

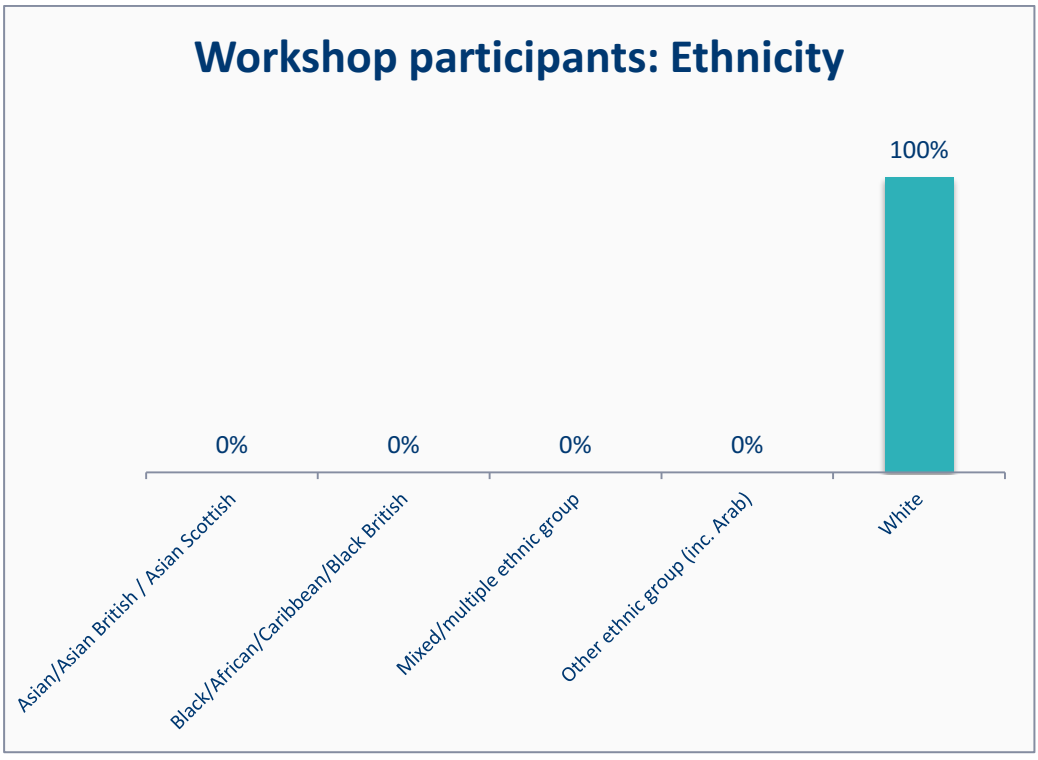


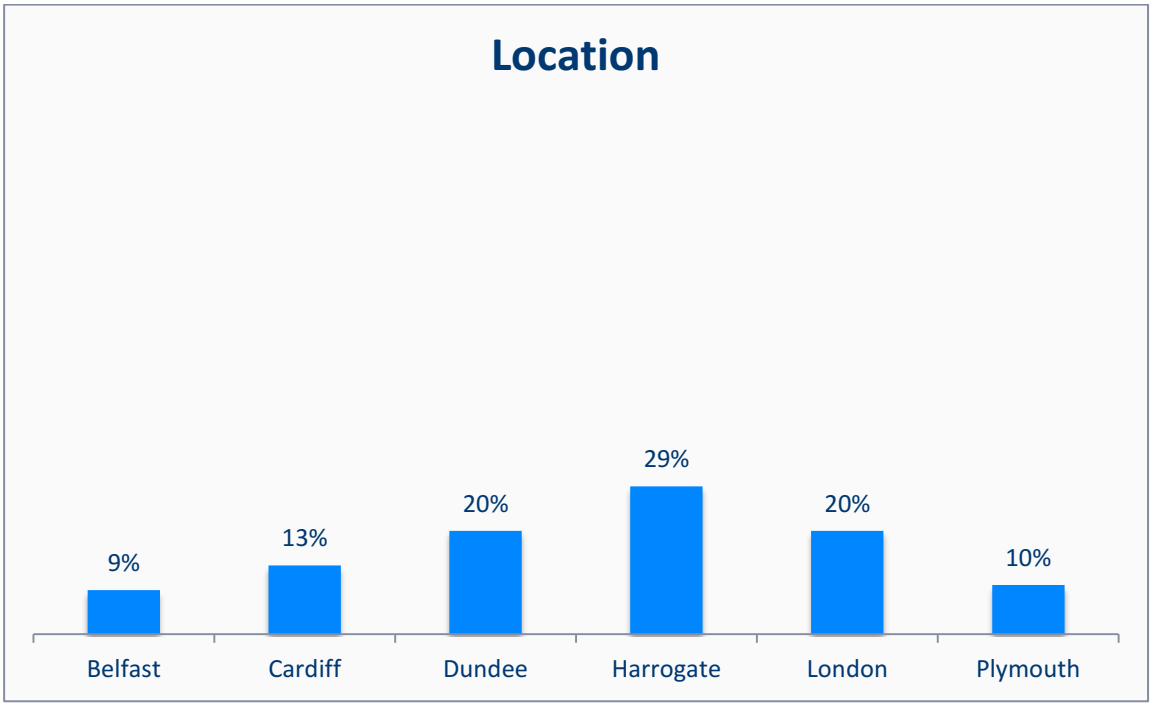


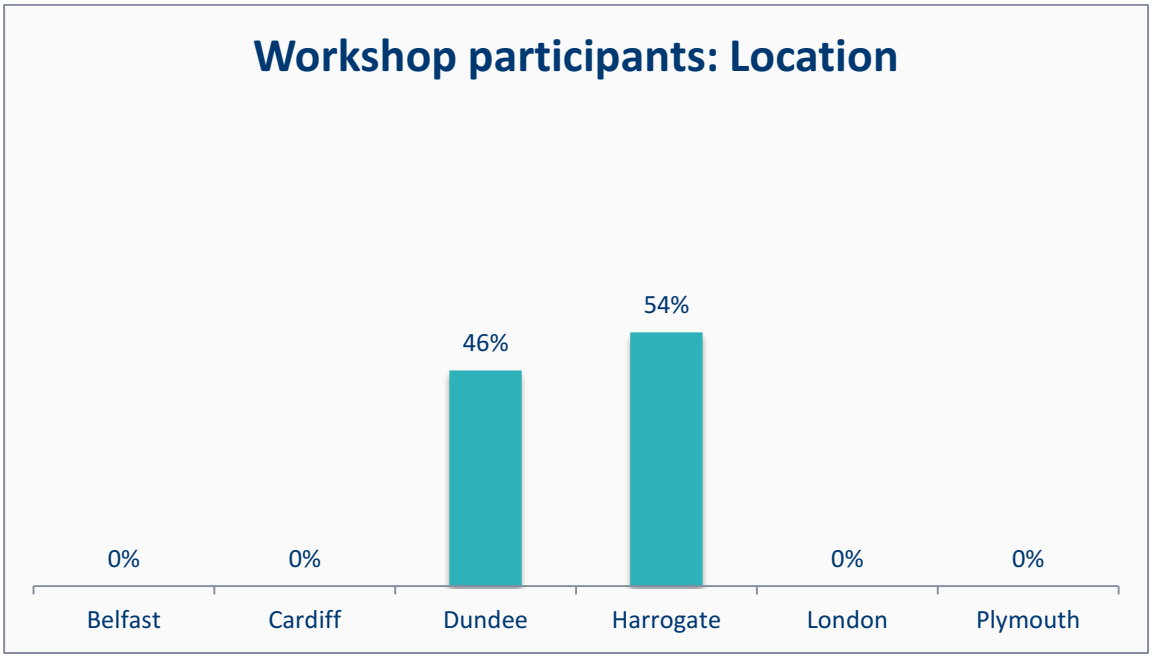

Age
6%
33%
32%
15%
13%
18-25
26-40
41-55
56-65
66+

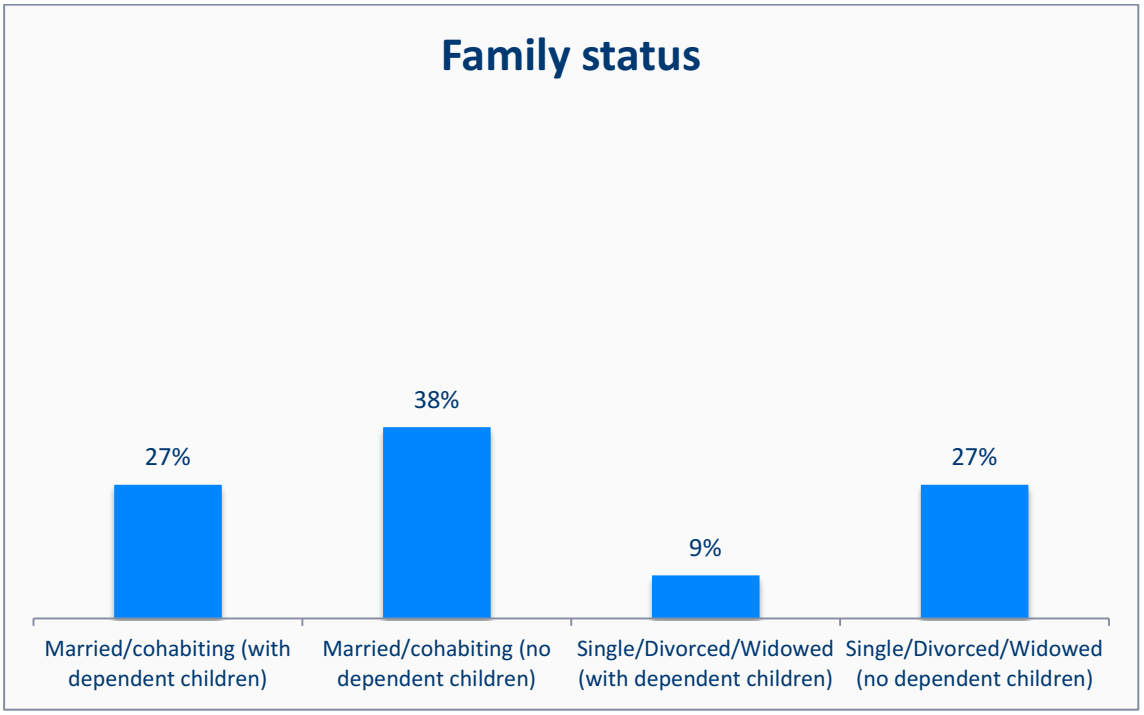

Workshop participants: Age
3%
22%
38%
24%
14%
18-25
26-40
41-55
56-65
66+

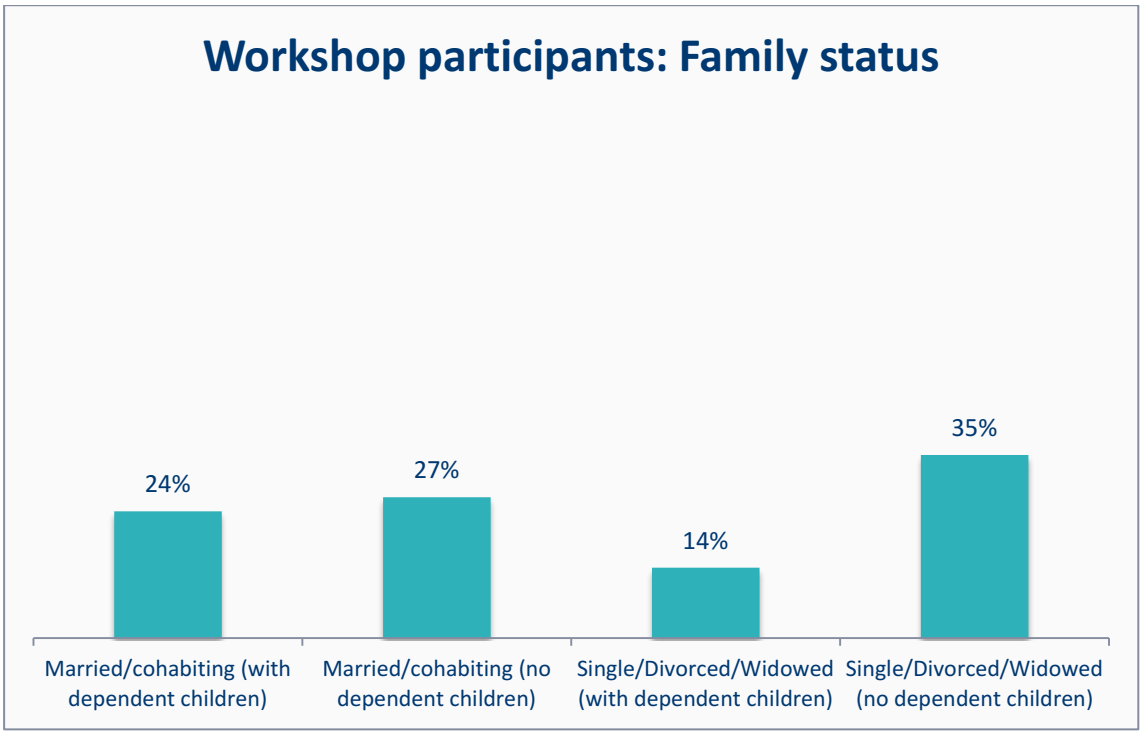

Ethnicity
91%
6%
2%
1%
0%
Asian/Asian British / Asian Scottish
Black/African/Caribbean/Black British
Mixed/multiple ethnic group
Other ethnic group (inc. Arab)
White

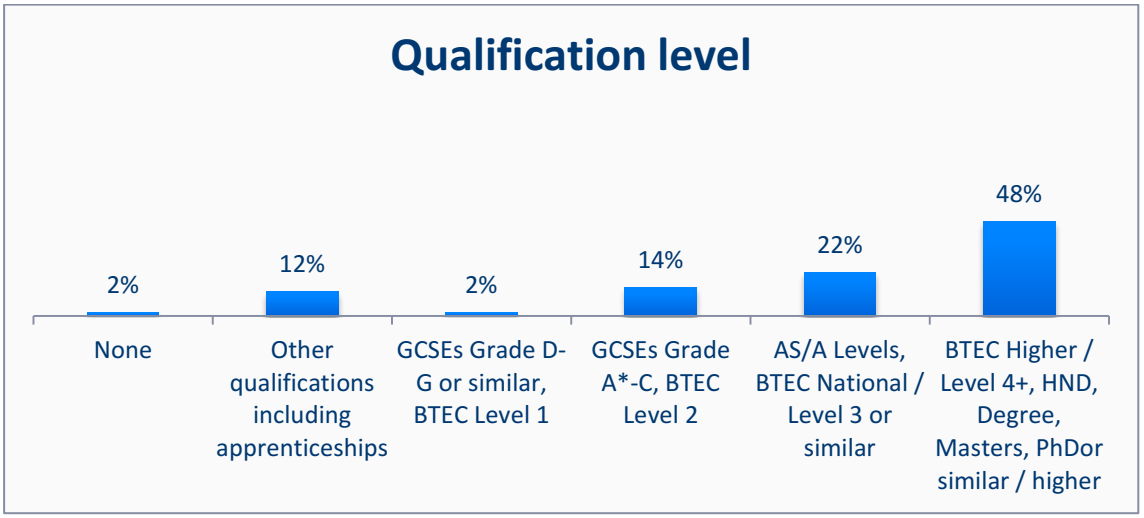

Workshop participants: Ethnicity
100%
0%
0%
0%
0%
Asian/Asian British / Asian Scottish
Black/African/Caribbean/Black British
Mixed/multiple ethnic group
Other ethnic group (inc. Arab)
White

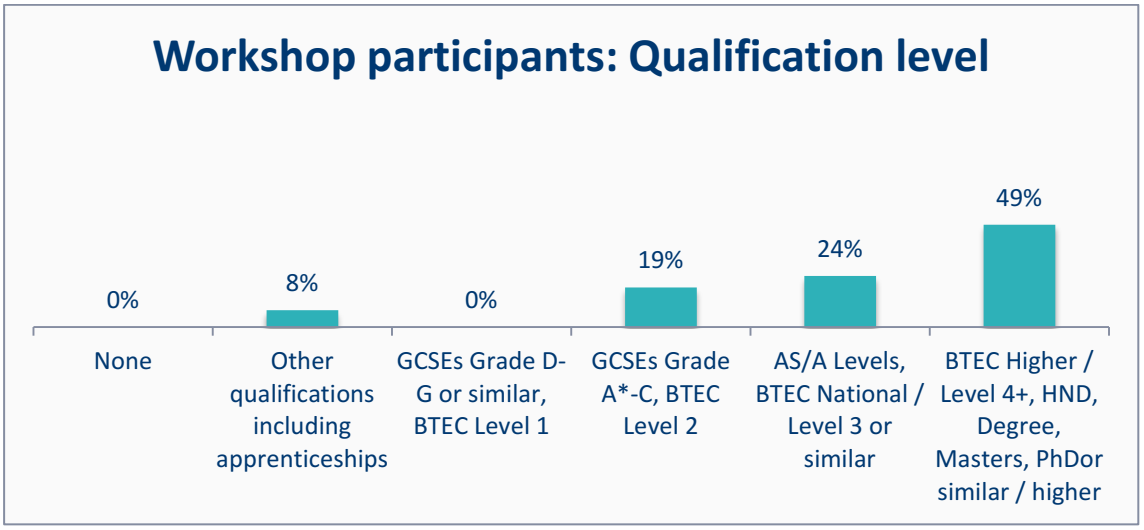

Location
9%
13%
20%
29%
20%
10%
Belfast
Cardiff
Dundee
Harrogate
London
Plymouth


Workshop participants: Location
0%
0%
46%
54%
0%
0%
Belfast
Cardiff
Dundee
Harrogate
London
Plymouth


Family status
27%
38%
9%
27%
Married/cohabiting (with dependent children)
Married/cohabiting (no dependent children)
Single/Divorced/Widowed (with dependent children)
Single/Divorced/Widowed (no dependent children)


Workshop participants: Family status
24%
27%
14%
35%
Married/cohabiting (with dependent children)
Married/cohabiting (no dependent children)
Single/Divorced/Widowed (with dependent children)
Single/Divorced/Widowed (no dependent children)


Qualification level
2%
12%
2%
14%
22%
48%
None
Other qualifications including apprenticeships
GCSEs Grade D-G or similar, BTEC Level 1
GCSEs Grade A*-C, BTEC Level 2
AS/A Levels, BTEC National / Level 3 or similar
BTEC Higher / Level 4+, HND, Degree, Masters, PhDor similar / higher


Workshop participants: Qualification level
0%
8%
0%
19%
24%
49%
None
Other qualifications including apprenticeships
GCSEs Grade D-G or similar, BTEC Level 1
GCSEs Grade A*-C, BTEC Level 2
AS/A Levels, BTEC National / Level 3 or similar
BTEC Higher / Level 4+, HND, Degree, Masters, PhDor similar / higher

Appendix B: Ideas submitted in the Innovation Challenge

Health & Wellbeing

Changing food habits and preferences

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *No ideas identified*	• *No ideas identified*
Processing & packaging	• New ranges of healthy snacks • Make 'not so nice' healthy foods smell and taste like favourite unhealthy foods (e.g. make protein rich insects smell like Peri Peri chicken)	• Regulation against use of ingredients/additives identified as addictive
Distribution & retail	• *No ideas identified*	• Retailers giving away free healthy food (e.g. vegetables about to go off) • Tasting demonstrations of healthy food in shops • Put all unhealthy snacks and food in one section at the back of the store and label it 'Unhealthy Aisle'
Consumption	• Apps that enable people to track food consumption and habits, integration with fitness apps	• Make the cost of advertising unhealthy food more expensive for manufacturers • Increasing the cost of unhealthy food, sugar tax • Education – teaching children (and parents) about healthy food in schools, cookery lessons • Breakfast clubs at schools to encourage healthy habits at a young age

		• Motivational TV programmes about healthy cooking • Using psychology to 're-programme' attitudes towards unhealthy food (e.g. being able to ignore it, stop seeing it as 'food') • Substituting bad habits with good habits (e.g. drinking water instead of eating unhealthy food to fill full) • Encourage habit change during life stage turning points • Encourage people to be more adventurous (e.g. trying foods from other cultures) • Employers offering free healthy food

Cost of healthy food

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *No ideas identified*	• Encourage more people to grow food in their gardens • Subsidies for producers and other incentives (e.g. grants, tax breaks)
Processing & packaging	• *No ideas identified*	• Make bulk cooking / freezing portions easier
Distribution & retail	• *No ideas identified*	• Increase distribution and access to food sold in local markets and independent shops (e.g. butchers, fishmongers) • Encourage more healthy fast food outlets • Misshapen vegetable box schemes like Asda's sold at a cheaper price

Consumption	• *No ideas identified*	• Increase costs of unhealthy food, sugar tax • Encourage children to eat less • Encourage more people to cook from scratch

Improving nutritional content of food

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• Genetically modified crops that have increased nutritional content • Genetically modified crops that can cure or control health diseases • Scientific research into how to make foods more nutritious	• *None identified*
Processing & packaging	• Products with added health benefits (e.g. Flora Pro Active spread) that are less expensive than current options • Replacing sugar with sugar substitutes such as stevia and maple syrup	• Consumer action to demonstrate to manufacturers that they want sugar reduced • Easier to understand nutritional labelling
Distribution & retail	• Distribution processes that minimise nutritional depletion of foods (e.g. quicker transportation)	• *None identified*
Consumption	• *None identified*	• Question Time style TV programme for consumers to quiz food industry panel

Skills and knowledge around healthy meal preparation

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• *None identified*
Processing & packaging	• Ingredient packs that contain all ingredients necessary to make a specific meal	• *None identified*
Distribution & retail	• *None identified*	• Recipe cards in stores and supermarkets
Consumption	• Websites/apps where consumers can enter ingredients (or scan a product) and receive a list of recipes • Apps that talk consumers through step by step preparation of healthy meals	• Healthy Masterchef – introducing a 'healthy cooking' segment into Masterchef TV programme • Community cookery classes and classes in schools • 'Rent a Granny' scheme to connect younger generation with an older person to show them how to cook

Making nutritional labelling less confusing

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• *None identified*
Processing & packaging	• *None identified*	• Standardised nutritional labelling • Visualise sugar and salt content in spoonfuls rather than grams • Larger font sizes in nutritional labelling • Explanations on packaging of what additives have been used

		and why they have been added into products
Distribution & retail	• Screens in supermarkets that people can use to scan products and receive more information • Scanners on shopping trolleys that people can use to scan products and immediately be told how healthy it is via traffic light colours and nutritional content	• *None identified*
Consumption	• *None identified*	• *None identified*

Making healthy food more tempting

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• *None identified*
Processing & packaging	• Formulate healthy food so that is more attractive (e.g. more colourful, more attractive packaging) • More interesting healthy snacks (e.g. Bounce balls) that are not as expensive as current options • Healthy cake range made out of vegetables (e.g. beetroot)	• *None identified*
Distribution & retail	• *None identified*	• Live tasting in supermarkets • Healthy snacks at supermarket check-outs • Intersperse healthy food products among unhealthy products in store aisles e.g. place bananas next to chocolate
Consumption	• *None identified*	• Reduce the cost of healthy snacks

Making healthy food more visible

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• *None identified*
Processing & packaging	• *None identified*	• *None identified*
Distribution & retail	• *None identified*	• Healthy snacks at store check-outs • Change layout of stores so aisles ordered by nutritional content, unhealthy food at back of the store • Colour code aisles to show which aisles are most/least healthy • Regulation against supermarkets who 'push' discounted unhealthy food • More promotion and offers for healthy food and supplements
Consumption	• *None identified*	• *None identified*

Sustainability and Ethics

Reducing food and packaging waste

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• *None identified*
Processing & packaging	• Meal kits with exact ingredients supplied	• *None identified*
Distribution & retail	• More precise stock control at food retailers	• Regulation to ban retailers from throwing away food • Supermarkets giving unsold food to food banks • Communal fridges on streets for

		leftover fresh food to feed homeless people
Consumption	• *None identified*	• Education to change consumer attitudes towards food waste and how to tell when food has gone off to reduce dependency on use-by dates • Cookery classes on how to use leftovers to create new meals • Using food waste to feed animals

Making food industry more sustainable and ethical

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• Unilateral action globally across countries to make food industry more accountable • Government procurement should require contractors to adhere to sustainability standards
Processing & packaging	• *None identified*	
Distribution & retail	• *None identified*	
Consumption	• *None identified*	• Educating consumers about industry practices

Increasing the availability of sustainable food

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• Increase amount of food grown all year round in the UK (e.g. through indoor farming, poly-tunnels) • Increase use of renewable energy • Land owned by the Church to be given over for farming • Increase number of communal gardens for growing food

Processing & packaging	• *None identified*	• *None identified*
Distribution & retail	• *None identified*	• *None identified*
Consumption	• *None identified*	• *None identified*

Improving producer livelihoods

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• Make it illegal for foreign fishing boats to fish in British waters • Government subsidies for British farmers • Encourage farmers to diversify
Processing & packaging	• *None identified*	• *None identified*
Distribution & retail	• *None identified*	• Increase opportunities for consumers to buy directly from farmers
Consumption	• *None identified*	• Increase the cost of food e.g. price of milk to reflect real cost of production

Where food is grown

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• Use technology to grow crops in the UK that are usually imported	• Increase investment in new technologies that can grow food all year round e.g. aquaponics
Processing & packaging	• De-hydrated foods (e.g. space food for mainstream	• Make it mandatory for imported food to display carbon footprint

	consumption)	on packaging
Distribution & retail	• *None identified*	• Tax on imports based on their carbon footprint
Consumption	• *None identified*	• *None identified*

Authenticity and Trust

What happens to food in the supply chain

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• *None identified*
Processing & packaging	• *None identified*	• Suppliers listed on packaging and information about additives • Information about sources, freezing and manufacturing dates, where it has been packaged, how long from manufacture to retailer
Distribution & retail	• *None identified*	• Marketing campaign by retailers to let consumers know what standards they expect from their suppliers
Consumption	• *None identified*	• Equivalent of CE marks used in other industries to ensure standards and suitability for market • Marketing campaign to increase consumers' knowledge about • Increased transparency about the suppliers involved in the food chain

Misleading product claims

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• *None identified*
Processing & packaging	• *None identified*	• Food Agency certification • Penalties and enforced shutdown of manufacturers found to make false claims • Stricter enforcement of existing laws • Voluntary pledge to avoid jargon on packaging • Banning ambiguous and unclear product claims
Distribution & retail	• *None identified*	• *None identified*
Consumption	• *None identified*	• Educating consumers to take more responsibility for reading labels and understanding food system

Making labelling less confusing

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• *None identified*
Processing & packaging	• *None identified*	• Standardised traffic lights on food packaging • Printing explanation of trust marks on food packaging (e.g. Soil Association, Red Tractor) • Visual information e.g. symbols, pictures, measurements in teaspoons not grammes

		• Increased information about additives and e-numbers on packaging
Distribution & retail	• *None identified*	• *None identified*
Consumption	• *None identified*	• Increasing public awareness of trade bodies and trust marks (e.g. Soil Association, Red Tractor)

Access to product information

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• *None identified*
Processing & packaging	• QR codes on packaging and menus which gives additional information to consumers	• *None identified*
Distribution & retail	• Apps or information screens that can be consulted for additional information at point of sale	• *None identified*
Consumption	• Make it easier to find websites with food information on	• *None identified*

Lifestyles

Demographic targeting (children)

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• *None identified*
Processing & packaging	• Single serve portions for older people living on their own • Foods enriched with nutrients	• *None identified*
Distribution	• Replace 'kids menu' in	• *None identified*

& retail	restaurants with smaller portions of adult food	
Consumption	• *None identified*	• Make it easier for children to be involved in cooking • Fruity Fridays in schools • Use celebrities to advertise healthy products

Making food more sociable

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• Making allotments more social, shared spaces for community • Encourage developers to include community gardens
Processing & packaging	• *None identified*	• *None identified*
Distribution & retail	• *None identified*	• *None identified*
Consumption	• Apps that connect neighbours/different communities to share authentic food experiences	• Cooking clubs – like supper clubs but focused on cooking • Eating meals together • Discouraging use of technology at dinner table • 'Thank you' lunches for colleagues to show appreciation

Reducing time of meal preparation

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• *None identified*
Processing & packaging	• Ready chopped vegetables	• *None identified*

Distribution & retail	• Meal kits containing all ingredients for one meal	• *None identified*
Consumption	• Slow cookers and pressure cookers	• Bulk cooking to provide multiple meals

Making meal planning easier

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• *None identified*
Processing & packaging	• *None identified*	• *None identified*
Distribution & retail	• Home delivery of meal boxes such as those provided by Hello Fresh	• Plan meals around supermarket food deals and promotions • Recipe cards and signage about meals in-store
Consumption	• *None identified*	• Shopping lists for planned meals • Recipe books for quick meals

Making grocery shopping easier

Stage in food chain	Science, technology and product ideas	Social, behavioural and policy ideas
Production	• *None identified*	• *None identified*
Processing & packaging	• *None identified*	• *None identified*
Distribution & retail	• Online shopping (with low minimum spends)	• Show how healthy meals can be made from long-life/store cupboard ingredients to reduce number of shopping trips for fresh food
Consumption	• *None identified*	• *None identified*

Appendix C: Resource list

Phase 1: Introduction

Blog 1

Introducing...Food Innovation

Over the next few weeks we are going to look at food innovation: what you think about different types of innovation, and where you think research and development (R&D) should be prioritised across the food supply chain.

What is innovation?

When it comes to food, the word 'innovation' gets used to refer to everything from new crisp flavours to new methods of farming (such as the urban agriculture techniques we looked at on the panel last year). But we don't want to tell you too much at this stage because we want to know what 'innovation' means to you.

To get your thinking started, we're interested in innovation that means something new that creates significant positive change.

Why do we want to talk to you about food innovation?

Future food security is facing a number of big challenges, some of which we've already talked about on the panel.

For example growing populations mean there will be more people to feed globally. People's diets around the world are changing and consumers in emerging markets increasingly aspire to more protein-rich (eating more meat and fish) diets (source). This is happening at a time when the natural resources we depend on for our food (land, soil, water, biodiversity) are becoming scarcer.

These issues affect us closer to home too: in the UK alone, population increases mean that it will take another 5 million tonnes of food to feed the UK population in 10 years' time (source).

These challenges to future food security means governments, scientists and businesses are looking for innovative new solutions right across the food supply chain – from how we grow food and process it, to how we distribute and store it, as well as how we consume it.

What do we want you to do?

We want you to start thinking about what innovation is. Watch the video below to learn about

innovations we've already seen in food. It highlights some of the innovations that the Royal Society named as the 'most significant' in the history of food and drink (source). You may find these surprising as they are all commonplace things now!

https://www.youtube.com/watch?v=MrrVoHkiF34

If you can't see the video, you can click here to read the transcript.

Tell us what you think in the comments section below:

- What does the word 'innovation' mean to you?
- What surprises you about the impacts of the historical food innovations shown in the video?
- What examples of new innovations in food have you already heard about?
- Who do you think benefits from new innovations in food?

Blog 2

What's next? Future food innovations

Last week we looked at some innovations that have had a big impact in the history of food: fermentation as a food processing technique, the threshing machine and the humble fridge. This week we're looking into the future. In this blog we're going to look at different types of innovations currently in the pipeline that may or may not become mainstream in the coming years.

Where do new food innovations come from?

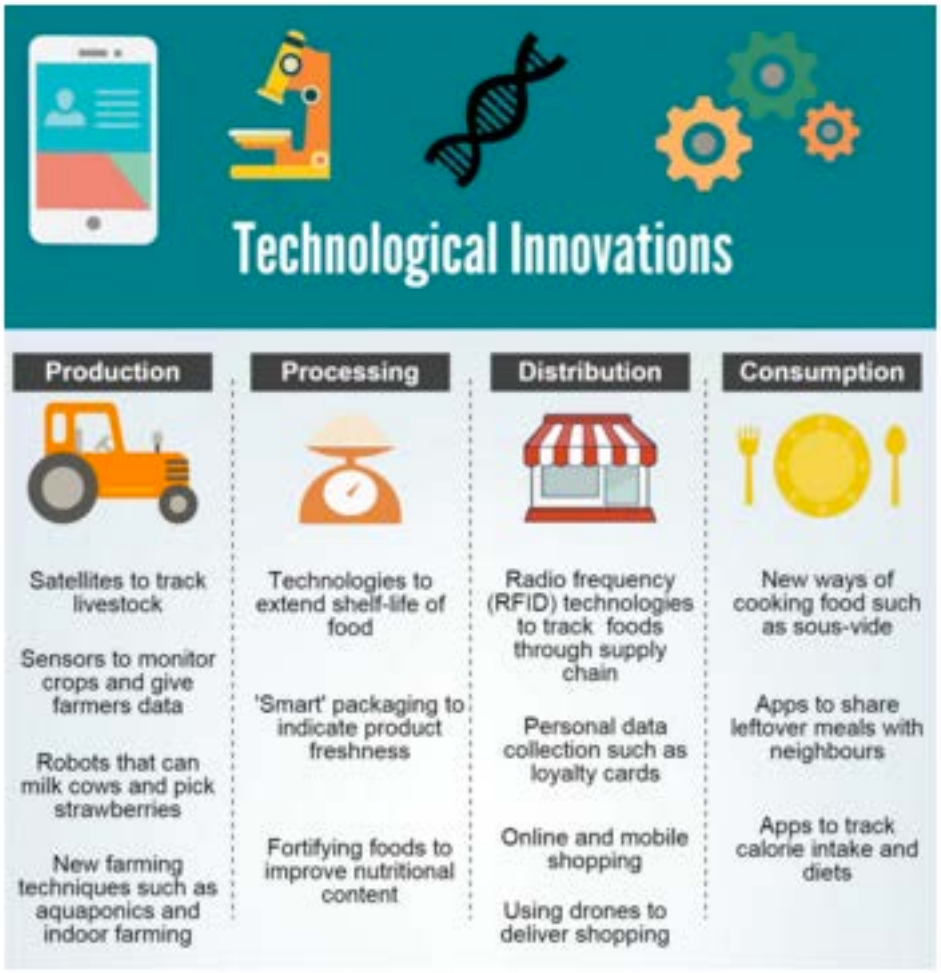
New food innovations can originate from lots of different places: scientists working in universities, research and development (R&D) in companies, small scale farmers and producers, as well as ideas from consumers and sometimes even science fiction writers. Some innovations in food can also come from scientific developments in unrelated fields.

There is growing interest in the idea of 'open innovation'. Traditionally developing new products was predominantly a closed process that took place within businesses. However the idea of open innovation encourages businesses to integrate external knowledge and expertise into their processes when creating new products.

For example, over the last couple of years there has been a competition in the UK last year which challenges students to develop new eco-friendly foods. Last year the winning products included fruit and seed snacks enriched with algae for additional protein and processed without heat treatment to reduce the environmental impact; an alternative to rice made out of small/misshapen cauliflowers rejected by supermarkets; and a healthier alternative to truffle chocolates made out of carob.

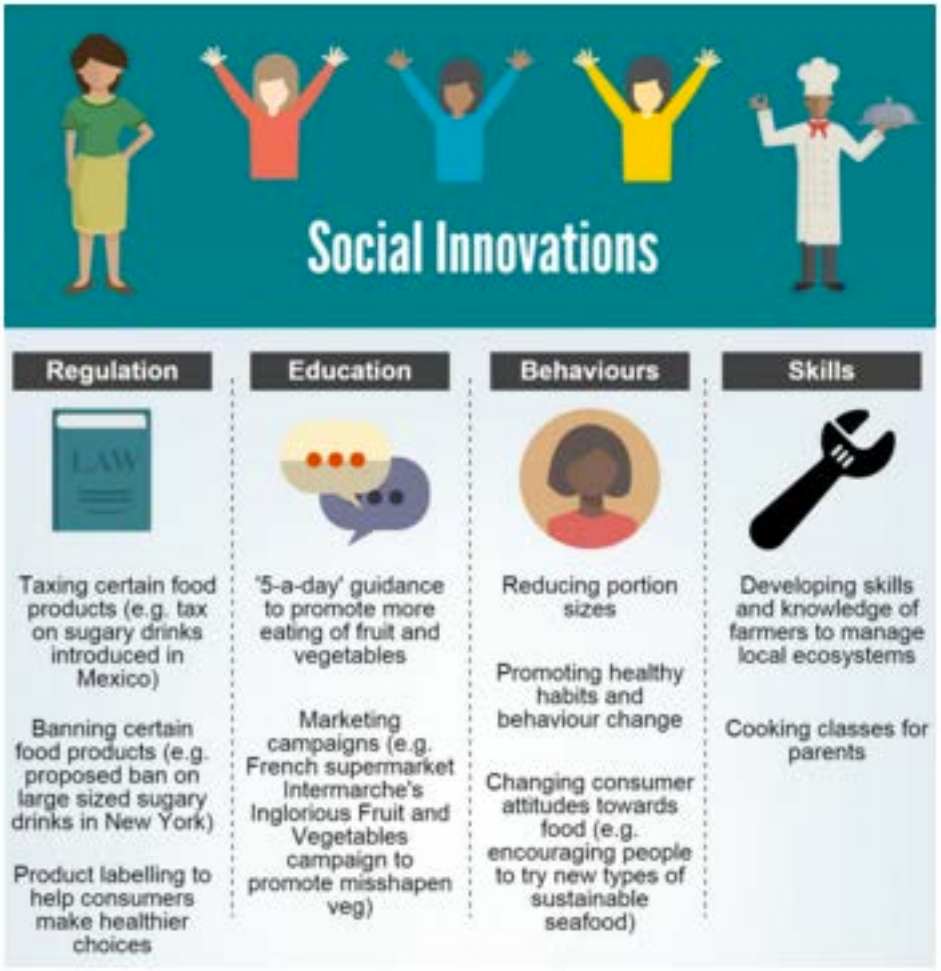
Different types of innovation

There are many different types of innovation happening across the food supply chain. These include technological innovations such as the ones listed in the image below.



For more information about these technologies, have a look at this report called Food Futures: From Business as Usual to Business Unusual produced by WRAP (an organisation helping businesses and individuals reduce food waste).

With so many new technologies being introduced across the food supply chain, it is easy to think that innovation is only about technology. However this isn't the case. There are also **social innovations** that try to create positive change by changing people's attitudes or encouraging people to behave differently.



To understand how technological and social innovations work to solve challenges across the food supply chain, let's look at case studies for two problems the food system is facing.

Case study 1: Making food last longer to reduce waste

The problem: Almost 50% of the total amount of food thrown away in the UK comes from people's homes and of the 7 million tonnes of food and drink we throw away each year, more than half of this could have been eaten (source). This problem has in part been created by "best before" labels on food which were introduced in the 1970s by supermarkets to protect themselves from lawsuits and promote food safety. However an unintended consequence of the labels has been an increase in food waste, as consumers' mistake "best before" labels with "use by" dates. Packaging and processing techniques have long been used to make food last for longer. For example salads often use 'modified atmosphere' packaging which removes oxygen and replaces it with inert gases to slow down decay.

New technological innovations:

- Smart packaging – 'intelligent labels' that change colour as the product deteriorates to show how fresh it is, giving a more accurate indication of product quality

- Pulsed electrical fields – a type of food processing that uses electrical impulses to inactivate micro-organisms and preserve liquids such as fruit juice and milk, with less negative impact on the taste of the product compared to thermal processing techniques that use heat – meaning that 21 day old orange juice can taste just as fresh as when it was first bought.

New social innovations:

- Regulation to scrap "best before" labels on food – last year the EU considered extending the list of foods that do not require "best before" dates to try and reduce the amount of food thrown away by consumers (source)

Case study 2: Making diets healthier

The problem: Diet is now the number one factor driving poor health in the UK, ahead of smoking (source). Changes in lifestyles and a faster pace of life has increased the consumption of convenience foods (that are often less healthy than meals cooked from scratch) and changed the way we eat, with eating 'on the go' becoming more common.

New technological innovations:

- Food fortification – functional foods such as pasta, rice and bread are being fortified with vitamins to help ensure consumers reach the recommended daily intakes. For example M&S announced at the end of last year that all of its bread is to be made using yeast fortified with vitamin D.

- HAPIfork – an electronic fork that helps people monitor and track their eating habits, and alerts them with gentle vibrations when they are eating too fast (eating slower makes it more likely that you will feel full and not eat as much)

New social innovations:

- "Nudges" to change consumer's food shopping and consumption behaviours – scientists in the US have experimented with ways to encourage 'mindful eating' that include adding mirrors onto shopping trolleys so people can see themselves as they shop, adding lines onto trolleys that indicate how much space should be filled with fruit and vegetables, and introducing placards on trolleys that tell shoppers how much fruit and vegetables other people buy

- Educating children to eat more slowly – children have often been told to eat more slowly over the years, but now there is growing awareness of the health benefits associated with chewing food more slowly as a way of controlling weight. Could this be considered a social innovation?

Tell us what you think in the comments section below:

1. What innovation examples mentioned in this article do you think will make the biggest difference to global food security?

2. What impacts (good and bad) do you think these innovations could have in the future?

3. Who do you think will benefit from these innovations?

Phase 2: Innovation Challenge

Part 1 of the Innovation Challenge – Problems for food innovation to address

FINISHED

Problem area 1: Health and Wellbeing

Chloe
created this challenge
a month ago

42
Ideas submitted

Deadline has been reached

Diet - what we eat and drink - plays an important role in people's health and wellbeing. In the UK diet is now the number one factor driving poor health, ahead of smoking. What people eat, how much they eat, food options available, and the information provided to help them make healthy choices can all have an influence.

What problems or frustrations do you experience when trying to eat more healthily?

Tell us what you find frustrating by submitting a problem to do with health and wellbeing. To submit a problem, click on the "submit your idea" button below.

FINISHED

Problem area 2: Authenticity and Trust

Chloe
created this challenge
a month ago

34
Ideas submitted

Deadline has been reached

Over the years there have been several events that have shaken public confidence in food safety and trust in the supply chain (e.g. BSE in 1990s, the horsemeat scandal in 2013). However it is not clear what the long term impacts of these scandals have been on consumer confidence in the food system.

What problems or frustrations do you experience when it comes to knowing that the food you buy is safe to eat and/or trustworthy?

Tell us what you find frustrating by submitting a problem to do with authenticity and trust in food. To submit a problem, click on the "submit your idea" button below.

FINISHED

Problem area 3: Sustainability and Ethics

Chloe
created this challenge
a month ago

39
Ideas submitted

Deadline has been reached

There is growing awareness that the planet's natural resources are under pressure and that this will pose a challenge to feeding future populations. Issues such as reducing food waste are impacted both by consumer behaviours as well as inefficiencies in the food supply chain. People say they want to live sustainably and to reduce their impact on the environment, but it can be hard to make lifestyle changes.

What problems or frustrations do you experience when it comes to making sustainable and/or ethical food choices?

Tell us what you find frustrating by submitting a problem to do with food sustainability and/or ethics. To submit a problem, click on the "submit your idea" button below.

FINISHED

Problem area 4: Lifestyles

Chloe
created this challenge
a month ago

23
Ideas submitted

Deadline has been reached

The way we live our lives has changed over the last few decades: more women are working and some people are working longer hours or working more flexibly. As a result, managing work and family responsibilities can sometimes feel difficult and people are looking to save time when it comes to buying and preparing food. In the future demographic changes such as an ageing population in the UK and more single person households may also create new lifestyle needs.

What problems or frustrations do you experience when it comes to fitting food shopping and meal preparation into your lifestyle?

Tell us what you find frustrating by submitting a problem to do with fitting food into your lifestyle. To submit a problem, click on the "submit your idea" button below.

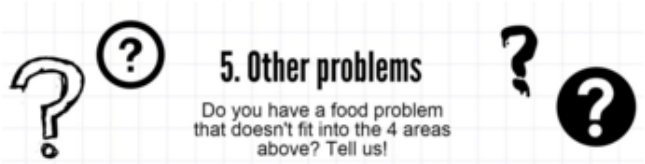
FINISHED

Problem area 5: Other types of problems?

Chloe
created this challenge
a month ago

21
Ideas submitted

Deadline has been reached

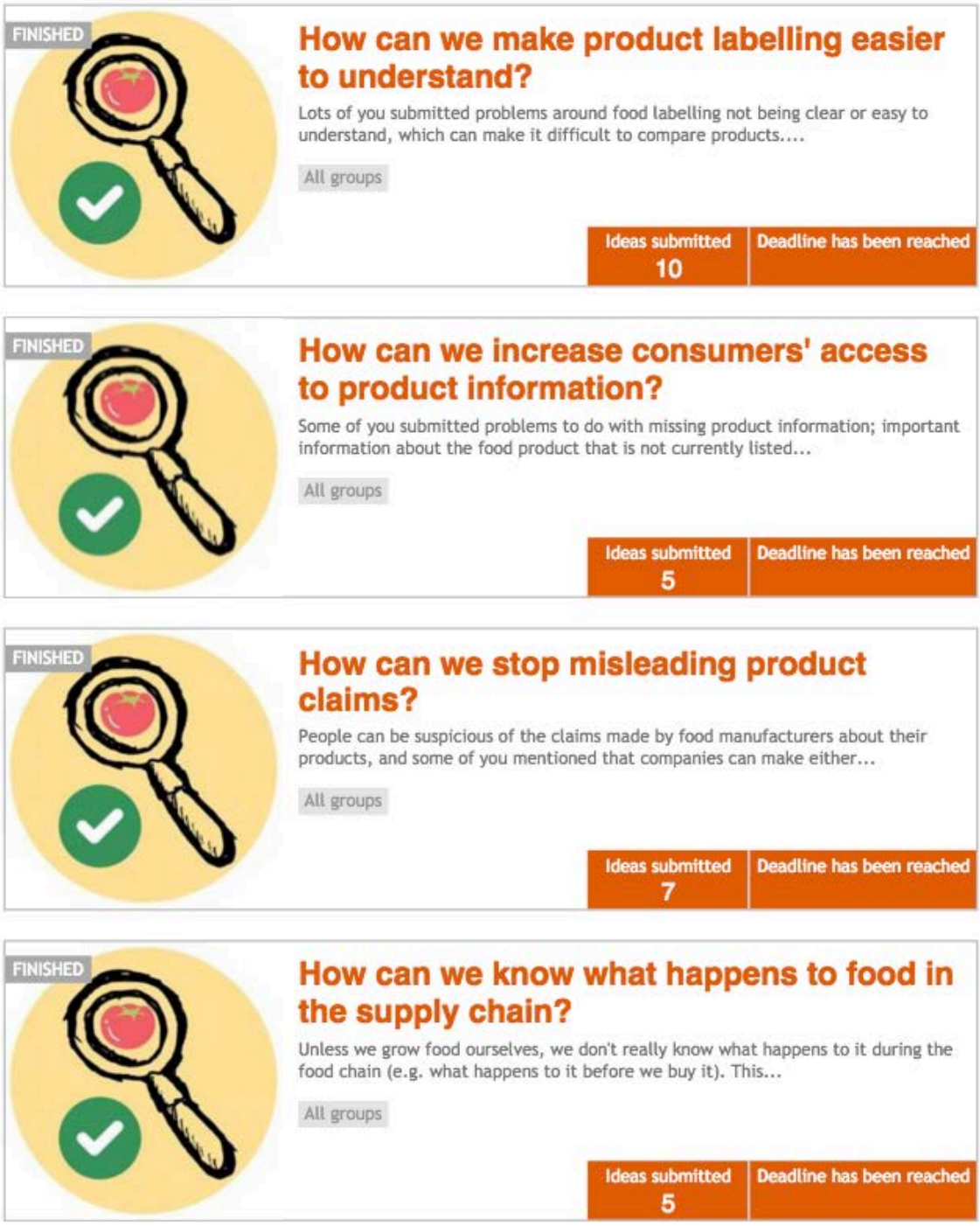


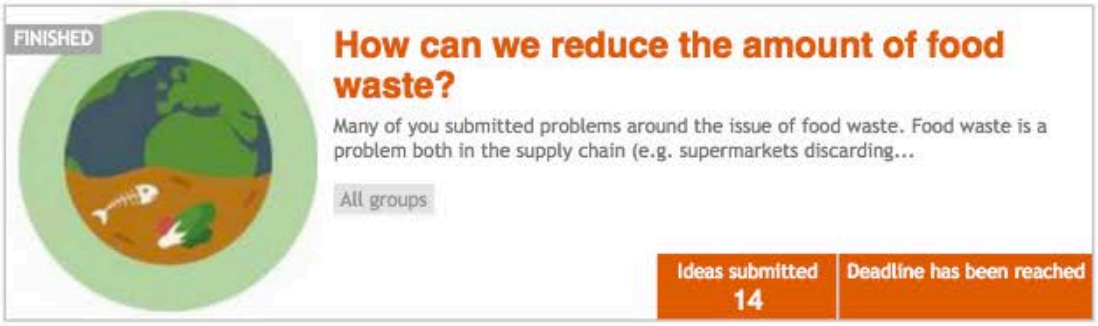
What have we missed? If you have thought of a food related problem but it doesn't fit under any of the other areas, we still want to hear about it.

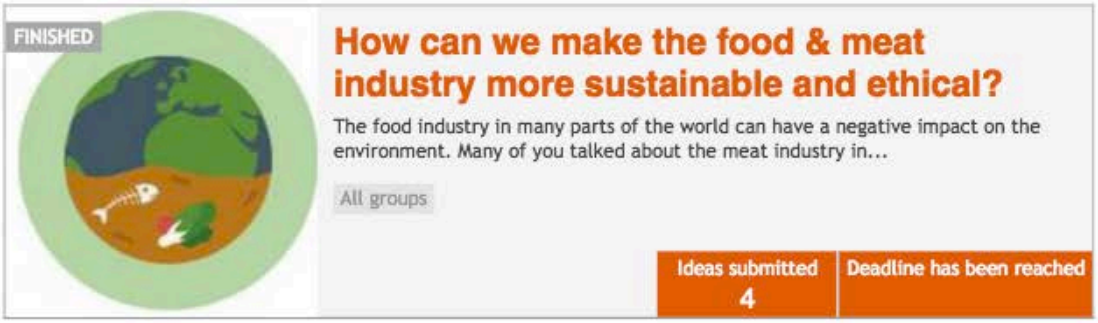
Tell us what you find frustrating by submitting a food related problem. To submit a problem, click on the "submit your idea" button below.

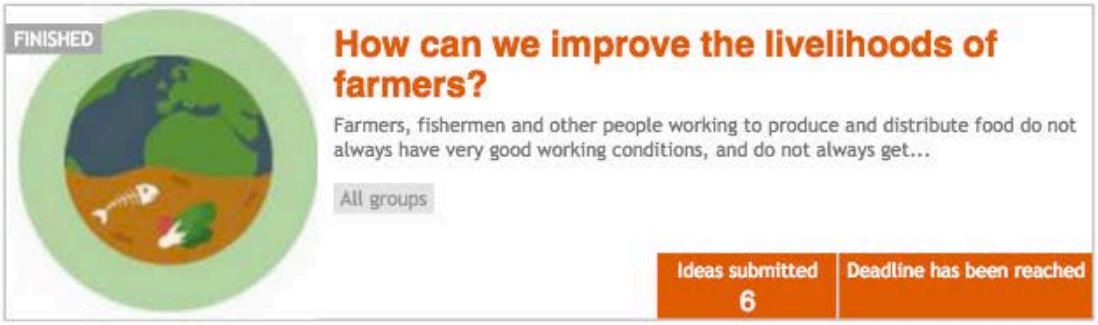
Part 2 of the Innovation Challenge – ideas for new food innovation

FINISHED
How can we make healthy foods more tempting?
Healthy foods don't always provide the same pleasure as unhealthy options and are not generally viewed as 'comfort foods'. This is a problem as...
All groups
Ideas submitted
7
Deadline has been reached
FINISHED
How can we make healthy foods easier to find than unhealthy options?
Unhealthier foods are often more visible in supermarkets, and this can tempt people into making less healthy food choices.
"I have been to...
All groups
Ideas submitted
7
Deadline has been reached
FINISHED
How can we improve the nutritional content of food?
Another frequently submitted problem is around the nutritional content of processed foods - lots of you mentioned the high levels of sugar and...
All groups
Ideas submitted
9
Deadline has been reached
FINISHED
How can we make health information on food less confusing?
Lots of you said that it can be confusing to understand the information about a product's nutritional content, for example when it lists calories...
All groups
Ideas submitted
6
Deadline has been reached


FINISHED
How can we make product labelling easier to understand?
Lots of you submitted problems around food labelling not being clear or easy to understand, which can make it difficult to compare products....
All groups
Ideas submitted
10
Deadline has been reached
FINISHED
How can we increase consumers' access to product information?
Some of you submitted problems to do with missing product information; important information about the food product that is not currently listed...
All groups
Ideas submitted
5
Deadline has been reached
FINISHED
How can we stop misleading product claims?
People can be suspicious of the claims made by food manufacturers about their products, and some of you mentioned that companies can make either...
All groups
Ideas submitted
7
Deadline has been reached
FINISHED
How can we know what happens to food in the supply chain?
Unless we grow food ourselves, we don't really know what happens to it during the food chain (e.g. what happens to it before we buy it). This...
All groups
Ideas submitted
5
Deadline has been reached


FINISHED
How can we reduce the amount of food waste?
Many of you submitted problems around the issue of food waste. Food waste is a problem both in the supply chain (e.g. supermarkets discarding...
All groups
Ideas submitted
14
Deadline has been reached


FINISHED
How can we make the food & meat industry more sustainable and ethical?
The food industry in many parts of the world can have a negative impact on the environment. Many of you talked about the meat industry in...
All groups
Ideas submitted
4
Deadline has been reached

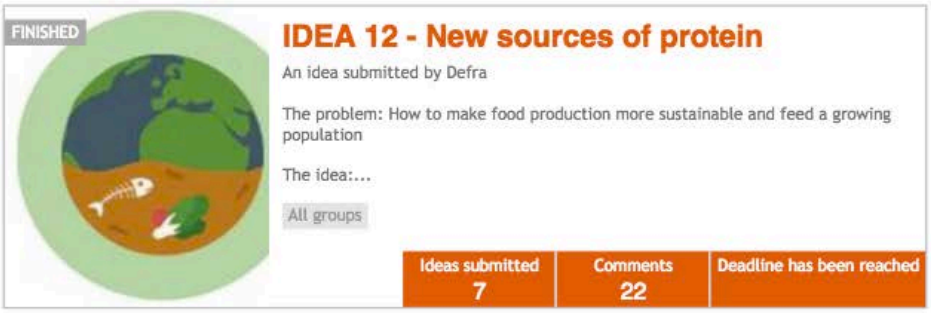

FINISHED
How can we improve the livelihoods of farmers?
Farmers, fishermen and other people working to produce and distribute food do not always have very good working conditions, and do not always get...
All groups
Ideas submitted
6
Deadline has been reached

FINISHED
How can we increase the availability of sustainable food?
The availability of sustainable food is a problem for many people around the world. In many developing countries, the issue is growing more food...
All groups
Ideas submitted
3
Deadline has been reached

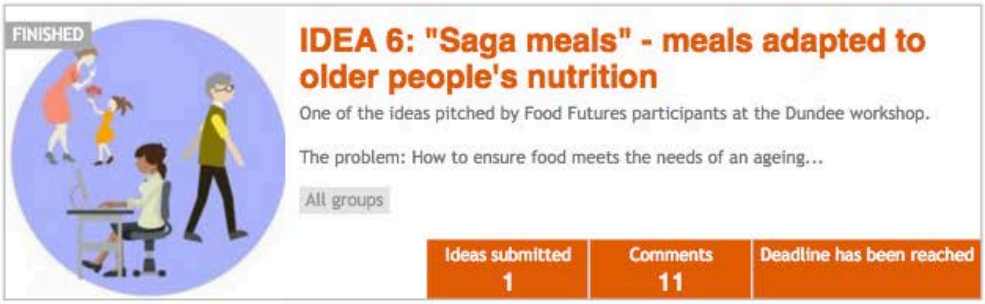
FINISHED
How can we reduce food miles?
Importing food from around the world and transporting it over long distances means that food can have a big carbon footprint.
"Why is...
All groups
Ideas submitted
8
Deadline has been reached

FINISHED
How can we make it easier to plan meals?
It can be difficult to think ahead and plan meals so they fit into our lifestyles, making it more likely that we spend more on convenience food....
All groups
Ideas submitted
5
Deadline has been reached
FINISHED
How can we make shopping for food easier?
People often have routines, such as doing a weekly food shop at the weekends. However if these routines get disrupted it can be difficult to get...
All groups
Ideas submitted
2
Deadline has been reached
FINISHED
How can we reduce the time it takes to prepare meals in the evenings?
This is a problem that many people submitted! Preparing food in the evenings and cooking from scratch can take time, which is difficult if you're...
All groups
Ideas submitted
6
Deadline has been reached
FINISHED
How can we make food more sociable?
For a long time eating together has been a a way of creating bonds between people, and yet eating food seems to be becoming less of a social...
All groups
Ideas submitted
10
Deadline has been reached

Part 3 of the Innovation Challenge – voting for ideas



FINISHED
IDEA 7: "Use renewable energy to produce local food"
One of the four ideas submitted by Food Futures participants at the Dundee workshop.
The problem: How to make farming practices more...
All groups
Ideas submitted 2
Comments 15
Deadline has been reached

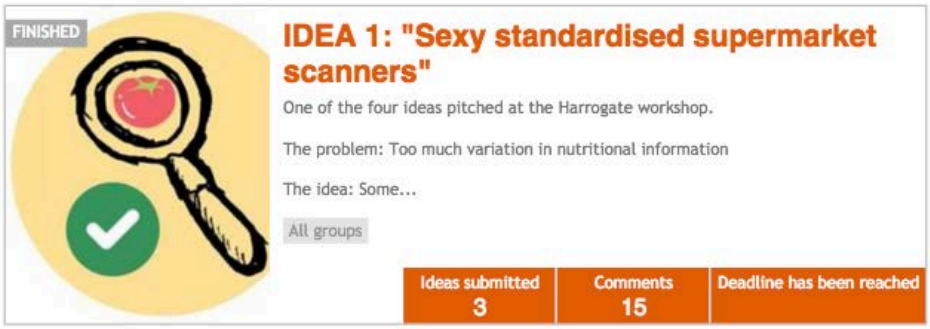

FINISHED
IDEA 6: "Saga meals" - meals adapted to older people's nutrition
One of the ideas pitched by Food Futures participants at the Dundee workshop.
The problem: How to ensure food meets the needs of an ageing...
All groups
Ideas submitted 1
Comments 11
Deadline has been reached

FINISHED
IDEA 5: "Add nutrients to flour at the growing or processing stages"
One of the four ideas pitched by Food Futures participants at the Dundee workshop.
The problem: How to safely improve the nutritional...
All groups
Ideas submitted 1
Comments 7
Deadline has been reached

FINISHED
IDEA 4: "Educate children about the basics of food through games"
One of the four ideas pitched by Food Futures participants at the Harrogate workshop.
The problem: We don't always know what goes into the...
All groups
Ideas submitted 2
Comments 17
Deadline has been reached

FINISHED
IDEA 3: "Educate communities about food and lifestyle"
One of the four ideas pitched by Food Futures participants at the Harrogate workshop.
The problem: Changing people's food preferences and...
All groups
Ideas submitted 3
Comments 10
Deadline has been reached

FINISHED
IDEA 2: "A voluntary obligation on retailers to purchase UK produce over imported food"
One of the four ideas pitched by the Food Futures participants at the Harrogate workshop.
The problem: How can we increase the availability...
All groups
Ideas submitted
3
Comments
9
Deadline has been reached


FINISHED
IDEA 1: "Sexy standardised supermarket scanners"
One of the four ideas pitched at the Harrogate workshop.
The problem: Too much variation in nutritional information
The idea: Some...
All groups
Ideas submitted
3
Comments
15
Deadline has been reached

Phase 3 – Workshops

Process plan

Time	Session
09.30 – 10.00	Registration, participants and specialists arrive, tea and coffee available. 15 minute briefing with specialists.
10.00 – 10.15	Welcome and introduction: who's in the room, small table introductions, evaluator to introduce themself / their role (if able to attend: if not, lead facilitator will note evaluation forms for close of workshop).
10.15 – 10.30	**Innovation 'show and tell'**: what makes something innovative A creative exercise to start the day and capture scope of participants understanding
10.30 – 11.30	**Problem space carousel**: tour of 4 problem spaces for innovation Participants move round the room in groups and are introduced to different problem spaces & associated ideas generated from Innovation Challenge activity. 1st voting exercise – which problem will make the biggest difference to global food security
11.30 – 11.45	Coffee break
11.45 – 12.05	**Innovation questions**: video interview with Ian Noble, R&D Director at PepsiCo Discussion of innovation process and perceptions as to who benefits and likely impacts of the case study
12.05 – 13.20	**Innovation priorities**: idea development and consideration of possible impacts Each group works on one problem space and considers the different ideas in pairs – what aspects do they like/dislike and why, who will benefit and potential impacts. Group develops a pitch for the idea they have prioritised. Whole group discussion to share each group's conclusions for the ideas considered in their problem space.
13.20 – 13.30	Thanks and close