LITERATURE REVIEW

Food Standards Agency
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# OUR FOOD FUTURE

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Research & Analysis

Food Standards Scotland
For safe food and healthy eating

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**Food Standards Agency 'Our Food Future'**

**Literature Review**

**by Andrew Darnton for FSA**

Research & Analysis

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## Introduction

This report presents the findings of a literature review undertaken in the initial stages of the Food Standards Agency's 'Our Food Future' programme of work. It has been undertaken in parallel with a public dialogue exercise (run by TNS BMRB), and both activities have been designed to feed into a Stakeholder Summit on Our Food Future, to be held in London on 18th February 2016.

The Our Food Future programme of work flows directly from a commitment made in the Food Standards Agency's Strategy for 2015-16. Since its launch in 2000, the FSA has followed its founding pledge that "*We will put consumers first in everything we do"* (FSA 2015a: 4). The Strategy for 2015-20 reaffirms that, and adds some new responsibilities, including to ensure consumers have *"the right to the best food future possible"* (ibid.:5). This commitment states that the current food system is under pressure, and access to safe and healthy food now - and in future – is unevenly distributed. In making this commitment, the FSA Strategy recognises that it is a very broad agenda, and the Agency itself is only one actor among many who will need to collaborate in order to deliver on that commitment. In some places FSA will lead, and in others it will help and co-ordinate; it is in this spirit of collaboration that the Our Food Future programme of work, and Summit, is being convened.

Our Food Future has been developed in close co-ordination the Global Food Security programme, of which the FSA is a core partner. The GFS programme was established in 2011 by the BBSRC (the Biotechnology and Biological Sciences Research Council), in co-ordination with six other scientific research councils, and UK governments, departments and associated agencies, to build the evidence base on how to advance global food security. Much of the work of the programme includes public engagement, and for the past year GFS has been running a Public Panel on Food Futures, comprising 600 member of the public, subsets of whom are invited to participate in dialogue exercises on different food security topics. The Our Food Future programme pursues similar pre-occupations to the GFS Panel, although its constituency is ultimately system stakeholders not the general public. Just as the evidence from public dialogue exercises to date – including by GFS – has been central to this review, so it is hoped this review may have value to colleagues in GFS, and others planning to run dialogues in future.

This literature review for Our Food Future has been undertaken in parallel to the public dialogue work on the programme, being delivered by TNS. The review's emerging findings have informed the approach to the dialogue exercises, but the outcomes from those dialogues have not been incorporated back into this review. As such the review represents the knowledge base from which stakeholders working on Our Food Future can move forward together.

The review is itself the product of an extensive and collaborative research programme, led by Andrew Darnton (AD). The full methodology is detailed in the Annexes to this report, but its different phases and their extent can be summarised as follows:

i) The Initial Call for Information
The review process began in October 2014, when AD, acting as external advisor to the Wellcome Trust's food and drink initiative (now branded 'The Crunch') sent out a call for information to 60 researchers and practitioners working on aspects of the UK food system. The scope of the call was broad in terms of topics, summed up as evidence on 'where the UK public is at' in terms of food-related perceptions and practices. A relatively tight timeframe was set (sources since 2010 – although this was not always

adhered to by contributors). As the principal aim of the review was to provide benchmarks to support the development of the Crunch, and track changes in public engagement over time, the emphasis was on quantitative data (though not just from surveys). AD was supported in the logging and selection of sources by Clare Curtis, then of the Wellcome Collection. In total, 101 sources were gathered from 42 individuals; 60 were selected as the basis of an internal report to the Crunch programme team and contractors (February 2015).

ii) The Follow-Up Call for Information
As FSA's 'Our Food Future' programme began to take shape in early 2015, it became clear that the evidence base on the UK public's relationship with food, and their role in the food futures agenda, would need to be reviewed (not least, preliminary to the new primary research which FSA was planning to undertake). The Wellcome Trust agreed to share the assembled body of evidence with the FSA, and AD was commissioned by FSA to update and then synthesise the evidence base. Accordingly in August 2015 a second call for information was sent out, to all 42 individuals who responded to the initial call (they were also sent a copy of the longlist of 101 sources gathered from the first call). The scope was similarly broad, with the same timeframe set, although the kinds of data searched for were extended, to include more qualitative evidence. The second call's focus was summed up as being on the 'views voices and practices of the UK public in relation to food', now and in future. The call was left open throughout the rest of 2015, and even into 2016, with participants contributing new work as it became available, right up to the reporting deadline in February 2016. In total, 76 individuals contributed to this call, and the total set of relevant sources they contributed across the two calls numbered 131.

iii) The Systematic Study
In November 2015 the FSA resolved to commission a systematic review to supplement the expert-led calls for information. The aim of the systematic review was to add transparency and robustness to the review process, and ensure any important gaps had not been left in the coverage of evidence. Valerie Viehoff at the University of Bonn was commissioned to undertake the systematic search, using a scope derived from the expert-led calls. Accordingly her search terms were broad, albeit the same timeframe was set, of sources produced since 2010. The search returned 1,307 sources. A set of filtering criteria were then applied, based on whether the source covered a) the UK b) food, in relation to consumers c) the UK public, whose 'views, voices, and practices' needed to be visible through the source (ie. it included primary evidence relating to them – although this need not always be new). Applying these filters to the titles of the sources returned, the selection reduced to 528, which was then reduced to 94 on reviewing the abstracts of each paper against the three filters. The full text of each of these sources was then reviewed against the priority topics of the 'Our Food Future' programme (agreed with the FSA and partners' steering group), with the result that 52 of the systematic sources went forward for final review.

The three strands in this programme of secondary research have been brought together in this single synthesis review. It is based on the 183 selected sources which in total were gathered via the three routes above. In drafting the report not all those sources were cited (largely due to constraints of space), while 15 more 'classics' were added to provide firm theoretical footings for the commentary. In the final outcome, this review cites 100 sources; these are listed in the annex at the back of this report, along with the 183 sources selected in total.

The result of this process is a substantial body of evidence: an inclusive current selection of what researchers know about the UK public's relationship with food going forward. An initial observation is that few of these sources explicitly talk about (or report on) food in the future from the public's perspective. As a result, much of this review involves extrapolating the public's role in food futures from what we know about their practices and preferences now. It is hoped that the FSA's Our Food Future programme, and other work like it, will see the public more fully involved in these questions from here on.

*Acknowledgments*

*Thanks are due to all those researchers and practitioners who contributed evidence to this review [listed in the Annexes below] – especially those who provided access to working drafts, or bespoke analyses of their datasets. Clare Curtis, and Valerie Viehoff, have earned huge gratitude for their sure handling of the large bodies of incoming evidence. Finally, thanks go the anonymous peer reviewer, whose careful weighing of the data, and rich connections out to the wider evidence base, have strengthened the report immensely.*

## Executive Summary

- Members of the public show very little awareness of the term 'global food security' when it is presented to them. Arguably it was not designed for use with the public, and is technical jargon, but they also show very little awareness of the issues that global food security represents, including that there is an impending crisis facing the food system, which in itself is harming the natural environment on which it depends. The only part of the situation with which people seem familiar is the pressure of the growing world population on food supply. The fact that the current system is unsustainable, and that our ways of producing and consuming food will have to change, is new news to most people.

- The very idea of food futures is strange to most people. People's relationship with food tends to be immediate, in the sense of short term, and proximal, based on what they buy and eat, not on global issues of supply and demand.

- 'Food choice' is a problematic phrase, best used to describe a body of literature which explores the factors in consumer decision making. It should arguably be used alongside the phrase 'food non-choice' which would highlight that for most people in everyday life food is not eaten as the result of rational deliberation; it would also foreground those publics whose access to food is proscribed, including through lack of available income.

- The most influential factors in food choice are price, quality and taste. Health concerns are subordinate to these, and environmental considerations are lesser still. The considerable evidence supporting this ranking suggests that people will not change their behaviours for food security reasons unless their requirements in terms of price, quality and taste and also met.

- Factors arguing against a rational choice view of food behaviours include emotions and habit, plus questions of identity, belonging and culture. Convenience is also key: food practices have to fit in with people's lifestyles; when they are busy (or time is not prioritised for food) convenience foods dominate.

- Capacity to choose is constrained for a number of subgroups within the public. For example, one fifth of women are on diets to lose weight. One fifth of over 70s cannot eat certain foods for medical reasons. Most topically, a proportion of households on low incomes lives in a state of food insecurity. Though we currently lack meaningful ways of measuring this group, Trussel Trust food banks provided emergency parcels on over 1 million occasions in 2014 – and these numbers have been growing year on year. For these groups in particular, talk of food choice may not be merely inaccurate but iniquitous.

- The very existence of a food system is a surprise to participants in dialogue exercises. They tend to regard it as a 'black box', and this sense of 'opacity' is felt to have increased in recent years as production methods have made more use of innovative technologies, and supply chains have become longer and more complex, to the point where they can be perceived as "*unnatural, mechanised and alien*".

- Since 2012, the predominant method for researching with the public around food futures has been dialogue exercises: intensive group discussions drawing on external information and expert inputs, often involving a series of meetings staggered over a period of weeks.

When dialogue participants are first told about the links between food and environmental impacts, and the urgency of the need for change in the food system, their first response is one of surprise. Following discussion, they then tend to develop a determination to do something about it, and their preference is that consumers take action by changing their behaviour, rather than that producers introduce more technological innovations to increase yields – for fear of adding to the 'unnaturalness' they already perceive in supply chains. Across several dialogue exercises, the participants go on to change their own behaviours, the most common changes being to eat less meat, reduce food waste, and buy locally produced food. Many participants report that they were already doing this anyway – but never on grounds of global food security.

- These 'demand side' changes among dialogue participants are – to an extent – mirrored in the wider public. Shopping locally and wasting less food appear to be acceptable to the majority of the public, or at least to be recognised as aspirational or appropriate forms of conduct. Eating less meat is more controversial. Dialogue exercises can result in enthusiasm for reducing meat intake – though this is not universally shared among participants. Evidence from the wider public suggests reluctance among some and flat refusal among many. Reasons for not reducing meat are well documented and include the 4 Ns (that it is natural, normal, necessary, and nice). There is also a well-established literature suggesting that meat eating can be fundamental to self and social identity (especially for men). However, reducing meat seems to be potentially much easier to negotiate than giving up meat altogether. Precise numbers vary from survey to survey but two subgroups seem to show a disposition towards meat reducing: older people (among whom 40% of those in their 70s have reduced the amount of meat they have eaten in the last year – apparently as a result of ageing effects) and younger people (among whom 20% of under 25s intend to reduce their meat eating in the next year). Young people are also the most likely age range to be vegan or vegetarian (5% of under 30s say they are), while women are also much more like to be vegan or vegetarian than are men (4%, vs. 2%). Overall, based on current evidence, the public are relatively evenly split on whether they are prepared to eat less meat (though the unwilling tend to speak louder).

- On the supply side, the public's principal role is in accepting (or refusing) new food technologies – which presupposes an initial level of knowledge and awareness, which is currently lacking for many of the newer technologies in particular. Beyond acceptance, there will then need to be a phase of active engagement as people negotiate how – or whether –to fit the technologies into their daily lives (as new 'sociotechnical' arrangements). Overall, the public appears to be mildly supportive, decreasingly negative, and largely uncertain about the application of new technologies in food production.

- In establishing the acceptance of new technologies, members of the public seem to deploy a number of rules of thumb. These include risk calculations (combining susceptibility and severity), personal experience of risks and ill effects, the scale of the organism on which the technology is being applied (ie. micro-organisms are more acceptable than plants which are more acceptable than animals), and the degree of 'naturalness' of the process (ie. how much the composition of the food is altered from its original state). However, for most technologies, most of the public are approaching from a position of ignorance – hence uncertainty or neutrality being the most popular option when they are forced to take a position on particular food technologies, coupled with an insistence on safeguards being in place.

- In terms of acceptance, the novel technologies that are most acceptable are those that are closest to 'natural' processes. Functional foods are an ill-defined category, but seem to elicit little concern, especially if they foreground health benefits and are applied to healthy 'carrier' foods (eg. brown bread). Mechanically separated poultry meat is also relatively acceptable, on the basis that the chemical composition of the meat has not been altered (and with the caveat that the resulting product is clearly labelled). Other technologies are much less acceptable, eg. irradiation (which may be okay on reflection, but people still wouldn't buy the products), and biotechnology with plants or animals (the former being preferable to the latter, but both fundamentally messing with nature). The least acceptable technology is synthetic meat, although in one study people's response was not aversion so much as confusion, and they spent time constructing scenarios to make sense of how it might fit into their daily lives. All other food technologies are much more emergent, attracting very little awareness among the public, and being very little researched to date in terms of public perceptions; these technologies include nanotech, and personalised nutrition advice based on genomics. In these spaces, experts call for awareness raising, or two-way dialogues in order to help the public establish their views. Finally, eating insects is an example of a potentially innovative practice (rather than a novel technology) which features in the literature. Indeed, eating insects is taken up by the wider public as the epitome of the debate on future foods – and is treated as novel, trivial, and revolting on social media, although in dialogue exercises it elicits few concerns, in principal at least (being both natural, and normal, somewhere).

- The tale of GM foods offers an important illustration of how public attitudes to food technologies can change over time, with nearly 20 years' worth of research evidence on public perceptions available to be reviewed. In 2009 the public's position on GM foods was described as one "*of moderate support and general ambivalence*", and in the period since little appears to have changed, apart from opposition weakening slightly, and uncertainty growing further. At the two poles, opinions are still divided but much of the antagonism appears to come from entrenched stakeholders rather than the lay public. There is however a strand in the story which demonstrates that people's views have been ignored: that the technology was ostensibly developed for the benefit of distant others, and for the profit of the agri-food industry, with arrangements made between businesses and farmers, while the end consumer was left out.

- The GM debate is also seen as important in casting a shadow over public perceptions of other food technologies, in a similar way to the shadows which other incidents have cast: from salmonella and BSE through to horsemeat. These incidents appear to have had a cumulative negative effect on trust in the food industry, and to have strengthened public perceptions of an over-engineered and technologized food system, closed to consumer understanding or influence. The role of the media is evident in turning food incidents into food scares, and their reach clearly shapes public opinion. However, it is notable how brief the influence of scares on behaviour can be: in the case of horsemeat, sales of frozen burgers bounced back within six months, once barbeque season arrived.

- Not least due to food scares, which shine a light into the 'black box' of the food system, the public report very low levels of trust in the food industry (while continuing to eat its products). They tend to bracket all operators in the supply chain as 'big business' – although those in rural locations appear to know more about production methods, and discriminate accordingly. Supermarkets feature prominently in public views on the industry however, and come in for universal criticism (often explicitly linked to the horsemeat issue).

Partly because of the 'black box' effect, people feel they have little power to influence the food system as consumers. They also struggle to deal with the complexity of the system when it is revealed to them, and push away responsibility for dealing with it onto government and business together. However, they tend to be little more trusting of government than they are of business – and often see it as in hock to business interests. People also tend not to understand the workings of government any better than they do the food industry. Nonetheless, participants make clear calls for stronger oversight of the system, and express their desire for someone to take the lead on food security issues (once they have been awoken to them). However, their calls for government action are general, and they do not tend to identify particular roles the government should take, or organisations which should lead on those roles – unless they are prompted by researchers.

- Given the very low levels of awareness of the impending crisis in the food system, the public dialogue exercises under review tend to close with participants calling for a programme of awareness raising. In some cases they see this as preparatory to behaviour change – of the sort they themselves have undertaken as a consequence of participating in the public dialogues. While this process works for them, it is clearly not scaleable: we'd be a long time achieving population-level change if we had to work through two rounds of discussions in a month with groups of 50 people at a time. Such a method would also be of questionable value in the longterm, as we constantly need to renegotiate our approaches to achieving food security in the face of ever-changing pressures and newly-emerging technologies. The first GFS dialogue from 2012 notes that experts and the lay public use different frames to talk about food system challenges. This review closes by recommending an open-ended process of sense-making shared between food system stakeholders and the lay public, in order to develop visions of viable food futures which everyone can share in. It is hoped that organisations like GFS, the Wellcome Trust, and the FSA can lead the way in carrying this shared endeavour forward over the coming years.

## Main Findings

### 1. Context

The FSA Strategy for 2015-20 frames its work within the challenge of delivering food security for the UK public. In doing this, it takes the definition of the United Nations' Food and Agriculture Organization (FAO), for whom food security is a state which *"exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life*"(1999, in FSA 2015). This state cannot be said to exist now in the UK – think of those in poverty (see eg. Fabian Society 2015) – and it is under increasing threat as we move into the future, not least as the effects of climate change take hold: there will be radical change over the next 25 years, potentially including in the period up to 2020, says the FSA Strategy.

There is increasing mobilisation around the challenge of food security across the civil society actors who make up an emergent 'community of practice' focused on the interaction between the public and the food system (for more on communities of practice, essentially "*groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly",* see Wenger et al. 2002). The work of the Wellcome Trust, and the FSA itself, has already been flagged, added to which are new networking bodies like the Food Research Collaboration, Eating Better, and – internationally, the EAT Forum. Their work follows in the footsteps of the more established Food Climate Research Network (FCRN), who have been alive to this agenda since 2005. Consumer groups such as Which? are playing a part, whilst industry-facing groups such as the Carbon Trust and Forum for the Future also have programmes of work running in this space. Meanwhile, the ESRC has brought together researchers in a multidisciplinary Nexus Network: exploring the 'interdependencies, tensions and trade-offs' between water, energy, food and environment (see http://www.thenexusnetwork.org/ ). Political groups and think tanks like Chatham House, and the Fabian Society, have set down their own markers in the debate, based on collaborations and Commissions which they have developed. Finally, UK governments, departments and the research councils fund the Global Food Security programme, co-ordinated by the BBSRC. [Many of these organisations - and more besides – have contributed evidence to this review: see the Annexes below.] All these bodies in their different ways are responding to the common challenge of providing healthy and safe food for people across the world, now and in future – and their mobilisation recognises that the challenge is urgent.

These bodies' ways of working also recognise that the challenge is complex: they have come together as networks and collaborations in order to respond to the interactions and feedbacks in the global food system. Like many sustainability challenges, food security cuts across boundaries: of governance, of markets, of theories and disciplines, as well as geographic territories. This challenge requires new institutions which work across traditional silos, an approach exemplified by the Global Food Security (GFS) programme. GFS was created in 2011 to explore responses to questions of food security, and to bring together policymakers and academics in the UK to help shape the agenda. It pursues global food security as a classic sustainability challenge of living within (ever-decreasing) limits, in order "*to provide the world's growing population with a sustainable, secure supply of nutritious food from less land and using fewer inputs*" (see http://www.foodsecurity.ac.uk/ ). This will involve balancing increasing supply (eg. through sustainable intensification – though what this entails and how remains contentious – see eg. BBSRC 2014) with reducing demand (especially for resource-intensive proteins like meat) whilst both mitigating and adapting to climate change (which is already reducing yields).

Judging from a number of key indicators, the situation is already urgent. A number of these are cited in the sources under review here, where they help to set the context for the discussion of public understanding and attitudes which follows. These include that:

- Emissions from the livestock sector account for 14.5% of global greenhouse gases (GHGs) – approximately equal to the tailpipe emissions from fuel burnt in all the world's vehicles (FAO/IPCC, in Wellesley et al. 2015).
- At current rates, consumption of meat and dairy produce is expected to rise by 76% and 65% respectively by 2050, with emissions rising accordingly (Bailey/FAO 2014, in ibid.).
- A 'do nothing' approach would mean that emissions from agriculture would take up the total carbon budget allowed in a 'two degree' warming scenario by 2050 (as agreed at COP 21) – without rises in emissions from any other sector (Bajlzejl et al. 2014).
- Recent modelling has established that increasing efficiencies in food production will be insufficient to prevent further increases in land use for agriculture, and accompanying emission rises; yield increases will need to be accompanied with "*substantial*" demand reduction if we are to live within land and carbon limits (ibid.).

The situation is summed eloquently by Tim Benton the UK's Global Food Security Champion who, giving evidence to the Fabian Commission on Food and Poverty, said the *"agri-food system is completely not fit for purpose going into the future, even though it has been relatively good to us over the last 20 or 30 years*" (Fabian Society, 2015). Or, put even more crisply, in the title of his presentation to the Wellcome Trust's Crunch team: 'Business as Usual is not an option'.

As this review shall go on to reveal, for most of the public, this situation is 'new news'. Indeed, like the community of practice outlined above, the 'food futures' research agenda is only just emerging: it is hoped that it can be made more tangible through this review. This agenda potentially spans the whole food system, including the supply side, the demand side, and the supply chains and governance structures which link and mediate between the two. There is the strong risk of the agenda being expert-led and technocratic, to the exclusion of the publics who are at the centre of the systems. This in turn would increase democratic deficits (ie. the lack of voice for certain subgroups in policy discussions), with the public being 'done to', and resulting in more winners and losers. It would also most likely lead to (or perpetuate) a broken system, which failed to allow for the needs and practices of the public as end user, and increasingly so as pressures on the system build over time.

This review endeavours to bring together the 'food futures' literature, and array it around the public (or – better – 'publics') at its centre. It is a vast literature, but one which currently is strangely hollow: as we shall see, there are relatively few sources in which the public addresses the future head on, in the context of food. The exceptions include public dialogue exercises, such as those run by the GFS, by Which?, and now under the FSA's 'Our Food Future' programme. Topics of relevance to the food futures agenda thus include: awareness of food security challenges, actual/potential dietary and other behaviour change, acceptability of emerging food technologies, risk perceptions, and trust in government and other actors. The evidence on these issues and more will be reviewed below, before closing with implications for ways forward in engaging the public in food future.

## 2. The Public and Food Future

While 'food futures' is beginning to appear as a professional agenda, the future is a dimension which is missing from public discourses around food. A telling example of this is provided by a 'social listening' study undertaken for the Wellcome Trust (OLR 2014); social listening, whereby researchers analyse content which has been shared through publicly-accessible social media platforms (largely Twitter and Facebook), provides an interesting complement to conventional market research methods, in that, while it is not derived from a representative sample of the public, it analyses discourses which were created without any researcher inputs (hence there is no chance of leading the public – a constant risk in areas of low salience and understanding). The OLR study reports that the social media debate was confined to future foods, was "*small in volume and limited in scope*", and that *"most of the people talking about the topic were not seriously engaged with the future of food*" (ibid.: 44). They conclude that "*any triggers in debate were drowned out by general noise – mostly around the novelty of eating insects"* adding that such discussion tended to be approached from the perspective of 'I'm a Celebrity Get Me Out of Here!'.

While the food futures agenda among professionals is framed in terms of food security, this language has no place in public discourse. In an early survey run by TNS for GFS in 2012, respondents were asked directly whether they had heard of the term 'global food security' (GFS 2012a). Around one in ten respondents (13%) said they had, whilst 86% said they had not. Notably, men were significantly more likely than women (17% vs. 10%) to have heard of the term, as were those in ABC1 socio-economic grades (18% vs. 8% of C2DEs). However, these response patterns are what one might expect to any knowledge testing question, and may well over-estimate actual awareness.

That suspicion is reinforced by evidence from qualitative research. Parallel to their survey, the GFS team commissioned a public dialogue exercise – the first of several, convened by them, Which?, and by the FSA. In this 2012 exercise (designed with researchers from SPRU at Sussex, and delivered by TNS), two workshops were held with a cross-section of 44 members of the public, across three locations (London, Aberystwyth and Edinburgh – see GFS 2012b). The first workshop explored the public's current perceptions and framings, before providing factual inputs including scenarios. There was then a break, during which time participants were asked to visit websites and reflect upon what they had learnt to date. The second workshop involved more factual inputs, including from selected experts in person, and from Tim Benton (the GFS Champion) by video. As we shall see repeatedly in this review, dialogues of this kind provide both research evidence and action-based examples of how participants respond to particular inputs, such as pieces of evidence or 'messaging': as such they are a popular tool in policy development work – although there is the constant need to scrutinise the findings to ensure that unprompted and prompted responses are not blurred. In the instance of the 2012 GFS dialogue, the concept of 'global food security' was introduced early in the first workshop, and the researchers report that overall awareness of the phrase was "*extremely low*" (ibid.: 14). However, *"upon reflection participants had a broad intuitive understanding of what the term implies*" and in particular they associated it with feeding a growing global population; it is notable that climate change was not reported to be part of their initial intuitions.

The absence of climate change from public understandings is important as it is arguably what injects the urgency into considerations of global food security – notwithstanding the large feedbacks between food production and climate change. In the next in what we might call the series of public dialogues – here, convened by Which? in September 2012, explicitly on the topic

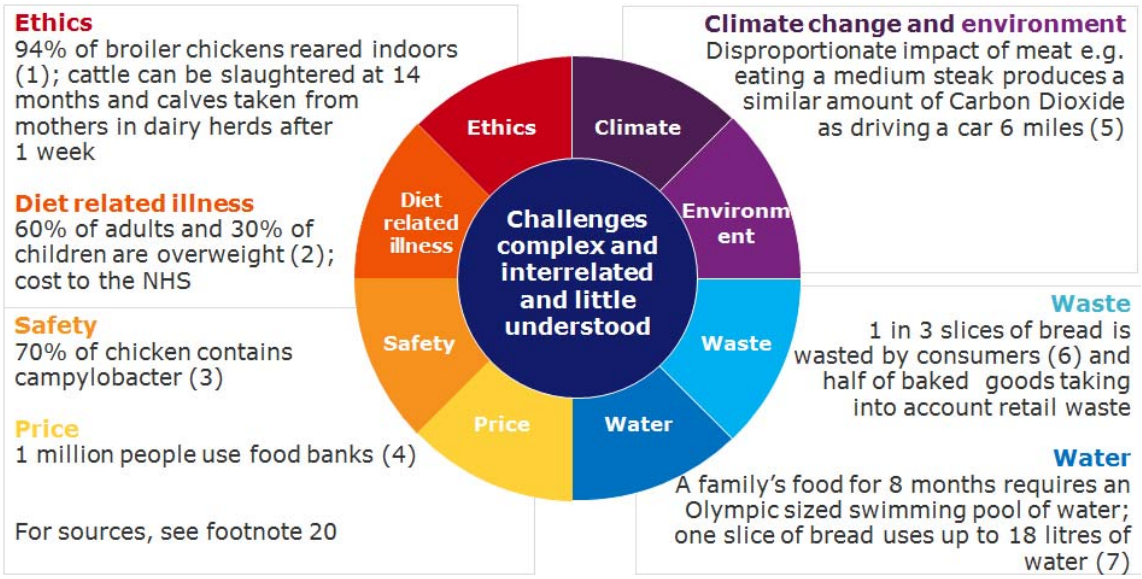
of 'the future of food', and based on two-day citizen's juries in four UK cities – researchers report that participants were "*surprised*" at the information from experts that there was an impending crisis in the food system (Which? 2013: 22). Further, the 'jurors' were described as "*shocked*" to hear of the connections between food, climate change, and price rises, which together were described as bringing this crisis about. One participant in Cardiff is quoted saying:

*"It's a lot more urgent than you realise and we're led to believe."*

In early 2014, TNS-BMRB convened two rounds of 'citizens forum' events for the Food Standards Agency, as a part of a programme of research to explore public perceptions, in support of the forthcoming FSA Strategy 2015-20 (FSA 2014a). The first wave of forums took place in five cities in England Wales and Northern Ireland, and involved 90 minute discussions to review and respond to existing research on public perceptions. Following an interval of a few weeks, the five forums were reconvened, and 'town hall' style meetings were held, with participants choosing the topics to be discussed, before dividing into two parties to debate them, against each other as it were. The three top topics chosen were affordability and healthy eating, food safety, and fraud and authenticity. However, other topics such as environmental impact and food security were also kept on the agenda. The researchers report that "*food security was not a top of mind concern for participants"* (ibid.: 32). This seems an understatement; it is striking that when the moderator raised the topic of availability, participants assumed they were talking about over-, rather than, under-supply of food. "*Consumers tended to raise the negative consequences of having too much choice. There was a perception that excessive choice in supermarkets was encouraging irresponsible food choices and wasteful practices*" (ibid.: 32).

The most recent in this loose series of dialogues was again undertaken by Which?, when in 2015 they ran a follow-up exercise to their 2012 juries (in partnership with the Government Office for Science, and again delivered by TNS-BMRB – see Which? 2015). This time the exercise involved two full-day workshops, reconvened one week apart; 49 people took part in all, in London, Cardiff and Paisley, and again they were selected to span diverse subgroups in the UK public. Again, a range of inputs were provided, including expert testimony; the interim week included a shopping task, informed by learnings from the first workshop, before the second workshop presented participants with a range of 'potential solutions' to the food system challenges and asked them to respond with plans of their own. Notably there were also a round of follow-up interviews, undertaken two months after the workshops, to explore lasting effects on participants. In terms of findings, once again, as in 2012, "*very few participants were aware of the challenges facing the food system*" (ibid.: 63). Moreover, there was "*considerable surprise*" at the level of impact the food system was shown to have on the environment (and this was even apparent among those who tended to "*take an interest in the environment*").

It is informative to take a look at one of the items of stimulus used in the first of the 2015 workshops:




The researchers describe these as "*stand-out pieces of information*", and found that they were "*generally a surprise to participants*" (ibid.: 20). The breadth, scale, and interconnectedness of the challenges clearly struck participants hard, judging from these quotations:

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

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

This qualitative evidence – or more precisely, findings from public dialogues – is important as it provides a relatively unprompted fix on levels of public awareness of the challenges to food security, which can serve as a sense-checker against quantitative data. We have already seen how the 2012 GFS survey revealed extremely low levels of awareness of the 'GFS' term (and suspected those responses may have included some guesswork). Related quantitative measures may also be inflated, for example the same survey reports that, when presented with the statement 'people in developed countries such as the UK need to change their diets and eat less or there won't be enough food to go round', half of respondents (51%) agreed. (However, 31% disagreed with the statement, and the researchers somewhat plaintively note "*this is therefore an area to improve upon*" – GFS 2012a: 10). However it does seem that the one aspect of food insecurity which the UK public is able to respond to is the questions of population growth; it was part of their 'intuitive' unpacking of the 'GFS' term described above (GFS 2012b), and is present in a number of other survey questions about the need for change in the food system. For example, in an 18-country survey by Globescan for National Geographic in 2014 – the 'Greendex' study - an average of 60% of respondents agreed that 'large' or 'very large' changes are needed in 'how we produce and consume our food in order to be able to feed a growing global population over the long term' (National Geographic, 2014). In the UK the figure was slightly lower than the global average, with 54% calling for 'very large' or 'large' changes, 37% 'moderate', and 5% 'small' changes; no respondent called for no changes – although the wording of the question did not encourage them to do so.

GFS survey data also suggest that the population dimension of food security is familiar to a large section of the public; the 2012 survey asked respondents whether any of a list of factors were 'likely to affect food security in the future' (GFS 2012a). From the list of prompts, respondents chose population increases (65%), climate change (59%) and the price of food (47%). However, given the qualitative evidence above we can have serious reservations about the levels of response to this question – though the rankings seem fair: more of the public are aware of population than climate links to food security (and most likely the gap between the two is far larger than this prompted question suggests). A potentially more valid measure is provided in a 12-country survey undertaken by MORI for Chatham House in 2014, as part of their programme of work on meat and dairy (Ipsos MORI 2014a). The survey is interesting (and potentially more useful) as it asks the question about the link between food and climate the other way round, as shown below.

Q3 How big a part, if any, do you think the following activities play in human contribution to climate change? [sic]

| [UK n = 1,040] | Little/nothing % | A Lot % | Lot/Moderate % |
|---|---|---|---|
| Cutting down of trees and forests | 9 | 62 | 88 |
| Burning coal, oil and gas in power stations to produce electricity | 10 | 63 | 87 |
| Exhaust emissions from trains, planes, cars, lorries and ships | 11 | 59 | 86 |
| Industry and manufacturing, for example the production of goods | 11 | 52 | 85 |
| Disposal and treatment of waste such as rubbish in landfill, and sewage treatment | 16 | 49 | 81 |
| Heating and cooling our homes and offices | 16 | 40 | 80 |
| Farming, processing and packaging the meat and dairy products that we eat and drink | 26 | 29 | 69 |

As the table shows, of the 7 activities which could contribute to anthropogenic climate change, meat and dairy farming is the least likely to be identified by the UK public: 69% say it has an effect, and 26% say it has little or no effect. It is notable that only respondents in Russia (42%) and the USA (39%) are more likely to say meat and dairy farming has little or no effect.

While the research evidence exploring UK public awareness of growing food insecurities is relatively limited, there is enough here to suggest that the vast majority of the UK public is unware there is a crisis now, or any time soon, and that the only piece of evidence they have to draw on in beginning to comprehend this reality is their general awareness that the global population is growing rapidly. Without a greater understanding of some other elements of the system (notably climate change, but also resource intensity, inefficiencies and wastes in the supply chain) it will be hard for them to join in wider public conversations about how to negotiate 'food futures'.

## 3. The Public and Food Present

If 'Global Food Security' is a professional discourse – and 'food futures' is an emerging area of work – what happens when we adopt the public's perspective? In contrast to the "*extremely low awareness of the phrase"* reported in the first GFS public dialogue (GFS 2012b), the researchers found that participants "*were not used to thinking about food in a global context – the frame of reference was too large. Rather… their 'engagement' with food was at point of purchase and concerned more immediate factors such as price and quality*" (ibid.: 14).

This finding has the ring of common sense, and suggests that any enquiry into public perceptions of food futures should start by understanding the public's relationships with food present. Food is primarily, for all of us, something to eat. If we were to adopt a blunt needs-based understanding of behaviour, like that proposed by Maslow back in the 1940s in his 'Hierarchy of Needs', food supplies our basic physiological need for sustenance (Maslow 1943). Yet even as he presented this analysis Maslow noted that basic needs are only the start of it: *"It is quite true that man lives by bread alone – when there is no bread. But what happens to man's desires when there is plenty of bread and when his belly is chronically filled?"* (ibid.: 375). Wo/men (and Maslow) move up the hierarchy, until they reach the top tier of needs, for 'self actualisation' ("*A musician must make music, an artist must paint, a poet must write…. What a man can be, he must be*" – ibid.: 382). For Maslow, food satisfies hunger, and the need to eat is then left behind; but readers (and writers) coming along after will note that food is fundamental both to sustenance and self expression. In the words of Claude Fischler, for example, "*food not only nourishes, but also signifies*" (Fischler 1988: 276).

Fischler's paper (on 'Food Self and Identity') provides analysis on how food is essential to our selves in two dimensions. The first we can call vertical, in following the orientations of Maslow's 'Hierarchy': this dimension "*runs from the biological to the cultural, from the nutritional function to the symbolic function*" (ibid.: 275). "*The second links the individual to the collective, the psychological to the social"*, and it is this dimension which Fischler's paper focuses on. It opens with the much cited adage: "*Food is central to our sense of identity*" (ibid.: 275, and eg. Macdiarmid 2015; Thompson et al. 2015). Fischler's contribution is to focus on how food literally and metaphorically makes us what we are; what we ingest is also a form of expression (self actualisation, in the language of Maslow). To turn away from foods we have been used to eating is to turn our back on who we have been, and ask questions about who we are and intend to be.

The ties between ways of eating and ways of being have been noted by social scientists since the start of their disciplines, and became especially prominent in the work of Levi Strauss, and of Mary Douglas, in the 1960s. In the 1970s, the sociologist Pierre Bourdieu focused on the role of tastes, as preferences or styles of being and doing, by which people identified themselves with particular groups, and marked themselves out from others. In 'Distinction' (1979; trans. 1984) Bourdieu identifies a fundamental opposition between 'distinguished' and 'vulgar' objects and practices, such that distinction becomes a means of expressing social class through lifestyle. Bourdieu finds this opposition in art, the body, language and food, with distinction being played out through the discourse of taste. Thus popular (vulgar) tastes are grounded in necessity: filling and economic foods which are eaten quickly in an "*ethic of convivial indulgence*" (ibid.:179). By contrast, dominant (distinguished) tastes are based on luxury and restraint, delayed gratification and "*sobriety for the sake of slimness*". To make reference to Maslow, there is a distinct hierarchy at work here – and tastes and foods provide some of the stuff of which it is constructed.

'Distinguished' styles are associated with those in power, and the observance of these tastes in part serves to keep those who cannot, or do not, follow the same practices at bay.

In researching and observing these 'distinctions' Bourdieu reveals great affection for the 'vulgar', and his hero is the bon vivant who "*is not just someone who enjoys eating and drinking; he is someone who is capable of entering into the generous and the familiar – that is both simple and free – relationship that is encouraged and symbolized by eating and drinking together, in a conviviality which sweeps away reticence and restraint*" (ibid.: 179). Eating is a social act, and being sociable ("*convivial*") expresses it at its height – in contrast to the separateness (eg. of menus, courses, and even tables) of refined dining. Foods taken and eaten express not only the identity of the eater, but eating together actively shows care for the social group to whom the eater affiliates. A more British example of egalitarian impulses is found in George Orwell's 'Road to Wigan Pier' (1937; in Fox & Smith 2011):

*"A millionaire may enjoy breakfasting off orange juice and Ryvita, an unemployed man doesn't. When you are underfed, harassed, bored and miserable, you don't want to eat dull, wholesome food. You want something a little bit tasty. Let's have three penn'orth of chips! Put the kettle on and we'll all have a nice cup of tea!"*

The quotation is taken from a paper on the 'junk food mums' episode at Rawmarsh School, Rotherham, South Yorkshire, where in 2006 a group of mothers responded to the School implementing a new healthy menu and banning pupils from leaving the site at lunchtime, by bringing food from local takeaways and passing it though the railings. By the third day it was reported that there was so much demand from the children that the mums used a shopping trolley to distribute the orders. A media storm blew up, in what the paper's authors describe as a case of 'moral panic' (borrowing a term from Stanley Cohen). Lines were drawn on both sides, with one of the mums, Julie Critchlow, describing the food served in the canteen as *"over-priced low fat rubbish"*, while the celebrity chef Jamie Oliver weighed in on the healthy eating side, himself having campaigned for healthier school meals (he used the forum of Top Gear to describe Julie Critchlow as a "*big old scrubber*" – ibid.: 407). The episode clearly stuck with Oliver, as he subsequently launched his 'Ministry of Food' TV show and concept, which included him returning to Rotherham in 2008 to teach the mums how to cook ten simple healthy meals (having first apologised for his remarks).

From the media perspective, the fault (and there generally needs to be some) was with the mums who failed to take responsibility for their children's healthy diets – in fact, flouted measures others were taking to do so. The Sun punningly branded them 'sinner ladies', and ran a cartoon based on the Fat Slags from Viz (in turn pointing up the regional identities and stereotypes marked out through different 'tastes', similarly to Orwell's idiom in 'Wigan Pier'). The prescription of cookery lessons is another sign of a deficit model being applied: it is presented as help (as in the 'Ministry of Food' format) but presupposes that individuals can determine what foods they and their families eat – if only they were skilled enough.

(As an aside, cooking lessons appear frequently in research and policy on healthy eating, as an intervention approach, or 'lever'. For instance, in a paper on people's use and perceptions of salt, the authors note that respondents aged under 40 "*reported a lack of time to cook, preferring to spend time on leisure activities, or more significantly, citing an inability to cook for themselves*" (Kenten et al. 2013: 108). It is hard not to feel that such observations carry some of the moral charge which Fox and Smith find in the Rawmarsh School story. By contrast, it is notable in a paper which reports on an interesting exercise in which people in Scotland were asked to follow a healthy diet (ie. as prescribed in government guidelines) for three days, that participants were clear that their

usual diet of less healthy foods was not followed on account of a lack of cooking skills (Macdiarmid et al. 2013: 416):

*"It's not that I can't cook, I think I am quite a decent cook... It's just more often than not I can't be bothered doing it to be perfectly honest."*

In the 'Ministry of Food' programme in which Jamie Oliver meets Julie Critchlow, she counters his apology by arguing that Oliver is "*living in a bubble*" (Fox and Smith 2011: 409). The phrase both sums up that his daily circumstances are different from her own, but also how the food practices she follows reflect the circumstances around her – she too is not making choices 'in a bubble'. From the outset, the mothers had argued that their action was *"nothing to do with junk food, but was a matter of cost and freedom of choice in an age of health surveillance*" (ibid.: 407). While there is much that is unedifying about the story (and the paper's authors raise the question of whether anyone other than the mums who featured in the 'Ministry of Food' programme benefited from Jamie Oliver's intervention) they do conclude that the episode *"moved the debate on from a focus upon individual responsibility and blame, to the beginnings of a discussion of the wider cultural, social and economic contexts in which people buy, prepare and eat food"* (ibid.: 410).

The episode moved the debate on, but did not close it; it smoulders in other contexts, such as cooking from scratch, and families eating together, while in other places it burns with a full flame, such as in discourses around food banks (see most notably Fabian Society 2015 also discussed in the next section). A recent study based on interviews with food back users finds people in similar circumstances to those in Rotherham (as Oliver says "*This is fucking Britain, this is fucking 2008. I've been to Soweto, I've seen AIDS orphans eat better than that*" – in Fox and Smith 2011: 410), and their comments echo both with those at Rawmarsh, but also those in the three day healthy eating trial in Scotland, reported above. One food bank user, Naomi, comments (Garthwaite et al. 2015:40):

*"I try and do the best I can with what I've got like I say it costs so much to get the food that I need, and it's easy for a GP to say to me 'Well you're eating the wrong stuff', I haven't got the money."*

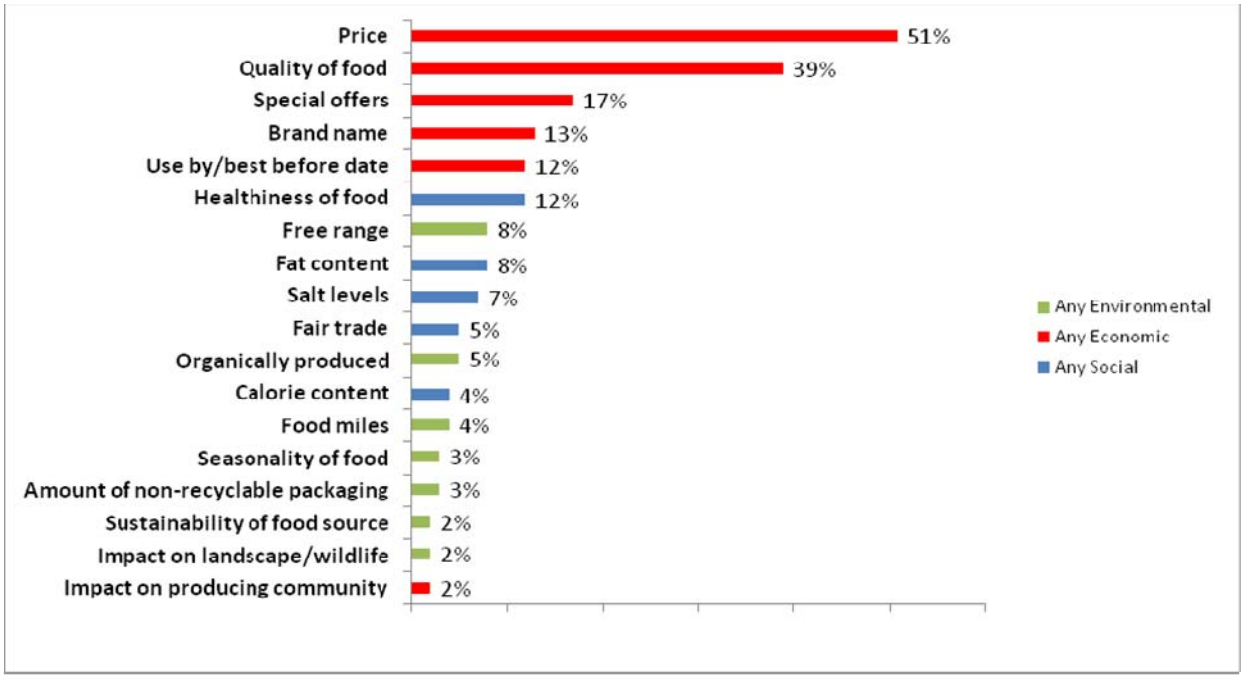
In the context of people with sufficiently low incomes to be eligible (and willing) to take emergency handouts, the authors conclude "*food choice is a concept no longer relevant to foodbank users.*" (ibid.: 43).

In so saying, the authors point to another version of the fault line between personal responsibility and social context which was crossed and re-crossed in the Rawmarsh story. There is a substantial part of the literature on food behaviours which talks about 'food choice' in unproblematic ways – whereas other researchers, often working qualitatively or ethnographically, cannot use the term comfortably, or at all. 'Food choice' not merely assumes that what people eat is what they want to eat ('revealed preferences', to an economist), but that it is the result of a behavioural calculation: as such the phrase is found most often in private sector sources, and commercial market research. It sits well with the concepts of consumer sovereignty, and of rational choice – it does not however work well for people whose consumption (here, their dietary intake) is selected from the donations of other people with greater choice over the food they buy, and who feel a duty to share it with others.

While food choice, or the power to choose, is unevenly distributed, a look across the literature which uses the term uncritically is highly informative. When the public are asked (in market research) what the factors are in their purchasing choices, their top answers are (in slightly

varying orders and wordings) price, taste and quality. A clear example is provided by a TNS survey for the FSA, undertaken back in 2008 (FSA 2008).

***When you go food/grocery shopping, what issues do you consider when choosing one food product over another? [spontaneous]***




Source: TNS Omnibus 7th-11th March 2008 Base: All principal shoppers (n = 1,418)

While similar questions are asked in various places (see eg. Divine 2015), the 2008 version above is interesting because of the way it is asked (unprompted) and the way the answers are analysed: clustering the responses into categories, economic considerations are far more commonly reported than health concerns, which in turn are more widespread than environmental issues (in any case, we may argue that 'free range' is more an ethical than an environmental concern, while it is notable that 'sustainability of food source' gets a few mentions – this may hint at what we now call food security issues).

This general ranking is in line with the results to comparable questions in other surveys. For example, a 2013 survey commissioned by the food industry think tank IGD provided respondents with a pre-coded list of factors influencing their shopping choices, and similarly found that price and quality outstripped health concerns, with ethical considerations coming at the bottom of shoppers' priorities (IGD 2013).

*Q. Rank your five most important considerations when shopping. Please think about the individual food and grocery products that you buy.*

| | |
|---|---|
| Price | 91% |
| Promotions | 68% |
| Quality or performance | 63% |
| Taste or smell | 53% |
| Healthy option | 49% |
| Use by or sell by date | 47% |
| Familiarity | 46% |
| Brand | 35% |
| Ease of use | 20% |
| Ethical or eco-friendly | 19% |

Taken at face value, the simple implications of such data for work on food futures include that the public does not tend to look beyond the price and quality of food when making purchase decisions, and that, even if people were more aware of the environmental and global impacts of the food they eat, alternative options would need to satisfy price and quality criteria before people would consider making different 'choices'. Even on their own terms such data prove food behaviours to be complicated. In another variant on this question, asked in a special module of the British Social Attitudes survey for the FSA, respondents were provided with prompted options, but unlike in the IGD version above, they were allowed to pick as many as applied (FSA 2009a). It is notable that the mean number of answers selected was six. For marketers trying to match their products to these criteria, the task is challenging – even without allowing for variation between different types of shopper (see the section below for further discussion).

Even within the discrete answering options offered to respondents in questions like these, there are shades of meaning at work, such that the answering categories may not be as stable as the survey writers would hope. If we take the example of 'quality', the second or third factor after price in the answers shown above, the IGD study complements its survey work with four focus groups, and finds that "*quality represents different things to different shoppers and often denotes different environmental, ethical and nutrition credentials*" (IGD 2013). Quality is revealed to be a subjective bundle of issues, incorporating animal welfare concerns, farming methods, long shelflives, and country of origin. We may also note that some of the issues in this bundle appear as answering options in the survey question itself, further blurring the categories. A recent economic choice experiment probed such distinctions further, and found that for those who can afford it, quality attributes are important, but that price tends to trump quality (Hussein et al. 2015). Within quality however are a range of considerations including taste/flavour, texture, colour and shape. Similarly, a 2010 study on attitudes to functional foods across several European countries including the UK found that consumers tend to make judgements about whether food is 'good quality' based on four dimensions: taste (or other sensory measures, as in Hussein above), convenience, healthiness, and naturalness (Grunert 2010). Clearly these criteria are more multifaceted, and subjective, than those asked about in the familiar survey questions. The conclusion however is similar, being that, in the absence of cost considerations, few consumers are willing to compromise on taste.

Questions like these – especially when asked quantitatively, through the medium of surveys – assume food purchasing to be the product of a rational choice. However, when we lift the lid on

this process, for instance, in qualitative research, complications quickly appear. One objection is that people are forced to deliberate and give rational answers when asked in research about how or why they buy particular foods. In contrast, when people actually shop, it is apparent that they are not deliberating over their options as carefully as they are in research. To give one example, in a piece of conflicting quantitative data, 24% of UK respondents said they always check food purchases to see if they have quality labels, while 39% said they do this sometimes; 36% said they never check (incidentally, the highest proportion across all European countries – Eurobarometer 2012). A further reason why we should be circumspect about these questions on factors influencing food choices is that they are precisely framed around the act of purchasing, rather than wider practices relating to dietary intake.

There are a raft of influences on food behaviours which are known to be non-rational, and these also feature widely in the literature. An obvious example would be the role of emotions, or affective factors – put simply, choosing with the heart not the head. The 'taste' option in the survey question above arguably conceals more subjective factors than the 'quality' option, and liking is recognised as a strong reason for eating particular foods (see the comments above about consumers not being prepared to sacrifice taste). The affective dimension is particularly important in the context of healthy eating, as it is commonly presented as the rational choice to eat healthily – as in the quotation from food bank user Naomi above. Nevertheless people, knowing this, still tend not to eat healthily to the extent they should (eg. people continue to fall short of 'their' 5 a day – see eg. Bates et al. 2014) – although in Naomi's case this is because she has been 'priced out' of healthy eating. Healthy eating is also a non-choice for many other people, especially if they find themselves in particular circumstances; take for example a young woman in a recent qualitative study on the use of nutrition information labels (Wahlich et al. 2013: 209):

*"If I am having a bad day and feel like eating some chocolate, that is much more likely to override any sort of common sense approach I might have to buying a healthy food."*

The study produced many similar testimonies from young women who clearly knew what healthy eating was – and often followed its precepts – but who deviated regularly from it, largely for emotional reasons (which they could then post-rationalise). As in the quotation above, it is clear that healthy eating can often be construed as rational ('a commonsense approach') while decisions about what to eat are often not made rationally.

It is notable that less healthy foods are often the ones which reveal the emotional component in people's decision making. A recent survey for the fairtrade chocolate company Divine throws up some powerful examples of the role of emotions in eating behaviour. Respondents were asked about their relationship with chocolate, and those who indicated that they 'love' it or 'really love it' were asked to write in (unprompted) what they love about it. Their responses echo the line of questioning by being largely emotional; at the extreme end, they are not just sensory but sensual, for example (Divine 2016: 27):

*"The feeling of smooth love in my mouth"*

Others are more multifaceted, and weave together the rational, the contextual, and the emotional:

*"I go through stages, sometimes I fancy something sweet. I love the taste, the texture and the fact that it is my freedom of choice, knowing that it is bad for me but it is my choice to eat it with the money*

*I work hard to pay for it."*

This response seems closer to the sort of complex answer one might get in a qualitative interview. It recognises that different foods are consumed at different times for different reasons – and that some of those reasons are affective. It is also notable that the whole response sits within a choice frame: having the 'freedom to choose', linked (tellingly, given the discussion above on the cost of healthy eating) with having earned the money, or right, to behave counter to taken-as-rational ways of eating. Finally, when taken together, there are many reasons here why the respondent shouldn't give up eating chocolate: presenting a challenge to those pushing for healthier diets, as well as those concerned about the security of future cocoa supplies (the context in which the Divine survey was undertaken).

Looking through these respondents' eyes, less healthy eating could be seen as perfectly rational, and certainly the norm, from which healthy eating is a new departure. This dynamic is what is emphatically revealed in the three day trial of a healthy diet, undertaken in the study in Scotland (Macdiarmid et al. 2013). The overwhelming response from respondents was surprise, but in a good way (ibid.: 415):

*"They were more normal foods than I expected. I kind of expected a bit more nut cutlet type things, but they were more normal."*

*"I honestly thought it would be like lettuce, tomato, cucumber, all that sort of types. I had potato salad and then I had coleslaw and a cheese roll I thought hmm that is a bit weird."*

While these quotations primarily attest to the unfamiliarity of respondents with the components of a healthy diet (as defined by government nutritional guidelines), they also clearly position foods considered less healthy as 'normal'. This role reversal for foodstuffs further underlines the gap between 'normal' or lay, and 'expert' (or 'healthy' in nutritionist terms) perspectives. Borrowing from Bourdieu, it is clear that the respondents expected the healthy diet to be close to the distinguished practices characterised by restraint which he associates with the ruling classes ("sobriety for the sake of slimness"). Also consistent with a 'Distinction' reading of this evidence, the one thing that respondents in the three day trial are most surprised about is that they do not feel hungry after the three days ("*It was quite weird actually cos I didn't feel hungry at all between them [meals]"* ibid.: 414). Interestingly, similar responses were reported in another Scottish study, entitled "What, not just salad and veg?', exploring the acceptability of government guidance relating to the Eatwell Week of menus (Leslie et al. 2014). There, respondents complained that there was no way they could find time for four meals a day (and no snacks), with some questioning why there appeared to be so many carbs (again, contradicting their notions of healthy diets).

The universal sense of surprise in these studies underlines not only how unfamiliar healthy ways of eating are, but how routine and 'normal' less healthy repertoires are considered to be. Habit is a considerable influence on behaviour, and an important strand in the food behaviours literature. For example, habit is physiologically connected to liking through the 'familiarity effect': "*Food preference is an increasing function of exposure frequency: the more frequently a food has been tasted the better it is liked"* (Eertmans et al. 2001). More recent qualitative sources reviewed here also attest to the association of less healthy eating with habits and routines. For instance, in a study from Ireland on out of home eating by mothers and their children, one mother comments that *"99% of the time you know what everyone's going to eat before you even go there anyway"* (McGuffin et al. 2015: 105). Moreover, the 'there' that the mother refers to tends to be one of only two or three restaurants

which have been tried and tested, such that a mother knows the meal will be a successful event, and the food will be eaten. One might consider this behaviour logical, although it doesn't conform to individualised models of rational choice.

That study also neatly illustrates the social dynamics around eating together (commensality, in conceptual terms). The food that ends up being eaten is the result of a collective choice, largely proscribed by what the children in the family are known to be willing to eat (ie. are familiar with). We may look back on the survey questions about factors informing purchase decisions and wonder how different the answers would be if the parents with children in the sample were asked to answer in their role as parent, rather than as 'consumer'. Some of the qualitative work reviewed here can help us speculate about how such a reframing would affect the responses. The out of home eating study from Ireland offers a number of examples, as does a further study from Scotland on people's reactions to the possibility of eating less meat (the 'Eating like there's no tomorrow' paper, by Macdiarmid et al. 2016: 491):

*"It's not just me that's eating meat in my house.*
*My husband's a bit of a 'it's not a meal unless it has meat in it'."*

That paper includes several examples of people discussing non-meat eating in terms of it being abnormal or weird. It echoes the same authors' three-day healthy eating trial study, in which one respondent spoke about being invited to a party during the period of the experiment, and feeling obliged to take things from the buffet in order to fit in – although she then did not actually eat them (Macdiarmid et al. 2013). In the same paper, the authors cite a study with school-aged children in Scotland in which the researchers conclude that healthy eating could be considered *"bad for young people's health"* because of the social and emotional downsides of deviating from acceptable norms of eating held by their peer groups (Stead et al. 2011, in ibid.). That conclusion is supported by a quotation from the study on out of home eating in Ireland (McGuffin et al. 2015: 105):

*"Imagine if you never went to McDonalds and told the child 'No you are never going to McDonalds' and then they go into school and say 'I've never been to McDonalds.'"*

This facet of people's eating practices takes us back full circle to the analysis of eating as a social practice, and a way of expressing ourselves and knowing who we are (as identified with the work of Bourdieu, or Fischler). The meal event is a large area of enquiry in the social science literature on eating, as first disassembled and taxonomised by Mary Douglas, who broke down the 'daily meal' into its constituent parts (Douglas 1972). Indeed, the family meal as a subject of study has been endowed through research with almost magical qualities; for instance, Anne Murcott has followed in Douglas' footsteps by examining the elements and techniques associated with the 'cooked' or 'proper' meal (as the public calls it), identifying the rules that must be adhered to make a cooked dinner 'proper' (Murcott 1982). Work in this tradition has been brought up to date by recent researchers, including in a paper which performs statistical analysis on a large dataset in an attempt to shed light on which bit of the family meal bestows its protective powers on children: in other words, explaining why children who eat 'family meals' report healthier diets than those who do so less often (Skafida 2013). While directions of causality are hard to establish in the dataset, it transpires that 'food choice' [sic] is the principal factor explaining the better outcomes: ie. the fact that children are eating the same food as their parents when they eat together means that they consume more healthy foods.

Meanwhile a recent secondary study comparing current eating practices in England and France has found that "*although considerable variation remains… it is premature to report the 'death of the family meal*'" (Gatley et al. 2014). Changes in meal occasions in England across the last fifty years are explored in depth in another paper, by Alan Warde and colleagues, who take a social practices approach in their analysis of meal occasions (Yates and Warde 2015). To do this, they compare the findings from a bespoke diary-based survey of Tesco Clubcard holders with a large dataset (of 4,500 interviewees) gathered in 1955. The details of their analysis (including variations by subgroup) are fascinating; suffice to say here that they conclude that the same general three meal a day pattern pertains in the present day as in the 1950s, but that there has been a simplification in the formats of each meal. Nowadays "*Breakfast has become a simple event, centred on cereals and/or toasted bread, often accompanied by fruit*", and "*Lunch also is increasingly a simple affair, most involving small dishes, principally sandwiches, sometimes supplemented with soup or a sweet item*" (ibid.: 307; indeed, they emphasise that the top five lunches recorded in their Clubcard survey are all sandwiches of different types). The evening meal is now the principal meal of the day (where lunch had been predominant in the 1950s) and is more elaborate in terms of dishes, time taken to prepare, to eat, and in terms of eating with others. Yates and Warde put this shift in emphasis between lunch and dinner largely down to changes in working patterns – particularly among women – and the demise of the cooked lunch in the work canteen.

It is informative to compare these patterns to those revealed (in rather less detail) in the recent study in Scotland exploring people's experience of following the draft Eatwell Week guidance (Leslie et al. 2014). Well aware that people's eating habits are shaped by their available time, the guidance was designed to include a quick breakfast – although this element immediately proved challenging, as many participants tended to skip breakfast. Lunch guidance involved advice on buying appropriate shop-bought sandwiches – echoing Yates and Warde's survey findings above. Finally, dinner guidance was the most difficult to follow, despite it involving quick and easy recipes: most participants reported they tended to eat convenience foods, in the week. (Notably, the researchers underline that no respondent found the evening meals too difficult to cook: "*I felt like a gourmet chef*", said one female participant (ibid.: 4)).

The value of adopting a social practices approach to understanding people's relationships with food is underlined in the studies highlighted here which concern eating patterns, with their emphasis on convenience foods. As well as reflecting socially-agreed rules for appropriate conduct, social practices are 'tempero-spatial arrangements', which means they happen at particular times in particular places – practices compete with other practices for time and space, and simply have to fit in. Throughout the recent literature, references are made to people being short of time, or tired out from busy days, to the point where they cannot be bothered to cook a 'proper' meal. Indeed, Kantar Worldpanel data from 2014 report that the time spent making the average meal has nearly halved over the last 20 years – from 60 minutes to 32 minutes (Fabian Society 2015). In his evidence to the Commission, Dale Southerton stated that that pattern can be observed relatively evenly across the income distribution.

As a corollary of those changes in time use, the UK has become the home of the ready meal: Mintel data from 2010 show that UK consumption of ready-meals was double that of France and six times more than Spain (reported in Jackson & Viehoff, 2016). The authors of that paper neatly cite the marketing proposition of convenience food as a 'meal solution', and it is instructive to contrast that with earlier conceptions of a 'proper' meal (as in Murcott 1982). Meanwhile, Alan Warde has described convenience food as "*tinged with moral disapprobation*" (Warde 1999: 518, cited in Jackson & Viehoff 2016). This is not the same 'moral panic' as swept

the nation in response to the Rotherham 'junk food mums', but it is more universally applicable, and suggests that for no one is food choice a free choice.

## 4. Publics not The Public

Before proceeding any further, this review should pause to highlight the variations across different subgroups and segments of the UK public that are apparent in the evidence base on food and eating.

In one sense, this move is a reaction to the tendency in the literature to speak in terms of the public as a single entity. This is a not an unusual occurrence, as quantitative data enable users to aggregate upwards to see responses across the whole dataset – and for ease and speed we look first at the total column, or the national picture. A second motive for inserting this pause is to act as a corrective to those qualitative sources which speak of a single public, paradoxically because their samples are too small for them to say anything with confidence about variation by subgroup. It is notable that the series of four dialogue studies under review (to varying extents) also tend to revert to a single 'public' when they report, presumably on account of their small samples (eg. Which? 2015 comprised 49 people), even though their participants were carefully selected to cover a wide range of subgroups in the population (GFS 2012b; Which? 2013; FSA 2014a; Which? 2015).

The discussion above on people's perceptions and practices in relation to food and eating is patterned with references to different places, genders and ages. Most of these are apparent in the qualitative evidence, and all these play a large part in determining food behaviours. This section briefly brings together highlights from the sources under review which demonstrate the wide variations in the perceptions and practices of different subgroups, divided according to 'standard' demographics, and other bespoke ways of clustering people into segments. In selecting what data to highlight here, emphasis has been placed on points that underline some of the larger differences between types of people on particular dimensions – which argue for treating these groups distinctly in research designs, and wherever possible, in reporting.

i) By Income

- There are no secure estimates of the number of people living in 'food poverty' in the UK. Indeed, one of the key recommendations from the Fabian Commission on Food and Poverty is that meaningful measures are established so the numbers of people living in these circumstances can be tracked (Fabian Society 2015).
- It should also be noted that the Fabian Commission talks of 'food and poverty', given the current instability of terms. They also prefer the term 'household food security' – which has the additional benefit of bringing the national and global food security agendas closer together. In doing this, they build on the work of Liz Dowler, in defining household food security as "*'the inability to acquire or consume an adequate quality or sufficient quantity of food in socially acceptable ways, or the uncertainty that one will be able to do so'* (ibid.: 34). The definition captures both the material lack of access to good food, and the emotional and social losses caused as a result – including that poor people's food futures are especially uncertain (that in itself is a part of food and poverty).
- The most widely used estimate of the number of people in food and poverty is based on the number of occasions on which people in crisis were provided with food by the Trussell Trust food bank network: this has been steadily growing from just under 129,000 occasions in 2011-12 to over 1 million occasions in 2014-15 (in Fabian Society 2015; Garratt Glass 2015). However, this is "*the tip of the iceberg*" according to the Commission, as these are emergency handouts, and the underlying levels of those living with food insecurity are a lot

higher (it is also noted that there are emotional and social barriers to coming forward and claiming the support from food banks even among those who are eligible – see eg. Purdam et al. 2015). A similar measure is derived from those people who used the Fair Share scheme, which distributes surplus supermarket food via 720 charities and organizations to families and individuals in need. In 2013 they served roughly 62,200 people daily, equating to 1 million people per month (cited in Garratt Glass 2015; Wells & Carraher 2014). Other survey-based measures of wider food insecurity include that 16% of 522 GPs (surveyed by the practitioners' magazine Pulse in 2013) reported referring patients to foodbanks in the past 12 month, while research by parenting website Netmums and the Trussell Trust in 2014 revealed that 56% of working families had bought cheaper, lower quality food, and 20% of parents had chosen between paying bills and buying food in the last 12 months (Garratt Glass 2015). However, in summarising these patchy data the author concludes that the *"prevalence [of household food insecurity] is typically quite low"* (ibid.: 1).

- Given their uncertain futures, even in the short term (hence 'living hand to mouth'), it is logical that people in food insecurity should look for the easiest ways to get calories at the lowest cost (one witness to the Fabian Commission described people in this situation as "*true economists*" – Fabian Society 2015: 14). In an example which resonates with the work of Bourdieu described above, Wendy Wills in her evidence described how lower income households are more likely to prioritise *"getting fed"* while those with higher incomes prioritise family health, "*presentation and self-preservation"* (ibid.: 15).
- Another of the Commission's conclusions is that "*it is not realistic to expect large numbers of people in low-income households to change the way they acquire and cook food without a change to their environments*" (ibid.: 15). This chimes with the conclusions of Fox and Smith, writing about the Rotherham 'junk food mums': obesity cannot be combatted by "*simply asking people to change their habits without understanding their habitus*" (meaning their styles of eating, which reflect their environments) (Fox & Smith 2011: 411).

ii) By Age

- Ageing effects mean that as people grow older, so they change what they eat. 2014 data from the Understanding Society panel survey report that 17% of those in their sixties, and 19% of those aged 70 and over avoid certain foods for medical reasons (University of Essex 2014). Meanwhile data from the same survey suggest that the proportions of people reducing the amount of meat in their diet increase with rising age; 7.4% of those in their sixties reported being 'partly vegetarian' – up from eg. 4.7% of those in their forties (ibid.).
- Ethnographic work from the 'Kitchen Life' study funded by the FSA suggests that older people may be at greater risk of infection from foodborne diseases including food poisoning (Wills et al. 2015). The authors conjecture that this may be because of deteriorating sensory capacity with increasing age (eg. such that it is harder to 'smell test' foods which may be going off). They also point to possible cohort effects, noting that older people grew up in a time of shorter supply chains – such that they have more difficulty in navigating the current food system, with the concomitant risks to food safety.
- There is also a difference of opinion in the literature on older people's attitudes to food waste. The mainstream view is that, because they grew up with postwar rationing and an ethos of 'waste not, want not' they are much more assiduous than younger people in avoiding food waste. WRAP's analysis across multiple of their own surveys agrees that the pattern of older people producing less food waste holds true, but they point to measures suggesting they are no more concerned about food waste than other respondents (WRAP 2014). The authors speculate that their lower levels of food waste may in fact arise from their being more skilled in certain food-related behaviours (also citing cohort effects – eg.

taking a list, cooking with leftovers, serving appropriate portion sizes), whilst also stressing they tend to have more time to undertake these and other food practices than do younger people.

- In their analysis of the findings from the British Social Attitudes survey from 2008, Natcen researchers note that across a number of measures older people were *"substantially more likely"* to be concerned about innovations in food technology than were younger respondents (FSA 2010).
- Reciprocally, across multiple sources, younger people (especially under 35) are shown to be less interested in food behaviours and less concerned about food science innovations. For instance, in an IGD survey on food technology, they were nearly twice as likely as average to say 'I have no interest in food science' – 34% saying so, against 18% of the whole sample (IGD 2014). Similarly under 25s were the most likely age range to say during the horsemeat crisis that 'I am not really bothered about the horsemeat issue' (28% saying so, against eg. 19% of 55 to 64s) (FSA 2013a).
- The WRAP 'People Focus' analysis shows that under 35s create the most food waste of any age range, especially plate waste (from serving more than they eat; older people are more likely to waste food by allowing it to go past its use by date) (WRAP 2014). The authors put this down to the time pressures which younger people report themselves to be operating under. This picture is confirmed in many other sources, for instance, the study on salt practices and perceptions, in which the authors concluded that younger people lack time, interest, and (as mentioned above) cooking skills (Kenten et al. 2013).
- Finally, according to Understanding Society, being 'completely vegetarian or vegan' peaks among the young then declines steadily with rising age: from 5.4% of under 30s, to 1.5% of over 60s (University of Essex 2014).

iii) By Gender

- According to Understanding Society, one fifth of women report being on a diet to lose weight: 21.4% (which is nearly three times the prevalence among men). Women are also nearly three times more likely than men to report being 'completely vegetarian or vegan': 7.8% said so in 2014, against 2.6% of men (University of Essex 2014).
- It is reported that women are spending less time cooking, with particular evidence that cooking for 'special occasions' (which is when the most elaborate meals are prepared) is increasingly being handled by men (eg. Gatley et al. 2014). As in the earlier discussion, this attests to the time pressures on women and their increased role in the labour market (see eg. Yates & Warde 2015).
- Women tend to be more concerned about innovative food technologies than men (according to the BSA 2008 analysis cited above – FSA 2010), as well as more concerned about food scares (eg. 19% were 'not really bothered about the horsemeat issue' at the time of the crisis in early 2013, as opposed to 25% of men – FSA 2013a). There are suggestions that they put greater store in the 'naturalness' of food (see eg. the salt study – Kenten et al. 2013).

iv) Households with Children

- Having children in the household appears to be a defining characteristic in the evidence base. We have already seen, in a study on out of home eating, how what children will accept often determines what food is bought or eaten (McGuffin et al. 2015). A detailed qualitative study involving depth interviews with pairs of mothers and children reveals even more complex dynamics which vary from family to family (O'Connell & Brannen 2013). In some

households children are in control, in others parents dictate intake, while in others there is an ongoing negotiation (tacitly or explicitly). It is noted that diets are least healthy in households where children are in control.

- Continuing the patterns among women, respondents in households with children were shown to be more concerned about food technology, and to give a higher priority to healthy eating, based on analysis of BSA 2008 (FSA 2010). They also claim to be interested in food labels at higher than average levels: 47% of parents of under 5s were 'very interested', against 32% of all respondents (IGD 2014). However, these quantitative data can be thrown into doubt by qualitative evidence also gathered by IGD which suggests that parents shopping when accompanied by small children are "*time-pressured, and focused on getting the shopping done quickly*" (IGD 2013).
- A further strand of evidence to support the time-pressed circumstances of parents with young children comes from the WRAP 'People Focus' analysis, which shows that households with children do indeed produce more food waste than other households (WRAP 2014). While their analysis is not conclusive, it tends to support the view in the wider literature that this is partly a result of children refusing to eat some of the food they are served (resulting in higher levels of plate waste).
- The particular influence of being in a household with children is also apparent in less expected sources, such as the survey on the Future of Chocolate (Divine 2016). There, respondents from households with children were much more likely than average to select fairtrade as one of the 'most important' factors in their purchasing choices from a list of prompted options (19% rated it 'most important', against 12% of those without children). Meanwhile, respondents from households with children were also much more likely to report 'very frequent' chocolate eating (59% vs. 45% of households without children).

v) By Ethnicity

- The Understanding Society 2014 Innovation Panel data include a simple sub-classification into white and non-white respondents. It is notable that 14.8% of the non-white respondents said they avoid certain foods on religious grounds (less than 1% of white respondents reported doing so). These data almost certainly overlap with responses to the question of vegetarianism: non-white respondents are three times as likely to report being 'completely vegetarian or vegan' as are white respondents (7.9% vs. 2.3%).
- Quantitative data cut by faith are not plentiful in the sources gathered for this review. A notable exception is the Ipsos MORI 12 country survey on meat and dairy perceptions, undertaken for Chatham House (Ipsos MORI 2014a) – while largely reflects the characteristics of the global sample including India. It is notable that in this survey 7% of the UK sample reported that 'I do not normally eat meat and do not want to eat this in future'; this was the second highest proportion of any country in the survey except India (32% of whose respondents chose this response).
- Finally, it is noted that the majority of black and minority ethnic (BME) respondents in the GFS 2012 survey agreed with the statement '*I am confident that our government will take the necessary steps to make sure there is enough food in the future*': 53% of BMEs agreed, where only 32% of white respondents did (meaning more white respondents disagreed than agreed with the statement) (FSA 2012a).

vi) By Segment

It is widely observed that 'standard' demographics such as those highlighted in this section do not predict food attitudes and behaviours with equal levels of accuracy. In mind of these

limitations, some organisations go on to divide the public into like segments based on those attitudes and behaviours themselves (or the closest predictors of those outcomes). They often do this in order to make their work in engaging with (and 'targeting') these publics more efficient. Of a number of segmentations included in the sources gathered for this review (see eg. National Geographic 2014; Verain et al. 2015), two are highlighted here and it is instructive to sketch out their contours, to see how the characteristics described above come together in distinct sets of people and lifestyles. Again, they may provide useful bases for drawing together samples of the public for future research studies in relation to food:

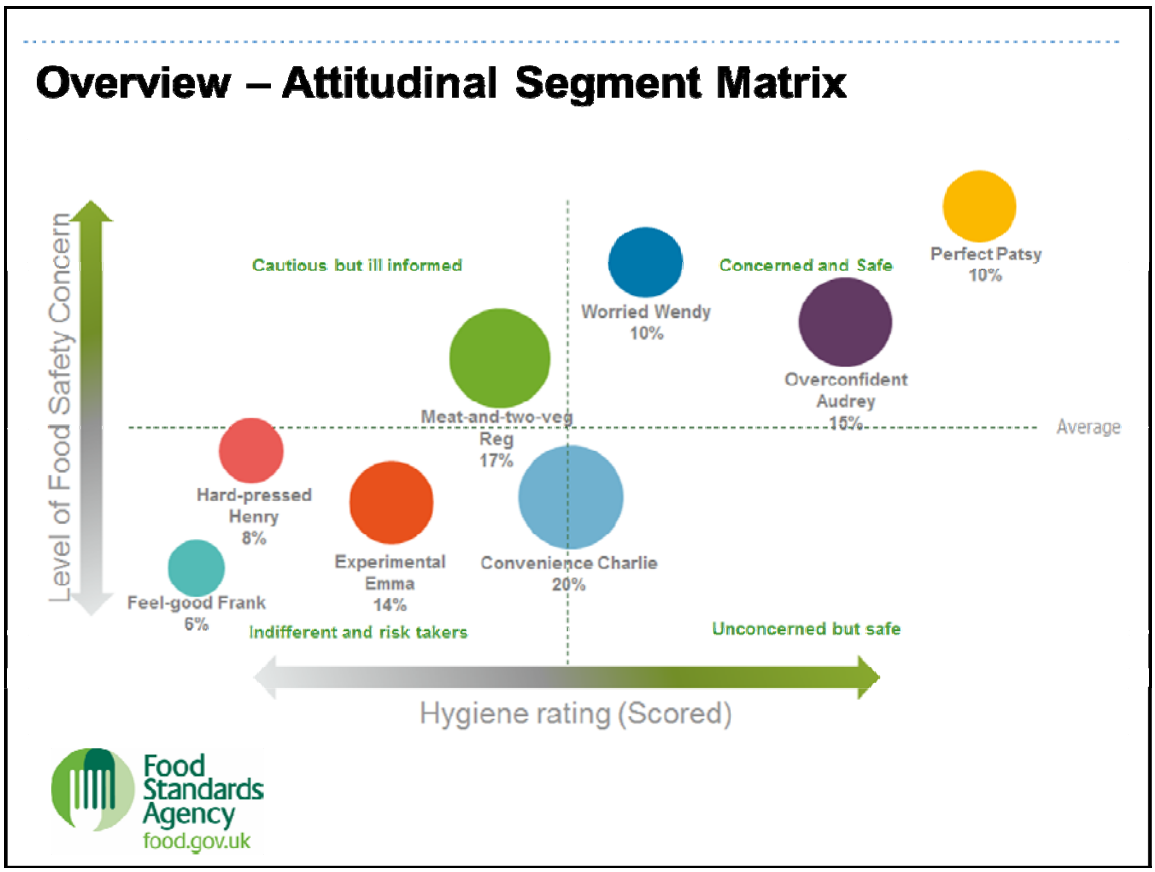
1. IGD Sustainability Shopper Segments (IGD 2013)
   The following segmentation was developed from a small round of focus groups undertaken by IGD in 2013. Accordingly it is not quantified, nor could it be replicated statistically in future studies. It comprises four segments, described as follows:
   i) Mainstreamers
      - Pragmatic, driven by and concerned about food quality but readily make quality/price trade-offs
      - Reactive – respond only to prominent issues and scares
      - Largely accept the food choices presented to them
      - Most concerns are latent, only half developed

   ii) Nutrition Savvy
      - Driven by their own and their children's health needs
      - Self-considered experts in health and nutrition which is reflected in their strong beliefs and decision drivers
      - Think in 'quasi-scientific' way about content of food – calories, fats, carbohydrates etc.

   iii) Ethical Foodie
      - Driven by love of food: flavour, eating, cooking experience
      - Strongly focused on food quality issues, seeking high quality ingredients
      - Pragmatic, realistic rather than idealistic about food production

   iv) Ultra Ethical
      - Serious about food issues, and are political
      - Consider a wide range of ethical, environmental and nutritional issues - tend to put environmental/ethical issues ahead of nutritional ones
      - Wary of commercially-driven food producers and supermarkets

2. FSA Consumer Segmentation (FSA 2015b)
   The FSA segmentation was developed by the Communications team at the Food Standards Agency, and is a fully replicable quantitative model. It is derived from cluster analysis of the Food and You dataset (Wave 3, 2014), which was then fused with the IPA 'Touchpoints' lifestyle database. As a result it contains a wealth of information on each segment, including media consumption, preferred brands, and time use, as well as the core data on food safety-related attitudes and behaviours from the Food and You survey. The segments are derived from 7 core attitudinal questions and 14 reported hygiene behaviours all asked in Food and You, resulting in 8 segments which can be plotted against those two dimensions, as follows:




Although the segments were created in the context of food safety behaviours, they may prove to have value (eg. explanatory power) in other food-related settings. Their potential transferability is enhanced by the breadth of lifestyle data which has been appended to each cluster – although it should be noted that there is an inevitable degree of approximation in undertaking a process of fusion in this way. The resulting segments can be described in many dimensions, though they have been named after the most representative type of respondent in each cluster (despite women being in the majority in all segments, half have been named after men). In order to show a few of the key differences between segments, a summary table has been created below, for the purposes of this review.

| [Name]<br>[Size in Population] | Worried Wendy<br>(10%) | Meat-and-two-veg Reg<br>(17%) | Experimental Emma<br>(14%) | Feel-good Frank<br>(6%) | Overconfident Audrey<br>(15%) | Hard-pressed Henry<br>(8%) | Perfect Patsy<br>(10%) | Convenience Charlie<br>(6%) |
|---|---|---|---|---|---|---|---|---|
| **Female %** | 59% | 52% | 62% | 61% | 66% | 56% | 69% | 51% |
| **Average Age** | 28 | 60 | 40 | 36 | 43 | 30 | 36 | 46 |
| **Average Income** | £27k | £23k | £37k | £53k | £37k | £25k | £35k | £27k |
| **Children in H'hold** | 51% | 4% | 19% | 26% | 25% | 39% | 37% | 23% |
| **I enjoy cooking and preparing food (agree)** | - | 53% | 80% | - | 88% | 21% | 78% | 47% |
| **I don't have time to spend preparing and cooking food (agree)** | 18% | 18% | - | 25% | 9% | 23% | - | 33% |
| **Top indexing statement** | **I've eaten fast food in the last seven days**<br>**31%** | **I don't normally eat between meals**<br>**44%** | **I regard myself as a connoisseur of food and wine**<br>**22%** | **Eat pink sausages or burgers**<br>**62%** | **I regard myself as a connoisseur of food and wine**<br>**24%** | **I've eaten food past its use-by-date more in the last six months due to financial reasons**<br>**53%** | **Nutritional information is important when I'm deciding where to eat out 37%** | **I'm not generally interested in food and cooking**<br>**37%** |

## 5. Priorities for Change

This review so far has established that people's awareness of global food security issues is very low, and they have little sense of a deepening crisis in the food system. The review has gone on to show how most people's relationship with food is proximal (ie. based on that which they come into close contact with) and immediate – not considering the global or anything beyond the short-term. As the review moves on in the next sections to sketch out the elements of possible food futures, we must keep in mind that the question of what changes the public wants or anticipates is largely a hypothetical one; they are living in and focussed on the present. Apart from the series of four dialogue exercises, there is little direct evidence on the public's view of the different food futures that may come about. Instead we need to extrapolate from the wider set of sources whose evidence bears on these questions.

In essence, options for change in the food system can be grouped under three headings: changes on the demand side (ie. in consumer behaviour), changes on the supply side (eg. from producers and retailers), and changes to the system as a whole – as collaborative action is required if we are to address the challenges of food security effectively (see eg. Wellesley et al. 2015; Fabian Society 2015).

### i) The Food System

When the concept of the food system is presented to members of the public in dialogue exercises, their first response is surprise. This has already been clearly demonstrated in participants' reactions to the eight 'stand-out pieces of information' used as stimulus in the second of the Which? dialogue programmes (Which? 2015). Respondents suddenly became aware of what they didn't know about the food system; one commented that it was an "*eye opener*" while another remarked on the breadth of related information presented: *"…it's just everything"* (ibid.: 20). When this evidence was reviewed in the earlier section on the public and food future, it underlined the lack of awareness of the pressing challenges on the food system. Here we might go further and argue that, if the public is not aware there is a food system, there is not much chance of them understanding that it is in crisis.

In the citizens forums held to support development of the FSA Strategy 2015-20, convened in early 2014, there was spontaneous discussion of food scares such as the horsemeat episode in early 2013 (FSA 2014a). After discussion about authenticity and oversight of the supply chain, the conversation moved on to wider issues of food production. The researchers report a similar sense of surprise among participants as we have seen in other studies when discussion moved up a level of scale beyond people's immediate relationship with the food they eat. Here surprise was experienced as a sense of unease, as participants faced "*the uncomfortable truth… that they have very little knowledge of the journey their food has taken prior to consumption*" (ibid.: 26). Accordingly, the researchers describe the public's perception of the food system as a 'black box' within which production occurs – with little more insight beyond that. The positive effect of the horsemeat episode was to shed light on the black box – an effect also noted in the Which? dialogue of 2015. There, the response to the emerging sense of complexity of the system was to associate it with opportunities for fraudulent practices by food businesses (Which? 2015).

In the Which? 2015 dialogue the researchers describe participants' view of the food system as "*very opaque*", which they derive from participants' sense of food supply chains having become very long and increasingly complex in terms of the number of between the site of production

and the point of purchase. Together these gave rise to their feeling that they had become "*distant*" from where there food was produced. Sparked by this new sense of awareness of stretched and many-stranded supply chains, the researchers implemented a quiz to establish how well participants knew the food system: just over half of participants scored between 0 and 3 out of 10. Researchers in the FSA 2014 forums also picked up on participants' sense of the opacity and complexity of supply chains and production processes (FSA 2014: 13). In that study participants talked about how this sense of distance was heightened by an awareness of the increasing use of technology in production processes. Participants expressed a strong feeling that food should be natural, and that this was being compromised by the shift to food production on a global scale. The researchers conclude that, having discussed the issue, the public's view was that current production methods are "*unnatural, mechanised and alien*" (ibid.: 14).

These shifts in production practices are associated by the public with the role of 'big business' (eg. Which? 2015). It is widely assumed that production has been moved around the world in order to find the biggest profit margins, and that technology has been deployed to cut costs. People assume that these practices, being unnatural, in some way pose a threat to public health, and so sometimes respond by calling for more state intervention to oversee practices all along the supply chain (FSA 2014a). It is notable that 'big business' also includes the retailers, and the supermarkets in particular attract substantial criticism for the negative influence they are perceived to have back up the supply chain (Which? 2015). Above all it appears to be multinational manufacturers who are most held accountable for changes in the supply chain: making it both longer and more mechanised. Quantitative data to support these views from public dialogues are provided by the Divine 'Future of Chocolate' survey, in which a representative sample of the UK public were asked a question about ownership models for chocolate companies (Divine being fairly traded and part-owned by the farmers' co-operative who grow the cocoa) (Divine 2016). Respondents were prompted with five different ways in which chocolate companies are run, and asked to rank which they would prefer to buy from. The most popular option was 'A company that pays cocoa farmers enough to invest in their farms', and the least was 'a company that is owned by a global corporation' (with a mean score of 1.53, on a scale from 1 to 5, where 5 was the top option).

It is interesting that the Divine survey then includes a subsequent bank of questions asking people which of a selection of chocolate bars they regularly eat, before asking them which of these they think are fairtrade certified, and which are owned by multinationals (a previous question had stated that over 70% of the chocolate sold in the UK is produced by three multinational companies). Respondents' answers to the ownership question were fairly accurate for the most popular bars, the majority answering correctly that KitKat, Galaxy and Cadbury's Dairy Milk were owned by multinationals; there were then a suite of brands owned by multinationals which only a minority of respondents identified as such (including Toblerone, Milka, and Green & Black's – all owned by Mondelez). The question provides an interesting indication of the patchy knowledge among the public of the ownership arrangements behind popular food brands – although it also highlights the fact that in many cases (like Green & Black's) these arrangements are genuinely opaque.

The sense that the public struggle to see through products to the production processes behind them is further illustrated in the first of the series of dialogue exercises, where the case of a KitKat was used as stimulus for a prompted discussion (GFS 2012b). (It is noteworthy that chocolate again provides the example – first because cocoa is one of the foodstuffs most threatened by global shortages, and second because it is deemed by professionals to be a quick way to engage lay audiences: almost an admission that healthy foods are not deemed so

mainstream). The KitKat example demonstrates both the diversity of ingredients within the bar, and the range of countries and continents they are sourced from. Participants' reactions' are in line with findings already reviewed here, including the Divine data above: first they were "*surprised*" at the range of ingredients, and then at the distances they had travelled. The shock was heighted as they still regarded KitKat as a "*quintessentially British brand*", despite the fact Nestle had bought Rowntree's many years ago (ibid.: 16).

That dialogue exercise reports that participants felt *"a particular unease around the long distances food and drink were transported"*, and that this was the initial way that they made sense of the links between food and environment which they had been made aware of (ibid.: 14). While a number of the dialogue exercises talk metaphorically of the 'distance' perceived between participants and food production, for many people this is also a literal problem. Given most people's lack of understanding of the complexity of the food system – in short, its systemness – they tend to look for more linear associations, like a single responsible entity to blame (usually 'big business'), and in this case a clear source of environmental impacts. The longstanding discourse around food miles – though now superseded in professional circles – is still prevalent in public understanding, and it features in all of the dialogue exercises, from GFS in 2012 to Which? in 2015.

Quantitative data support this sense that the public prefer 'local' food to 'global': for instance, a recent Eurobarometer survey found that 38% of UK respondents reported buying local and seasonal food 'whenever possible' (compared to an EU average of 36%) (Eurobarometer 2014). It is telling that this response comes to a question which asks which actions people are personally undertaking to reduce the impacts of climate change – thus reinforcing the link between food miles and environmental impacts (and notably omitting any other high-emitting aspect of the food system, such as waste and losses, or meat production). This finding is echoed qualitatively in the citizens forums for the FSA Strategy 2015-20: first, environmental impacts were not deemed a priority topic by participants, but were kept on the agenda by the researchers. Then, when they were raised, the top solution to minimise the impacts raised by respondents was that the government should intervene to ensure retailers only stocked foods produced locally (FSA 2014a):

*"If there was a supermarket which said that all our meat and all our vegetables came from the local areas of Yorkshire, minimum transportation, I would buy from there'*
*(Leeds, ABC1, Wave 2)*

However, while the evidence presented here was generated in response to researchers prompting about environmental impacts, for many of the public local food seems to deliver several benefits, and it may not be that tackling climate change is the uppermost. In fact the IGD focus groups in 2013 found that local was used as a proxy, or informal indicator, for quality – and that view is supported by a three-country analysis of consumer preferences for locally sourced lamb, in which local is equated by consumers with fresh (Font I Furnols et al. 2011). In the IGD study, local also means British, and another of the aspects of local food which the UK public values is the potential to support farmers and the UK economy more widely (IGD 2013). In the three-country study on lamb, this tendency is found among each nation's consumers, and is labelled as 'ethnocentrism', a kind of informal protectionism practised by the lay public, and bracketed among ethical shopping measures.

It may be helpful to consider these findings in the light of other evidence from the dialogues that people's relationship with food tends to be "*immediate*" and close to the point of purchase (GFS 2012b). Indeed we can conjecture that, with their adherence to the concept of food miles and

their conviction that buying local is the socially correct course of action – on multiple grounds – that people are attempting to shorten the supply chains that have evolved in food production, and to cling to more linear understandings of food production, and a more transparent relationship with the food they eat. This may help explain their response when they are confronted in research with the fact that there is a food system. Then when the 'black box' is opened, it can be "*overwhelming*" (GFS 2012b).

### ii) Demand Side Change

In the absence of public awareness of the food system, and hence the need for system change, public priorities for change tend to fall into discrete categories: supply side (eg. new methods to produce more food more efficiently), or demand side (ie. behaviour change by consumers themselves). When this choice becomes apparent in dialogue exercises, people tend to choose demand side measures over changes in production. For instance, in the second round of workshops in the Which? 2015 dialogue exercise, participants were asked to consider a range of possible 'solutions' to the food system challenges and they consistently chose the low tech over the high tech – largely to avoid causing any more 'unnaturalness' in production methods. This was particularly the case in a choice between eating less meat, and eating lab-grown meat (Which? 2015).

However, these kinds of difficult choices tend only to be presented to the public in the context of dialogue exercises about food futures, and even then only at the end of the engagement process, hence we cannot regard the findings as prima facie evidence of public perceptions, in the same way we might the findings from a conventional qualitative study. There is as much research evidence that the public would be unwilling to change its food behaviours – and sometimes that contradictory evidence exists in the same study. For example, the Which? 2015 dialogue also finds participants expressing *"considerable cynicism*" that the wider public will change its food behaviours (ibid.: 30). Quantitative data from a representative survey support the case that people will tend to resist calls to change their food behaviours. The global Greendex survey included a question about people's intentions 'to change their behaviour in future for environmental reasons' (National Geographic 2014). Despite the potentially leading nature of the question, fewer than half of British respondents (46%) said they intended to make changes to their behaviour: and this was the lowest proportion in any of the 18 countries surveyed.

Given this resistance to change, it is remarkable that the Which? 2015 dialogue closes with evidence from its follow-up interviews two months post-intervention that the majority of participants have reported changing some of their food behaviours - and having kept those changes up. Of the 20 participants who were re-contacted, 17 reported having changed their behaviours since the dialogue, with the most common changes being eating less meat, wasting less food, and buying locally produced food (Which? 2015). On the face of it, this is a remarkable finding, which suggests that effortful public engagement can be effective in triggering lasting behaviour change. Yet we should approach these data with caution, given the small number of respondents in the original sample (49), and the self-selecting nature of the subsample (of 20) who responded to the re-contact interviews. We might also recall that some of these behaviours – like eating less meat – are relatively common in the wider population: for instance, 40% of people in their sixties report having reduced the amount of meat they have eaten in the last 12 months (Understanding Society 2014) -such that there may be 'attribution effects' at work among the Which? recontact respondents. Aside from such methodological observations, a questioning response to the finding of self-reported behaviour change at two months post-workshops is that such intensive interventions are not scaleable, or potentially inclusive, enough

to effect change across the whole population. Leaving that aside, it is also notable that the dialogue process has clearly transformed the participants, to the point where they are able to express considerable cynicism about the potential for behaviour change among the wider public, which they are apparently now less a part of.

The Which? 2015 dialogue participants may provide proof that, with increasing familiarity with issues around food security, behaviour change can result - and from this we can infer there is at least potential for similar change in the wider public. It is interesting to note the behaviours that the participants report having changed, as it is likely these are the most appropriate for population-level behaviour change in the context of food futures. We have already reviewed evidence suggesting that many of the public are already buying local 'always' – or trying to (Eurobarometer 2014). We have also seen that people can identify multiple reasons for wanting to do so (IGD 2013). When it comes to reducing food waste, this also appears to be a behaviour which is widely held to be desirable, if not actually normative. In the report on the Which? 2013 dialogue, a few items of omnibus survey data are included, one of which asks about the behaviours most associated with the environmental impacts of food (Which? 2013). Food waste is equal first, associated with environmental impacts by 71% of respondents ('pollution from pesticides' is the other top option) – and it is notable that food miles come next, associated with environmental impacts by 64%. Turning to the dialogue element of the study, it is stated that some participants reported already having taken steps to reduce their food waste before the dialogue began, ostensibly to save money, given the rising price of food. Then again, when respondents were asked at the end of the second day of workshops whether they intended to change their behaviours, a similar set of responses came back to those behaviours reported as actually changed by the 2015 participants: eating less meat (and more fruit and vegetables), and wasting less food. One participant commented (ibid.: 31):

> *"I will buy less. I don't need half of what I buy but because it's on special I do… and waste it."*
> (Glasgow)

Turning to the behaviour change most reported by dialogue participants, eating less meat, it is worth noting first that there is growing momentum in the climate change literature that this is a behaviour which is not just desirable but required. For instance, we have already heard about the scenario modelling which has established that demand side reductions are required – as well as supply-side intensification - if we are to live within the two degree limit for global warming agreed at the COP 21 meeting in Paris (Bajzelj et al. 2014). Reducing meat consumption – especially red meat consumption – is seen as the most direct way of achieving this cut in demand-side emissions, because of the resource intensity of livestock farming, especially red meat and dairy (see eg. Wellesley et al. 2015). Further statistical modelling of impacts, this time based on the relative intensity of different styles of diet based on varying amounts of meat, has established that widespread reductions in meat consumption across the meat-eating public could reduce impacts more than trying to convert smaller numbers of the public into non-meat-eating vegans and vegetarians (Scarborough et al. 2014). Indeed the authors of that study provide the compelling statistic that moving from a 'high meat diet' (100+ grams per day) to a 'low meat diet' (less than 50 grams per day) would reduce an individual's carbon footprint by 920kg CO2e every year – which is roughly equivalent to one economy return flight from London to New York (960kg CO2e). (Were two high meat eaters to become vegetarians, that would generate an emissions saving roughly equivalent to taking a small family car off the road for one year.) The strategy of asking people to reduce the amount of meat they eat, rather than stop eating meat altogether, has also been found to be more engaging, in a study with the Dutch public (De Boer et al. 2014).

Findings from the dialogues reviewed here would certainly support that expert contention. It is notable that in the most recent of the dialogues, Which? 2015, several participants not only reported having reduced their own consumption of meat through the dialogue process, but that they felt this was the most feasible way of reducing the impact of meat production – and without any 'unnatural' innovations to production methods (Which 2015?: 36). For many participants eating less meat felt achievable as they had already reduced their red meat consumption over the last few years – usually for health reasons. The researchers conclude:

*"Change was possible:*
*"We are going to start buying Quorn beef as well, because of the cows and the effect it's got on the planet. I'm not going to turn veggie or anything, but I'll just eat less meat."* (Paisley, Female)
*But not for all:*
*"I have my doubts about it. Personal preference. I like eating meat. It's good for you. We're programmed carnivores."* (Paisley, Male)"

The enthusiasm of many participants (shared in places by the researchers) is punctured by the blunt refusal to join in from this male respondent. This interruption allows us to turn to the rest of the ever-increasing body of evidence relating to public perceptions of eating less meat, and note that the vast majority of this literature presents the countervailing case: that most people are unwilling to reduce how much meat they eat. A seminal example is provided in the 'Eating like there's no tomorrow' paper, cited in the early sections of this review (Macdiarmid et al. 2016); indeed, the title of that paper continues '…Public awareness of the environmental impact of food and reluctance to eat less meat as part of a sustainable diet'. Among the many unenthusiastic respondents is a man from Scotland who sounds a little like the dialogue participant from Paisley quoted above (ibid.: 491):

*"I probably won't eat less meat. I'm aware of the environment, I take other steps, fine I do my bit, recycling, driving less but I probably wouldn't change my diet."*

This respondent is typical of others in the study, and the impression that the majority view is against eating less meat is supported by quantitative data gathered in the MORI 8-country survey for Chatham House (Ipsos MORI 2014). In one question, respondents are presented with a list of actions which they might undertake 'in order to limit their contribution to climate change', and asked how likely or unlikely they would be to make these changes in the following year. Given the option 'Eating less meat, or replacing the meat in some meals with alternatives such as beans', 14% of UK respondents say they are doing this already, and another 27% say they are likely to do this in the next year – which is a substantial proportion. However, more than half (54%) say they are unlikely to do this in the next year, and the only other option which is less popular is eating fewer dairy products: 68% of people are unlikely to do this.

In considering these particular findings, we should note that the question somewhat gives the game away, by telling respondents that the actions listed contribute to reducing climate change impacts. If anything, we might assume that would cause respondents to feel more inclined to say they intend to undertake some of the behaviours listed. Either way, it gives people information which other evidence suggests they do not have. The 'Eating like there's no tomorrow' study has already been cited to show the public's lack of awareness of the link between food and environmental impacts; the paper is clear that this is particularly the case in the context of eating meat. One male respondent makes the link to health impacts, but otherwise the researchers draw a blank (Macdiarmid 2016: 490):

*"Too much red meat, yes, I think has probably been out, we probably all known that well for several years now [related to health], but I've never actually linked it to an environmental issue."*

Again, quantitative data support this finding; for instance, the recent 'Future of Chocolate' survey re-used a battery of attitude statements first asked in the Greendex 18 country survey in 2014 (Divine 2016; National Geographic 2014). One item asks for agreement with the statement 'Eating meat is bad for the environment'; in the Divine sample from 2015, 20% of UK respondents agree with the statement and 50% disagree (the most popular option is 'strongly disagree', chosen by 28% of respondents – by contrast only 7% agree strongly). Given this widespread lack of awareness bordering on denial, it is likely that the Which? dialogue exercise needed to lead with this type of information early on, and give respondents time to assimilate it, before producing the enthusiastic response to the potential for eating less meat at population level.

It should be remembered of course that there are many reasons for potentially reducing the amount of meat in one's diet – and that environment appears near the foot of the list, if at all, even for those who are already doing it (see eg. Which? 2015). There are also many reasons for not reducing meat, several of which are articulated in the 'Eating like there's no tomorrow' paper. These reasons will be familiar to those who have read the 'Food Present' section above, and its reflections on food non/choice. The reasons listed in that paper include taste, pleasure, and social influences. We might also add the dialogue participant's objection above about it being healthy and natural ("*we're programmed carnivores*"). These kinds of objection are familiar to researchers in this area and have recently been brought together in a typology called the 4Ns (Piazza et al. 2015). This typology takes the earlier '3Ns of Justification' (Joy 2010), that eating meat is…

Natural
Normal
Necessary

And adds one further N based on a new set of interviews, that it is…

Nice

The paper is clear that these are post-rationalisations, the kinds of things people say when asked to deliberate about their food behaviours. Yet these four dimensions occur repeatedly in the 'food choice' literature (and not just in relation to meat eating). All of these resonate with the discussion of the evidence on food futures above, and one could be tempted to go further than these researchers in arguing that meat is central to identity, to the point where not eating meat threatens to sever a person from his sense of who he is. Claude Fischler writes in this mode, not about meat per se, when he notes that we are what we eat (literally, as we 'incorporate' the substances that we swallow) such that eating different things would make us other than who we are (Fischler 1988). Meanwhile Bourdieu makes similar points about identity but this time very much about meat, and very much in relation to being a man. Men are identified as "*natural meat eaters*" (Bourdieu 1977: 192):

*"Meat is the dish for men, the nourishing food par excellence, strong and strong making… the dish for men, who take a second helping."*

We may like to observe that many of the 'unwilling to change' verbatims cited here come from male respondents. We may also like to recall one woman in the 'Eating like there's no tomorrow' study, whose was cited in the 'Food Present' section above, saying (Macdiarmid et al. 2016: 491):

*"It's not just me that's eating meat in my house.*
*My husband's a bit of a 'it's not a meal unless it has meat in it'."*

That she observes the social patterns of eating in her household makes this response a good example of the 'Normal' N (to deviate from meat eating could create a rift in their marriage), but it is also notable that her husband's meat eating has an identity and a name all its own: he is "a 'it's not a meal unless it has meat in it'".

Despite these substantial obstacles and objections, people do reduce their meat eating, and not just when they have taken part in intensive deliberative research exercises. It has already been noted that among older people there is a clear tendency to reduce meat intake across the lifecourse – indeed we could argue it is part of the identity of becoming an older person. According to a new analysis of the British Social Attitudes 2014 dataset, by Natcen for the Vegetarian Society, 29% of the public reduced the amount of meat they ate across the previous year (Lee & Simpson 2016). Notably these proportions increased steadily with rising age, from 19% of 18 to 25s to 39% of 69 to 79s (before falling back slightly to 35% of the 80 and overs).

YouGov data commissioned by the Eating Better consortium in 2014 show a slightly different shape to the age trend: overall 20% of people reported eating less meat than a year ago – though in answer to the same question asked in 2013, the figure was 25% (a difference which Sue Dibb of Eating Better explains with reference to the horsemeat issue, which occurred in early 2013 and noticeably resulted in reduced sales of meat and meat products – see Dibb & Fitzpatrick 2014). In the 2014 data, meat reducing 'since last year' also increases up the age range (from 12% of 25 to 29s to 28% of 60 and overs) but it is also above average among the under 25s (22%) – which suggests that there may be a groundswell towards meat reducing which is not simply related to the effects of ageing (Eating Better 2014). Further support for such a contention comes from another question in the same survey, which asks people directly whether they would be willing 'to eat less meat and fewer meat products in the future'. 35% of the whole sample say they are willing, and again the proportions increase up the age range, but 29% of under 25s report being willing, as do 39% of 60 and overs. Notably 41% of women are willing to do so, as opposed to 30% of men. Finally we should note that while 35% of the whole sample are willing to eat less meat in future, 29% say they are unwilling: nearly (but not quite) an even split.

Reducing is one thing, but giving up meat altogether is another, as the experts have observed (eg. Schosler et al. 2012; Scarborough et al. 2014; De Boer et al. 2014; Verain et al. 2015). Many surveys reviewed here collect data on how many people are vegetarian or vegan (often in an initial section about 'special dietary requirements', along with eg. allergies, see eg. FSA 2014b). Most of these surveys ask the question in different ways, some including being 'partially vegetarian' which others term 'flexitarian'; some also include being 'pescitarian' (eg. FSA 2013a). One simple measure is provided in the 8-country MORI survey for Chatham House (Ipsos MORI 2014): asked how they feel about the amount of meat they eat in a normal month, 7% of the sample replied 'I do not normally eat meat'. Meanwhile the YouGov survey for Eating Better reported that in 2014, 6% of respondents said 'I do not eat any meat or meat products' (when asked whether they had eaten more or less than a year ago). Notably female respondents (8%) and people under 25 (11%) were the most likely subgroups to report this (Eating Better

2014). Finally, a special module of dietary practices was asked to the Innovation Panel in Wave 4 of the Understanding Society study reported that 2.7% of respondents were 'completely vegetarian or vegan', and another 5.4% were 'partly vegetarian' (University of Essex 2014). As with the Eating Better data, women were much more likely than men (4% vs 1.3%) to be 'completely vegetarian or vegan', while 16 to 29 year olds were the most likely age range to be 'completely vegetarian or vegan': 5.4% reported being so. The data also show a smooth decline up the age range – the inverse of the pattern for being partially vegetarian (which we can associate with meat reducing, and thus ageing effects).

Reflecting on the differences between some of these percentages, we can observe that survey methodology plays a large part – but related to this we can note that questions which ask 'how much meat' (more/less/any) seem to generate a higher proportion of non-meat eating responses than those than questions which directly invite people to tick a 'vegetarian/vegan' box. In view of the other evidence gathered here, we might speculate that explicitly claiming the identity of a 'vegetarian/vegan' is socially challenging, as it deviates from normal standards of less than healthy eating, and the possibility of eating a 'proper' cooked meal with meat and two veg. Across many sections of the public, to say you are a 'vegetarian' or 'vegan' is to admit to being abnormal or 'weird'.

Notwithstanding what the labels currently signify, given that young people appear to be much more likely than average to be (and, to admit to be) vegetarian or vegan than other age groups, there is the potential for those patterns to pertain as they move up the age range, resulting in a normalising of vegetarianism. It is certainly notable that support for action to reduce meat eating across the population is also strongest in this age range. In a question which almost seems like a parody of the public dialogue process, A YouGov omnibus survey in November 2015 asked the following (YouGov 2015): 'A report suggests the livestock industry produces about 15% of global greenhouse gases, roughly equivalent to all the exhaust emissions of every car, train, ship and aircraft on the planet. Would you support or oppose government intervention to reduce meat consumption in our diets?

In response, 33% of respondents supported intervention, but 49% opposed it. It is notable that support decreases, and opposition increases, with rising age. 18 to 25s are the only age range in which more respondents overall support (38%) than oppose (35%) intervention – although 27% also indicate 'Don't Know'. Only among the 60 and overs does the majority overall oppose intervention (56%).

In conclusion, while expert opinion is clear on the need to eat less meat, the citizens' jury (as we might say) is out.

### iii) Supply Side Change

In the context of this review of public perceptions and practices in relation to food futures, the question to address about changes to the food system on the supply side is initially one of public acceptability. Put simply, the food industry develops the innovations and makes the changes, and the role of the public is to accept – or reject – them. But the actual process of adoption will be more nuanced: for the new technologies to be effective, they will not only need to be accepted but adopted, and applied in appropriate ways which ensure they deliver the designed-for benefits. This realisation is consistent with the discussion about 'food present' and 'food choice' above: if we take a practices approach to understanding change, then adoption of new technologies is about fitting them into everyday life, as 'socio-technical arrangements' (see eg.

Geels et al. 2008). If this is to be successful there will need to be negotiation on both the social and the technological sides, and ultimately an accommodation between the two – for a successful example, we could think about the 'good fit' represented by convenience foods (Jackson & Viehoff 2016).

The obvious alternative to reducing demand is increasing supply. When the need for change in food systems is made clear in public dialogue exercises, participants seem quickly to appreciate these two broad options (eg. GFS 2012b). When prompted in quantitative surveys, the public is also quick to endorse the case for producing more food – especially when the question is asked in the context of population growth. Thus in the early TNS survey for GFS, the vast majority of respondents (85%) agreed that 'to meet the needs of a growing population we will need to both grow more food and reduce the amount of food we buy and waste', and half of these respondents agreed strongly (52%) (GFS 2012a). Similarly in a Eurobarometer survey also in 2012, the vast majority of UK respondents (83%) agreed that the EU should 'help other countries to produce more food'. A similar proportion of respondents (86%) agreed that the EU should 'produce more food to reduce its dependence on imports' (Eurobarometer 2012). However neither of these surveys made clear the level of resource inputs required to increase production, or the change in land use required to produce sufficient extra food – and when people are told about this in dialogues, their response (as to so many 'futures' challenges) is surprise (GFS 2012b). The real challenge, as identified by the expert modellers, is to increase production without increasing (or while actually decreasing) current levels of inputs (see eg. Bajzelj et al. 2014).

Notwithstanding the widespread ignorance of production methods and their resource intensity, when in public dialogues people become aware of the food security challenge, and identify the need to produce more, then they immediately assume this will involve more technological innovation. In the first GFS dialogue, for example, an *"immediate association*" was made between producing more food and introducing more food technology (GFS 2012b: 15). In turn, "*food technologies were often viewed as synonymous with intensive farming practices*". Similar reactions are also reported in subsequent dialogues (FSA 2014a; Which? 2015). What happens after that is interesting: as in the first GFS dialogue, there is a difference of opinion, with people's responses broadly dividing along two lines, what the researchers call a 'Promethean view' (held by "*those believing in the ability of science and technology to transform nature and help overcome scarcity through innovation*") and a 'Precautionary view' (held by "*those concerned about the health, environmental and social impacts of such technologies, seeing their use as part of a wider dynamic of large agri-businesses dominating food production with potentially unforeseen consequences*") (GFS 2012b: 20). It is worth remarking in passing that the Promethean view was more common among participants in rural locations, and the Precautionary view more common among the urban.

A comprehensive review of food technologies commissioned by the FSA from Brook Lyndhurst in 2009 concluded that *"the overall tone of public attitudes towards novel food technologies is one of wariness, unease, uncertainty, and sometimes outright negativity"* (FSA 2009b: 11). The authors also suggested this is in part inherent in public responses to food technologies, almost regardless of the technology, citing the example of tinned food, which was regarded with suspicion for years after it was first introduced (Young 2003 in ibid.). Coming up to date, it appears concerns about food technologies in general may have relaxed somewhat, but caution is still strong. For instance, in 2013 IGD asked a survey question with a number of attitude statements which they had previously asked in 2007 (IGD 2014). The biggest group of respondents (63%) agreed that 'Science has a role to play in producing food but we need to apply it with caution', and this was up from just under half (47%) in 2007. Meanwhile the numbers choosing the other two 'polar' statements had fallen: in 2013, 16% agreed 'Food should be entirely natural and scientists

shouldn't be involved in producing food' (down from 21%), and 12% agreed 'I am confident in the way that science is used by food companies and I trust in scientists to improve the way that food is produced (down from 16%). Summarising the shift over time, and the position at the time in 2013, we might say that the UK public has become less negative, less supportive, but more uncertain about the role of new technology in food production. This pattern is borne out across responses to specific food technologies (see below): most people lack knowledge and feel uncertain, resulting in a consistently large proportion of 'Don't Knows' and 'Neither/Nors'.

There is a substantial literature on risk perceptions and much of that relates to food. Some of it follows a behavioural economic tradition, based on ways of understanding decision making under uncertainty (see eg. Slovic 2000). Put simply this explores what happens when people are asked to make choices about things of which they do not have sufficient knowledge to anticipate the possible outcomes of their choice with any degree of certainty. The general economic 'default' process for decision making is to set perceived costs versus benefits, or in the context of uncertainty, risks versus benefits. Thus across the literature on public acceptance of food technologies we find studies which analyse the calculations that people make about the potential benefits from different technologies. For example, a recent paper on non/acceptance of Genetically Modified (GM) foods writes of the need for benefits to be communicated as clearly as risks: "*Why take a risk when there is no perceived benefit to be gained in so doing?"* (McWilliams 2014: 116). It is also noted, again in the context of GM foods, that benefits to the self count more strongly in the calculation than benefits to other (and the main perceived benefit of GM foods is that they can help 'feed the planet') (see eg. FSA 2009b). It is also widely noted that the lay public don't tend to follow the precise calculation process as identified by experts and modellers of various stripes. Instead of using objective information, they draw on personal experience, or in economic terms reach for "*intuitive and experience-based estimates of the risk rather than probabilistic estimates"* (Strachan et al. 2011: 8). One implication of this is that policymakers need to account for the public's less rational processes in trying to anticipate how they will respond to particular new technologies (ibid.).

The classic formula for calculating risk perceptions is based on a combination of susceptibility and severity: do people think they will be affected should the ill effects arise, and if they are, how bad will the effects be (see eg. Slovic op. cit.). Risks can cause concern on both grounds. In the context of emerging technologies, susceptibility is even more unknown than for existing risks, so a construct called 'technological risk' is often substituted in to the calculation (Fischoff et al. 1978). Another way of phrasing the calculation is as a combination of concern and control (with the former roughly relating to severity, and the latter susceptibility); these methods are used in one particular study under review, a modelling exercise based on large-scale survey data (Erdem & Rigby 2013). The method adopted is 'Best Worst Scaling', in which participants are presented with different combinations of 4 items (from a longer list) and asked to choose the best and worst. This simple technique generates extensive data on respondents' preferences which can then be ranked, and analysed using regression techniques, so each risk can be positioned in a 'control/worry space' (ie. a matrix). As one example of a result, a house fire is ranked as a greater concern than a heart attack, and this can be explained by it falling into the high control, high worry space (whereas a heart attack is perceived as much less under an individual's control). It is instructive to look at the ranking resulting from this exercise, which includes a number of food safety risks and novel technologies (ibid.: 1738). [Note that the table shows mean index scores from analysis using a multinomial logit regression model; also, that the data on which the analysis is based were collected from c.400 UK respondents in 2009.]

| [risk] | [MNL score] |
|---|---|
| Additives | 9.92 |
| Fire at home | 8.49 |
| Salmonella | 7.30 |
| Mobile phones | 7.15 |
| GM | 6.67 |
| Being run over | 6.57 |
| Depression | 6.07 |
| *E. coli* | 5.72 |
| Being burgled | 4.68 |
| Diabetes | 4.49 |
| Heart attack | 4.46 |
| Pesticides | 4.38 |
| Hormones | 4.35 |
| BSE | 4.21 |
| Bird flu | 3.81 |
| Cloning | 3.59 |
| Food allergy | 2.66 |
| Swine flu | 2.48 |
| Climate change | 1.70 |
| Struck by lightning | 1.30 |

The researchers reach a number of conclusions based on the results of their analysis. Some of those most pertinent to food futures research include the obvious point that food safety risks (eg. of foodborne infection) cause a lot more concern than novel food technologies. This can be explained in part by people's lack of contact with or experience of novel technologies as against eg. food poisoning. Climate change is the classic example of a remote and uncertain risk, and as such is calculated to be nearly trivial, appearing toward the bottom of the list (just above 'struck by lightning'). Risks involving pathogens, the researchers note, tend to elicit more concern – partly because people feel they should be able to control for them. Meanwhile those food risks with which people have had time to become familiar elicit more concern than those that are newer: the example here being E Coli, which the authors note was well known by the time of the survey, whereas Swine flu, which was current at the time, had yet to be fully assimilated into the public's risk repertoire and so was of less concern. Finally, the researchers comment that the findings on GM foods are "*quite remarkable*", then go on to speculate that it too has passed the stage of being novel, such that the public feels it is less uncertain (but see below for a fuller discussion on GMOs).

In ranking the likely acceptability of different food technologies, a number of other scales or heuristics (rules of thumb) are featured in the sources under review. One such heuristic applied to biotechnology risks is the 'Hierarchy of Acceptability' which finds that biotechnologies cause more concern when applied to organisms higher up the 'tree of life' than when applied at the bottom: for example, applying technologies to microorganisms causes little concern, but applications involving the 'higher' animals and humans are much less acceptable (eg. Gaskell 2000 in FSA 2009b). A less formalised, but equally apparent rule of thumb is that based on 'naturalness', whereby technologies that relate to the processing or end use of foods are more acceptable than those which alter its chemical composition. A simple example of such a scale can be found in a paper on the acceptability of responses to campylobacter in chickens (MacRitchie et al. 2014). On-farm hygiene measures are the most widely acceptable, ahead of

interventions like steaming, freezing, or vaccinations, which are all preferable to irradiation, and last of all, a chemical wash. The scale of relative naturalness seems to be applied by the public time and again across the evidence reviewed here: as in dialogue participants' overall preference for demand side changes, rather than hi-technology interventions (Which? 2015).

This informal scale of naturalness has been used to organise the section immediately below, in which highlights from the evidence on public reactions to specific novel food technologies and practices is presented. Thus the section begins with the most acceptable (and natural) - functional foods – and runs through to the least acceptable – synthetic meat. Nanotechnology, and personalised nutrition (based on genomics) are addressed at the end, not because they are widely unacceptable, but because they are the newest and least well-evidenced technologies: public responses could yet go either way. Finally, GMOs appear as a coda, their extensive literature and longer heritage warranting particular consideration. There is only a limited amount of evidence on some of these technologies, and much of it has been generated through the recent series of public dialogues. Dedicated reviews have appeared recently in some of these areas, though they often remark on how little secure evidence there is of public reactions to some of the newer technologies (see eg. Frewer et al. 2014, on nanotechnologies). There is the ever-present danger of research leading the public, and manufacturing opinion where opinion would not otherwise exist – we should start from the position that most food technologies are of low salience for most of the public (see eg. FSA 2009b). Note also that recency is critical in this space, as technologies develop quickly, and public responses also evolve.

- Functional Foods
  Functional foods are an emerging category and this adds to their sense of ambiguity. The 2009 Brook Lyndhurst review observed that there was little evidence about UK public perceptions available (at least not in the public domain) (FSA 2009b). Work since then points to functional foods being a hybrid category, with benefits positioned on the boundary between healthiness and naturalness (Eden 2011). In this sense they are compared to organic foods (a category to which, in terms of market size, they were comparable at the time) but with a greater use of technology, whereas organic foregrounds natural and unprocessed benefits. Technically, functional foods are also an ambiguous category; some are more natural than others, such that 'plant food supplements' (inc. evening primrose, St John's wort, and ginseng) overlap with 'herbal medical products' – and in different countries the line is drawn differently between them (Garcia Alvarez et al. 2014). Public perceptions similarly need to be judged on a case by case basis (eg. Grunert et al. 2010), with rules of thumb including the level of benefit provided, and the 'carrier' foodstuff involved (staple and healthy foods are the 'carriers' regarded most positively eg. added fibre in brown bread – see FSA 2012b). However, across all cases it is reported that women tend to be more positive than men (whereas on most other food technologies, women tend to express more concern – see eg. ibid.). Further light is shed by a paper on probiotics, which describes them as "*on the fringes of healthy eating*" and having health benefits "*beyond nutrition*" – consumption is the result as much of buying into a healthy lifestyle as seeking specific physical benefits (Koteyko 2010).

- 'MSP' Meat
  In the Which? 2015 dialogue, mechanically separated poultry (MSP) meat was deemed more appropriate than other meat-related technologies (most obviously lab-grown – see below) (Which? 2015). It was seen as reasonably natural, as the processing did not alter the composition of the meat; respondents acknowledged they probably also ate it already in

other products – although those other products were processed and so tended to be seen as less than ideal in themselves. The downsides were as much about how the processing was explained and the food labelled, otherwise the technology would increase the perceived 'opacity' of the food system (see ibid.: 37):

*"The only issue we had there was, great to put a whole chicken though a blender if you wanted to, as long as you're telling the consumer that's what you're doing.*

- Insects

  This review opened by noting that the public's spontaneous discussions of future foods (as evidenced by social media) revolved around eating insects, and that the topic was commonly trivialised and expressed simply in terms of 'yuck factor' (OLR 2014). Eating insects is an innovative practice, rather than a novel technology; it tends to fare better in public dialogues than it does on say Facebook, and in the Which? 2015 exercise it met with a relatively positive reception, respondents noting that eating insects was common in other countries, some of which countries had healthier diets than our own – thus it could be said to be 'natural' if not 'normal' here (Piazza et al. 2015). In the Which? dialogue, participants were also relatively positive about the idea of using insects as animal feed – eg for chickens, which again was deemed acceptable as it was "*fairly natural for chickens to eat flies*" (Which? 2015: 37). Discussions became more complicated when the process of feeding the insects on waste products was introduced, with some participants worrying that chickens would end up indirectly being fed on their own wastes.

- Irradiation

  The 2009 review notes that there was little evidence available on UK public attitudes to irradiation, although it is also suggested to be an area characterised by low knowledge and misunderstanding (FSA 2009b). It is mentioned for example that one in three consumers deem food labels signalling irradiation as 'warning labels' (He et al. 2005 in ibid.). The participants in the Which? 2015 dialogue tended to be very cautious of irradiation, which was deemed unnatural, and immediately a threat to health (radiation being a threat to health, so ingesting food which had been irradiated could also be a threat to health). Direct benefits were apparent, for instance in extending the 'shelflife' of bread (which is a prominent food waste concern in the research evidence – see eg. Which? 2013); however the 2009 review reports evidence that irradiating vegetables tends to be more acceptable than irradiating beef (by the 'Hierarchy of Acceptability' principle discussed above – see FSA 2009b). It is notable that the 2015 discussion moved participants from outright rejection to the more considered position that they would be unlikely to buy irradiated foods.

- Plant Biotechnology

  For participants in the Which? 2015 dialogue, biotechnological interventions were deemed inappropriate on grounds of unnaturalness – albeit they were seen as relatively less inappropriate than biotechnology used in meat production. Some participants made the link to selective breeding processes, and used it to argue that traditional farming processes were not entirely natural in any case. In a sense plant biotechnology was seen as the thin end of the wedge in the use of technology in industrialised supply chains, as one woman commented (Which? 2015: 44):

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

The time dimension is important to note here: the less acceptable (more unnatural) technologies sparked concerns about the unknowable potential for negative consequences over time: what another participant called a "*Pandora's Box*" effect. It was also the case that the benefits were less clear than the risks – or specifically, the benefits to consumers, as it was presumed that innovative biotechnological applications were being pushed through by big businesses in the interests of maximising profits.

- Animal Biotechnology and Cloning
  Objections in the Which? 2015 dialogue to the use of biotechnology in meat production were akin to those in plants, but turned up a couple of notches. Thus it was dismissed outright, on grounds of "*messing with nature*", and as being pursued by big businesses in the interests of profit (Which? 2015: 44). Having engaged in two sessions of discussion, respondents also could not see the need for biotechnological solutions, as they were enthusiastic about simply eating less meat. One participant pointed out that the animals would need to be fed in any case, whatever their genetic make-up. It is interesting to note that, as one of the dialogues was held in Paisley close to where Dolly the Sheep had been cloned, participants there felt reasonably well informed; however this did not increase their levels of acceptability of the technology, as they were aware that Dolly had gone on to develop health complications. By contrast the 2009 review found that awareness of cloning was very high (due not least to Dolly) but that understanding was very low – views were "*semi-formed*" but very negative (FSA 2009b: 30).

- Synthetic Biology and Lab-grown Meat
  The 2009 review for FSA could find no sources relating to public reactions to the use of synthetic biology in foods – instead they had to extrapolate from other contexts (FSA 2009b). A much more recent study explores perceptions of 'synthetic meat' with the UK public but again finds very little knowledge – such that the study became a shared exercise in discussion and 'sense making' (Marcu et al. 2015). In the Which? 2015 dialogue, participants reacted in a similar vein to that for cloning, only more strongly, for example (ibid.: 38):
  *"There's lots of environmental pros for it. But we were looking at the wee mad scientist in the laboratory, experimenting with things. It's an unnatural process and we're not used to that."*
  Again, the point was raised that the technology was being driven by the profit impetus among big businesses, and that it would be much more straightforward for consumers to reduce the amount of meat they ate. However, the Which? team note that the public reaction was not made any more positive by the stimulus material for this part of the dialogue featuring a picture of a steak in a petri dish – they note that how novel technologies are presented will have a strong influence on public reactions.

- Nanotechnology
  Like synthetic meat, there was little evidence available on nanotech applications in food at the time of the 2009 review, and none of that related to acceptability among the UK public (FSA 2009b). However the wider literature on public perceptions of nanotechnology suggests that acceptability may be higher for 'nano-on-the-outside' applications (eg. packaging) compared to 'nano-on-the-inside' (eg. food composition). The review authors quote a comment that "*public opinion on nanotechnology is in the early stages of the issue cycle and -as a result- still very much in flux*" (Lee et al. 2005 in ibid.: 26). The picture has been brought up to date by a dedicated meta-review in 2014 (Frewer et al. 2014), but only to the extent of reaffirming the lack of evidence, and the consensus view in what literature there is that public understanding is very low. The authors also note the risk of generating erroneous responses

by prompting the public with attitudinal questions, and argue that expert-lay dialogue is urgently needed: "*As long as consumer attitudes towards nanotechnology remain largely uncrystallised, constant re-evaluation of what the consumer thinks is required*" (ibid.: 106). A more recent study, conducted with staff in agri-food businesses in Ireland, comes to a similar conclusion, but in a more instrumental way (Handford et al. 2015). The authors note that, despite low levels of knowledge, the public has developed negative views of nanotech (as high risk, unnatural, and unethical) and they have done so by basing their attitudes on previous high profile issues like GM and horsemeat. They conclude that public engagement will be vital to counteract these misperceptions.

- Personalised Nutrition Advice
  Personalised nutrition advice should perhaps not appear at the end of this mini-review of technologies as it does not seem to be the least acceptable; however, like nanotech, it is the newest and as such most open to both interpretation and misinterpretation. The drawback to personalised nutrition advice is that, in the current context, it refers to bespoke advice which is derived from gene analysis of the consumer in question. Technically it can involve two technologies: nutrigenomics (which explores the effect of specific nutrients on gene expression) and nutrigenetics (which explores the effect that genetic variation has on the interaction between nutrients and disease) (see Fallaize et al. 2013). In research with people who already have genetically-derived medical conditions, there are early signs that the technology will be accepted (ibid.). These people are subject to regular medical tests and 'screening' so personalised nutrition advice could be seen as a bolt-on to that process; however serious (if hypothetical) concerns are expressed about data protection (see also Poinhos et al. 2014). A further study by a similar group of authors explores a potential tension in the roll-out of this technology, and whether it should sit within the NHS or not (Fallaize et al. 2015). The conclusion reached in the paper is that NHS doctors and practitioners could make the initial referral to the private sector provider – as paying for the advice was found to increase the chance of people adhering to it.

- GM foods
  Finally, it is important to consider the issue of GM foods, which have the longest heritage of the technologies reviewed here, and the largest literature. GM is thus taken as something of a test case in terms of the journey towards (or away from) public acceptability – although for many, it has cast a long negative shadow over public perceptions of all food technologies (see eg. Handford et al. 2015 on nanotech, discussed above).
  We have already noted Erdem and Rigby's surprise at the relatively low concern score given to GM on their table of 'best-worst' risks (Erdem & Rigby 2011). They seek to explain the ranking by suggesting that the initial uncertainty feeding the previously higher levels of public concern may have worn off over the ten or so years of controversy (their data having been collected in 2009). They also speculate that the food price rises which were occurring in 2009 may have provided a different context in which the benefits of GM for increasing production yields were more valued. Either way, their view that this relatively high level of acceptability was "*quite remarkable*" is grounded in the long history of antagonism between two sides on the issue of GM (ibid.: 1742). It is notable that that antagonism is still apparent in the current literature on GM, albeit in the views of expert stakeholders not the public. Thus, on the one hand we have advocates writing papers about 'Turning the GM Battleship' (McWilliams 2014) and on the other we have opponents writing books about 'The Fight for the Future of Food' (Guthman 2011) – the idiom is one of a battle, still raging at the extremes.

The wider public's position is less entrenched, and appears to have relaxed in much the way that Erdem and Rigby's 'best-worst' risk analysis suggests. A bespoke study commissioned by the FSA from Natcen in 2009 (the same year as the 'best-worst' data were gathered) found that opposition had lessened in the ten years since they first started public polling on GM foods: fewer people were against, and more of them had moved into the uncertain middle ground. Nonetheless, the proportion of 'antis' (31%) was still nearly double that of 'pros' (17%) – but the biggest group was in the middle (39%) (FSA 2009a). As one candid respondent commented (ibid.:22):

*"I don't really know anything about it so there's no point in me trying to put a point over on it because I really don't know why they'd be doing it."*

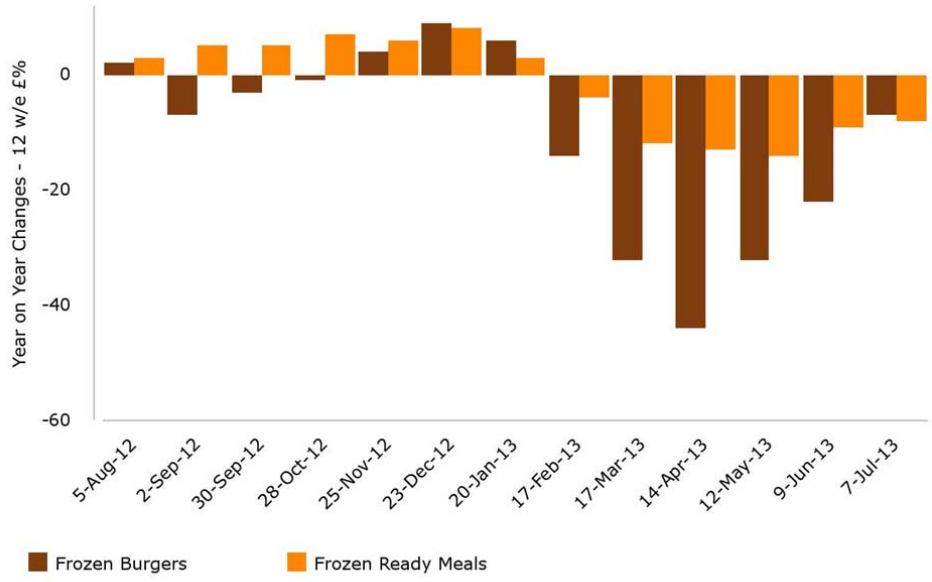
A further report for the FSA analysed responses to the 2008 British Social Attitudes survey, and revealed a similar pattern of minority views at the poles, and the majority sat in the uncertain middle ground (FSA 2010). For example, in response to one question, 18% of respondents agreed that the advantages of GM foods outweighed any dangers, whilst 31% disagreed; leaving the majority (51%) in the middle or not knowing. The Natcen authors described the distribution of public opinion as "*a position of moderate support and general ambivalence*", but could not predict which way the neutral middle would be likely to move in future (ibid.: 103).

If we fast forward to current surveys, the answer seems to be that little has changed since 2008/09. In a pair of questions ask by IGD in 2014 on the willingness of consumers to buy GM lower fat crisps, 33% of respondents indicated they were neither more or less likely to buy these than ordinary crisps (IGD 2014). However, 37% were more likely, and 30% less likely, and the researchers make the point that how the technology and its benefits are presented is critical. Also, in the 18-country Greendex study from 2014, respondents are asked to signal their level of agreement with the statement 'I Don't Mind GMOs in Food If It Helps Farmers Produce More and/or Keeps Prices Down' (National Geographic 2014). British respondents are the second most likely (after India) to agree with the statement, but it is notable that disagreement still exceeds agreement - 28% agree, but 42% disagree – and that still in 2014 – still – 30% neither agree nor disagree, or don't know.

One of the implications of the long-running GM debate for efforts to engage the public in future is that the public needs to be brought into the discussions early, and given a sense of ownership. Continuing low knowledge correlates with indifference at best, and opting out from the public conversation at worst. One of the fault-lines that still drives polarised views (especially among expert stakeholders) is over the balance of power, or ownership over, the technology. Thus on the one hand advocates can look on the indifference or neutrality of large groups of the public as an opportunity for engagement with the specific aim of winning them over: "*to tell the truth about biotechnology's potential*" (McWilliams 2014: 117). Meanwhile the other side of the debate, led on this occasion by the NGO sector, observes that GM technologies have been rolled out from the top down, with no evidence of demand from the public as end users (eg. Guthman 2011). Labelling of GM foods is mobilised in this debate: in the EU, where GM foods were labelled, they remain on balance unacceptable to the wider public (although, interestingly, the largest group remain uncertain either way), while in the States where there was no labelling, acceptance has been higher (ibid.). It is telling that advocates of the technology like McWilliams are now calling for a counter-labelling campaign: "*the documented ambivalence over GM crops among a significant proportion of the population, in addition to what seems to be an encouraging predisposition toward acceptance, suggests that the time is quite ripe for a carefully considered labeling campaign*" (McWilliams 2014: 124). This is unlikely to disturb GM's opponents in the EU.

Another key influence on public engagement has been the media – and it may be worth speculating that public opposition has weakened in this country, and ambivalence increased, as GM issues have become less prominent in the media since 2009 (and certainly 1999). The Natcen report from 2009 is clear that public reactions to GM foods were conditioned by the then recent and high profile food scares, both around salmonella and BSE (FSA 2009a). Now we find researchers on new technologies like nanotech saying similar things about GM (eg. Handford et al. 2015). It is clear that the media has a big role to play in shaping public opinion. A pair of recent studies undertaken with stakeholders working in the media find that they have a key influence on how the public makes risk perception calculations (Henderson et al. 2014). When interviewed, the media staff reported that they play two main roles in the context of food 'incidents': one is as a conduit or intermediary, passing information "*between the public and the relevant authorities*" – the example of a product recall is given (Wilson et al. 2014: 4). The other role is as "*public watchdog*", which involves them investigating and revealing facts which the 'authorities' might rather conceal. Neutral observers might also suggest that they play a third role, which we might call 'firestarter': fanning the flames of a story such that an 'incident' becomes a 'scare'. This pattern also seems applicable in non-critical food 'incidents' such as the Rotherham 'junk food mums' episode described above, where media activity escalated the story to a case of 'moral panic' (see Fox & Smith 2011).

This pattern is also apparent in evidence relating to the recent horsemeat issue – also not exactly a new technology scare so much as a crisis of authenticity and traceability in supply chains (with a dose of fraud thrown in food good measure). The issue was circulating in the US in late 2012 but it was only when FSA inspectors in Ireland found traces of horse DNA in other meat products in early January 2013 that the story began to emerge. It was not until February that product recalls happened in UK supermarkets, and the story became prominent in the UK press (see eg. FSA 2013b). As one of the media stakeholders interviewed in the studies above comments: "*if an issue does not exist in the media, then it is not really an issue for decision makers and the larger public*" (Wilson et al. 2014: 1). We may also like to recall the point made by Erdem & Rigby in their 'best-worst' risk study in the context of swine flu: it did not register highly for public concern as it was a new story at the time the survey was undertaken (in contrast to E Coli, where public concern had become well established). There is clearly a time-lag effect at work in turning food issues into food scares, and then in those food scares influencing public risk perceptions – of that issue, and potentially of related technologies. In the context of horsemeat, meat product sales data can help to show the actual effects of food scares over time; the following chart from the Kantar Worldpanel shows UK frozen processed food sales data across the 12 months from mid-2012 to mid-2013 (Kantar 2013). The time lag between the first incidents of horsemeat contamination and the drop in sales is clear.




What is also clear is the bounce-back in sales of frozen processed products as the story begins to fade from view. By the summer of 2013, burgers are back in the UK public's shopping baskets and on their barbeques. Amidst all the noise of media debate and public perceptions data, people's eating habits appear to be remarkably resistant to change – whether on the supply or the demand side.

## 6. Trust and Governance

The fall and rise of frozen burger sales across the period of the horsemeat issue could be used as a proxy measure for levels of trust among UK consumers in the authenticity of processed meat products – although the relationship between trust and sales levels is also tied up with product recalls and the removal of processed meat products from supermarket shelves. In this instance, we could either read the crisis as a brief interruption of public trust in a system which is otherwise resilient, or conversely, as a mark of the resistance of people's food practices to changes in circumstance. Both views are represented in the evidence on the UK public's trust in the food system, which can be characterised in two ways:

i) A low trust system

In this model, we live in a 'risk society' characterised by fears and threats concealed beneath surface-level order (see eg. Beck 1992). The UK public's relationship with the food system is experienced as a series of shocks and scares (salmonella, BSE, E Coli, the threat of swine flu, avian flu, the horsemeat issue – plus the GM debate rumbling on). Modernisation in the food supply chain has only served to distance the public from food production, and to increase the 'opacity' of the system (see eg. Which? 2015, FSA 2014). Taking our cue from Fischler, we are suffering a collective crisis of identity, because if we cannot be sure what we are eating, we cannot be sure who we are (Fischler 1988). Meanwhile the dominant rhetoric is of consumer choice, with responsibility pushed onto individuals to achieve the outcomes deemed good for the whole. This 'low trust' model is consistent with Peter Jackson's research on people's relationships with food in an "age of anxiety" (Jackson 2010).

ii) A high trust system

Whatever the incidents, public trust in the safety of the UK food system remains consistently high. For instance, a TNS poll in 2012 found that UK consumers were the least likely of the publics in 7 countries to agree that "*I am at risk of the food that I eat damaging my health*" – only 33% of UK respondents agreed (TNS 2013). The system as a whole is resilient, and incidents represent opportunities for consumers to take stock and re-negotiate their relationship with the system, evolving new sets of practices which further increase their safety. This model is applied in the literature in the context of a study on responses to the threat of Avian influenza (De Krom et al. 2010) where confidence levels in the UK poultry incident were found to have remained high, even in the wake of bird flu cases in 2006-07.

There are elements of truth in both models, such that they can both plausibly function in their own spaces in the literature. There are also other ways of understanding trust in food which take an institutional approach, focussing of models of governance and modes of consumption, which do not depend on tracking consumer views at all (see eg. Kjaernes et al 2007). However, when we turn to the research evidence from this review which touches on public levels of trust in the UK food system, and in the main actors across that system, it appears we are on balance closer to the low trust than the high trust model. Each new incident, or novel technology, is shown to be viewed by the public through their experience of the last incident or scare (see eg. FSA 2009b; Handford et al. 2015; Which? 2015). Although overall levels of trust in our food being safe to eat tend to remain high, trust in system actors is a lot lower (as we shall explore below), and people remain reluctant or unwilling to engage with a system which they see as "*very complex*" (FSA 2012b). Finally, there are signs that the public has bought into the idea of the consumer society with its doctrine of personal responsibility (eg. Which? 2015) – hence the moralising

about healthy eating, the guilt associated with less healthy diets, and the vilifying of those individuals who do not comply (eg. Macdiarmid et al. 2013; Fox and Smith 2011).

In reviewing this evidence it is helpful to start with the low sense of agency in relation to the food industry reported by people in response to research questions – as many of their answers to other questions about who should do what may be seen in the light of their low confidence in their own ability to make change. Thus, in the Greendex 18-country survey we find only one third of UK respondents (34%) agreeing with the statement 'As a Consumer, I Can Influence the Types of Food Available Where I Shop' and 45% agreeing that 'Consumers Have Little Influence over How Food Is Produced' (National Geographic 2014). In qualitative evidence, these sentiments are explicitly linked with food scares such as BSE and horsemeat, which knock on into crises of confidence in the food system. Again, the increased application of technology along the supply chain is seen as having decreased consumers' sense of agency to influence it (eg. Macdiarmid et al. 2016).

The first of the GFS public dialogues explicitly makes the link between the public's (new) awareness of the food system as a 'black box' and their subsequent reaction to ask someone else to take charge of it: "*issues framed in this way were seen as the responsibility of others - particularly governments and business. Participants wanted to know whether and how governance was being coordinated*" (FSA 2012b: 25). Faced with a complex system of which they were previously unaware, it is an understandable response for people to try to push it away. This tendency is also apparent in the responses of some subgroups of the public who are consistently more likely to say they are not interested, eg. in food science (IGD 2014), or not bothered eg. about the horsemeat issue (eg. FSA 2013b). These respondents often tend to be the younger and more time-pressed, and there is little surprise that those who don't feel they have time to cook from scratch do not now want a role in designing the future of the food system.

Starting from the perspective of a low-agency member of the public is helpful in explaining some of the contradictory responses that arise when the role of different system actors is discussed with the public: some of the responses make more sense through the lens of 'anyone but me'. Thus public trust of industry actors all along the supply chain appears very low. First, the public does not tend to differentiate between these actors, for example by dividing them into stages in the food supply chain (producer, manufacturer, retailer). Hence in the first round of workshops in the Which? 2015 dialogue, participants simply talk about 'big business'; it is only later that they start to discriminate between different actors. When they do, it is the supermarkets who come in for the most criticism (we might speculate this is because the supermarket is the point at which they as consumers tend to come into contact with the supply chain: it is notable that participants in the more rural workshops were more knowledgeable, and positive, about production processes eg. farming methods).

We have also heard on numerous occasions how participants in the Which? 2015 dialogue assumed that the application of food technology is predominantly to increase the profits for 'big business' (eg. "*We're only doing this so the top cats can make lots of money. Ethically it's completely wrong*" – ibid.: 44*).* However, despite this mistrust in retailers, in the paper on trust in response to Avian flu, respondents argue that it is the retailers who should be ensuring the food that they provide is safe for people to eat, as once it is on the shelves it is too late for consumers to tell what's in it (the 'black box' metaphor is used again here – De Krom et al. 2010). In a further example of contradictory reactions to retailers, the IGD survey from 2013, 87% of respondents agreed that they expect grocery companies to be 'constantly checking that their suppliers are providing healthy products and are acting responsibly towards the environment' (IGD 2013). However, a

further question suggests that for most respondents that is one way of pushing the responsibility away from themselves, even if it is on to a set of actors who they do not trust: 61% agreed that 'food and grocery companies should just get on with doing the right thing for the public's health and the environment, rather than telling them about it'.

Further apparent contradictions surface in the public's response to the role of experts. When confronted with the complexities of the food system during public dialogues (paradoxically, often via the input of expert witnesses and discussants) a common response is for participants to frame the situation as complex, and a problem for experts (eg. Which? 2015: 29):

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

However, when specific examples of technological approaches to food system challenges are raised, it is also common for the experts' judgment to be doubted. The 2009 review by Brook Lyndhurst presents examples of the public suspecting that experts might get carried away by the potential of new technologies and overshoot ethical boundaries (FSA 2009b). Meanwhile we have already encountered the verbatim from the Which? dialogue about "*the wee mad scientist in the laboratory, experimenting with things*" (Which? 2015: 38).

Turning to public perceptions of government, a similar set of dynamics and contradictions are at play. We have seen how, faced with the complexity of the food system, the standard response is to call for business and government to take greater control (eg. GFS 2012b). In answer to a prompted question in a quantitative survey in support of the FSA 2015-20 Strategy, respondents indicated that their top three priority responsibilities for government in relation to the food system were: food fraud & lack of authenticity (among 61%), food technology (55%) and food safety & hygiene (53%) (FSA 2014c). Thus in the citizens forums convened in support of the FSA Strategy 2015-20, the researchers report that *"Consumers fundamentally believed that the Government had a duty to help keep them safe, and also to protect their interests around food more widely."* (FSA 2014a: 15). However, other dialogue exercises reveal strong negativity towards the government, largely because they were seen to be weak in the face of industry opposition, or worse (eg. Which? 2015: 30):

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

However, one participant in the FSA Strategy forums provided a response that makes some sense of the apparent contradictions in people's relationship with government; the participants' comments neatly embody the passing of responsibility back and forth between state and individual (FSA 2014a: 25):

> *"Ordinary people's knowledge doesn't allow them an insight to what's really going on, so you really are depending on the government to do that for you -the people who do have the knowledge and are paid to do it. I think that ordinary people do have to place an enormous amount of trust in the government."*

Across the evidence from the various dialogues, there is the strong sense of people not wanting to take an active role in the shaping of the food system, and turning to government as the best bet, before demanding that it takes a stronger role. However, as with their grasp of the food system, or of 'big business', so their grasp of the workings of government is pretty weak. The

Which? 2015 dialogues are telling in this regard: first participants say there would need to be safeguards in place to ensure that new food technologies are used appropriately to ensure global food security. These safeguards would need a body to oversee them, and participants are sure it would have to be independent of industry, because of the profit imperative that people believed was already driving the pace of innovation. The Which? team then asked who that independent body might be: *"When pressed for suggestions, participants thought that bodies like Which? (an independent organisation) or the Food Standards Agency (which was not seen as Government) would provide a non-partisan view"* (Which? 2015: 46).

It is clear that, even in the context of a dialogue exercise, it will take a lot of prompting from researchers to get a response to questions on matters of governance. Returning to the quantitative survey undertaken in preparation for the FSA Strategy 2015-20, when the question of government responsibilities for food was asked with prompted responses, answers in the 60% range were achieved (FSA 2014c). When asked spontaneously what issues respondents would like to see the Government take greater responsibility for over the next 5-10 years, 64% gave no answer. (The researchers add "*food safety, cost (each 5%) and promotion of British food (4%) top the list, but the percentages are very low*" – ibid.: 17).

When not "*pressed for suggestions*" the public is not forthcoming with answers for who should lead on questions of global food security. It is notable that in the Which? 2013 report, it is the authors who call for a greater role for the FSA, for instance in joining up safety, nutrition, and food security (Which 2013?) – but no evidence from participants is cited to back up these calls. It remains an open question who should lead on advancing global food security issues, but it seems clear that the answer will not come from the public, or not without some prompting.

## 7. Implications – Engaging Publics

Given the "*extremely low*" levels of awareness of global food security issues, and the sense of "*surprise*" among participants when the urgency of the challenges to the food system are opened up to them, it is small wonder that the public dialogue exercises end with public participants calling for awareness raising. Thus in the first of the dialogues, participants spoke of how they went home and spoke to friends and family and found that *"no one really knows about it or has thought about it"* (GFS 2012b: 26). Given that the exercise had been such an *"eye opener"* for them, they felt that future dialogues should have a *"core awareness raising component"*. Meanwhile in the most recent of the series of dialogues, participants reported how they had changed their own behaviour as a result of what they had learned through the dialogue experience (Which? 2015). Accordingly the participants advocated awareness raising activity at every turn, as the first step to enabling others to change their behaviour.

Given the very low levels of basic knowledge about the food system, how it operates, its impacts on the environment, and the unavoidable need for change, it is hard to disagree that work to put some of this knowledge into circulation among the wider public is required. However, awareness raising of the sort the Which? participants advocate is unlikely to be the best approach to public engagement in this space, for a number of reasons:

i) Information alone is insufficient
This point is well known (and has been learned the hard way) among actors in government, the food system, and researchers. In fact, the Which? participants know it too – hence they call for formal education, lessons in cooking skills, and contemplate (before rejecting) the idea of taxes to reduce meat consumption (Which? 2015). However, their repeated falling back on awareness raising as an enabler of behaviour change – as they feel it was for them in the dialogue process – reaffirms their imperfect understanding of food behaviours as the outcome of individual choice. We should simply recall the discussion in the section on 'Food Present' above, and the evidence that for many publics their eating habits are a non-choice, illustrated by the conclusion of Fox & Smith writing about the Rotherham 'junk food mums': "*Obesity cannot be combated by simply asking people to change their habits without understanding their habitus*" (Fox & Smith 2011: 411).

ii) Emerging technologies, uncertain futures
While some of the scientific evidence on the environmental impacts of food production and consumption is pretty firm and uncontested, there are many areas of the food futures agenda which are much more contested, or inchoate. For example, a large part of the dialogue exercises is focussed on developing solutions to food security challenges, and these are both ill-defined and hotly debated in many instances. On the supply side, many of the technologies which are associated with increasing production whilst reducing impacts are still ill-defined, whether in the pipeline or still on the drawing board. The example of synthetic meat mentioned above is instructive: so unfamiliar was this idea (let alone product) to people in research, that their response was to embark on a process of "*sense-making*" in which they spontaneously constructed scenarios to try to understand how synthetic meat might fit into the food system and their everyday lives (Marcu et al. 2015). A similar dynamic is apparent in a paper on nanotechnology, in which the authors call for a process of "*constant re-evaluation of what the public thinks*" while interpretations of the technology are still "*largely uncrystallised*" (Gupta et al. 2015: 106).

iii) Who to engage, and how

This review has made a point of foregrounding multiple publics not a single public when exploring people's perceptions and practices in relation to food. This is always good practice in research (as in marketing, policy, strategy…) but particularly so in the context of food behaviours, which vary so widely across different subgroups of the public, and are so bound up with different subgroups' identities. Among some of the subgroups highlighted are those who consistently say they are not interested in engaging with food: whether at the level of food science (eg. IGD 2014), or in responding to food scares (eg. FSA 2013a), or even in the immediate sense of the food they consume on a day to day basis (see eg. the FSA consumer segmentation – FSA 2015). Many of those who respond to research questions in this way are younger adults, who also comment that they are time poor. For groups like these, as well as for those who are poor in income terms, it is a good question how they should be adequately engaged in negotiating the future of the food system.

To varying extents, the public dialogues themselves have tried to find answers to these questions: although it is notable how little appears to have changed in participants' responses in each new dialogue – despite the evident changes that the participants in each individual dialogue exercise undergo. The earliest of the dialogues, run by the GFS programme, closed by identifying that the public participants and their expert convenors lacked a common language for discussing the issues of concern (GFS 2012b). They summed up these differences in terminology in a useful table, reproduced here:

| Issue | GFS programme framing | Public framing |
|---|---|---|
| ***Supply and demand*** | Greater focus on food supply/production side; no explicit focus on demand within thematic priorities, though emerges within *Sustainable diets* theme | More explicit focus on demand, particularly in terms of reducing western consumption of resource intensive diets such as meat and diary. |
| ***Global food*** | Clear international focus to research themes, focusing on globalised food production and supply | Parochial framings around food dominated. Global food issues often framed in relation to domestic choices |
| ***Economics*** | Focused on analysis of markets and market failure, particularly in relation to regressive policies/ externalities | Explicitly highlighted themes of power and responsibility of big business |
| ***Resource efficiency*** | Core thematic priority within GFS, particularly focused around water energy and nutrient inputs | Challenging area for participants to engage with (seen as abstract); the main hook around resource efficiency is tackling waste (seen as a major priority and quick win) |
| ***Food technologies*** | Broad and substantive focus, cutting across all four research themes. Wider issues (from researcher discussion in the sessions) associated with measurable risks | Almost exclusively focused on GM. Wider issues risk and safety, but also broader issues around motivations, winners and loses. |
| ***Research and outcomes*** | Focused on research and the development of knowledge to help address the challenges around GFS | Focused on outcomes and policy reforms (rather than just research). Key focus on power and governance in shaping food |

The table draws our attention to the point that 'GFS' is a professional discourse, and that the 'food futures' agenda needs a new language if the wider public are to be successfully engaged in it. We could argue that this task is even preparatory to the one of 'awareness raising' which the dialogue participants call for, as without a common language, it will be hard to share information in a way that is intelligible to the recipients.

Yet we should also note that the table is pointing to a clash of 'frames' and not just language. Building on this insight, we could recommend that what is needed are shared meanings, to be reached through negotiation, or what the authors of the study on synthetic meat might call 'sense making'. While the participants in the most recent Which? dialogue want a kind of instrumental programme of communication which leads to behaviour change, the evidence arrayed in this review can be used to point to the conclusion that a more fundamental kind of 'dialogue' is required: one which is closer to the original Greek sense of the word, as "*a free flow of meaning between people in communication, in the sense of a stream that flows between banks"* (Bohm 1996: 7). Such an open-ended enquiry would engage lay people and experts in finding new ways to interrelate, and think and speak about the complexities and challenges that we collectively face. As in the synthetic meat study, it would naturally involve the creation of scenarios, which might serve as different visions of potential food futures – except unlike the scenarios that are currently in circulation these would have been co-created with the wider public, and not just be presented to the wider public as stimulus materials in research activities (see eg. Steedman and Shultz 2009). Such stories are vital in helping us make sense of the world, and what we, collectively, want from it – as Tara Garnett recently noted in presenting her own vivid and variably unsettling scenarios for sustainable food futures (FCRN 2015). It is vital the public are prominent in this storytelling project going forward, both because we cannot know what futures are possible without their participation, as well as because to omit them would risk further excluding certain groups from food security going forward (because *"those with most power tend to determine which narrative dominates"* – ibid.: 2).

It is not clear who is best placed to carry this work forward – and, as established above, asking the public directly is unlikely to result in a useful answer. But several actors are already delivering aspects of the food futures work, including:

- The GFS programme
  Their programme of dialogue goes back to 2012, and continues through their Public Panel on Food Futures, a body of 600 diverse members of the public who are invited to join in online and face to face dialogue activities, when they choose to do so. Their most recent activities have focused on the food system, and urban agriculture (see GFS 2016 – forthcoming). The governance structure of the programme, involving multiple research councils and government departments, makes GFS well placed to co-ordinate a process of negotiation and sense making around food futures, incorporating the lay public as equals.
- The Wellcome Trust Crunch programme
  The Crunch programme is a high profile public engagement initiative co-ordinated by Wellcome but delivered by a consortium of organisations expert in formal and informal education, and public understanding of science, as well as leading partners from media, culture and the arts. The Crunch's focus in on Wellcome's definition of the 'nexus', which includes health alongside food and the environment, and may mean the programme's focus is not so squarely on food security issues – although it may be all the more engaging with the wider public because of it, and lead them to similar places in due course. Running for a year or more in 2016-17, the Crunch is likely to deliver the awareness raising activities which

dialogue participants have asked for, and prove an 'eye opener' for different publics in relation to the complex and urgent challenges faced by the food system.

- The FSA 'Our Food Future' programme
  Work on 'Our Food Future' has just begun, and this literature review is part of the first steps to build the evidence base from which activities can be launched. Thus far, Our Food Future is configured as a process of stakeholder engagement, drawing together actors from across the food system, and including government and civil society organisations. There is a possibility that some of the governance structures called for by dialogue participants and convenors alike may emerge from this network, especially if FSA are to lead on delivering their commitment to give consumers "*the right to the best food future possible*" (FSA 2015a: 4).

In conclusion, the 'food futures' project should be approached as one of collective sense-making, telling and retelling stories about our relationships with food over time, in order to create scenarios for viable and sustainable futures which we all can co-exist in. As Tara Garnett says in presenting her FCRN scenarios: *"closer exploration of our gut feelings through the medium of storytelling – which is all that scenarios are – might reveal some unwanted surprises. Do we really want what we think we want?"* (FCRN 2015: 27). And asking this question is especially urgent, given that what we have is 'not an option'.

## Annexes

### i) A Note on Methods

The Our Future Foods literature review combined multiple methods, in three phases, as follows:

a) The Initial Call for Information
The review process began in October 2014, when AD, acting as external advisor to the Wellcome Trust's food and drink initiative (now branded 'The Crunch') sent out a call for information to 60 researchers and practitioners working on aspects of the UK food system. The scope of the call was broad in terms of topics, summed up as evidence on 'where the UK public is at' in terms of food-related perceptions and practices. A relatively tight timeframe was set (sources since 2010 – although this was not always adhered to by contributors). As the principal aim of the review was to provide benchmarks to support the development of the Crunch, and track changes in public engagement over time, the emphasis was on quantitative data (though not just from surveys). AD was supported in the logging and selection of sources by Clare Curtis, then of the Wellcome Collection. In total, 101 sources were gathered from 42 individuals; 60 were selected as the basis of an internal report to the Crunch programme team and contractors (February 2015).

b) The Follow-Up Call for Information
As FSA's 'Our Food Future' programme began to take shape in early 2015, it became clear that the evidence base on the UK public's relationship with food, and their role in the food futures agenda, would need to be reviewed (not least, preliminary to the new primary research which FSA was planning to undertake). The Wellcome Trust agreed to share the assembled body of evidence with the FSA, and AD was commissioned by FSA to update and then synthesise the evidence base. Accordingly in August 2015 a second call for information was sent out, to all 42 individuals who responded to the initial call (they were also sent a copy of the longlist of 101 sources gathered from the first call). The scope was similarly broad, with the same timeframe set, although the kinds of data searched for were extended, to include more qualitative evidence. The second call's focus was summed up as being on the 'views voices and practices of the UK public in relation to food', now and in future. The call was left open throughout the rest of 2015, and even into 2016, with participants contributing new work as it became available, right up to the reporting deadline in February 2016. In total, 76 individuals contributed to this call, and the total set of relevant sources they contributed across the two calls numbered 131. In the process of reviewing these sources, the relevant content in each was summarised into an Excel spreadsheet, against each of the longlist of priority topics set for the review. A summary table to show the coverage of sources by topic is included in Annex ii below.

c) The Systematic Study
In November 2015 the FSA resolved to commission a systematic review to supplement the expert-led calls for information. The aim of the systematic review was to add transparency and robustness to the review process, and ensure any important gaps had not been left in the coverage of evidence. Valerie Viehoff at the University of Bonn was commissioned to undertake the systematic search, using a scope derived from the expert-led calls. Accordingly her search terms were broad, albeit the same timeframe was set, of sources produced since 2010. Relevant publications, published between 2010 and 2016, were identified via searches of web of science, google scholar and science direct databases. The following terms were used in various combinations to the perform searches: 'food' (or

'meal', 'eating', 'nutrition', 'cooking' or 'diet'), 'food future', 'public', 'consumer', 'household', 'opinion', 'motivation', 'belief', 'behaviour'.
The search returned 1,307 sources. A set of filtering criteria were then applied, based on whether the source covered a) the UK b) food, in relation to consumers c) the UK public, whose 'views, voices, and practices' needed to be visible through the source (ie. it included primary evidence relating to them – although this need not always be new). Applying these filters to the titles of the sources returned, the selection reduced to 528, which was then reduced to 94 on reviewing the abstracts of each paper against the three filters. The full text of each of these sources was then reviewed against the priority topics of the 'Our Food Future' programme (agreed with the FSA and partners' steering group), with the result that 52 of the systematic sources went forward for final review. These 52 publications were read and analysed again and through a continuous iterative process, information from these publications was extracted into a standardised table and allocated to emerging themes, e.g. 'healthy eating', 'meat', 'authenticity/traceability', 'food labelling', 'governance/responsibility', etc. The headline results of this allocation are shown in Annex ii below.

From the three methods for gathering described above, 183 selected sources were identified – these are listed in Annex iv below. In drafting the report not all those sources were cited (largely due to constraints of space), while 15 more 'classics' were added to provide firm theoretical footings for the commentary. In the final outcome, this review cites 100 sources; these are listed in Annex v below.

Finally, it is worth making a few observations about the combination of methods used, in order to convey the value of this mixed methods approach.

- Expert-led calls for information provide a resource-efficient means of identifying the most important sources on a subject at that point in time, based on the expertise of those best placed to comment (in primary research terms, we could call this a 'Delphi' method, reliant on experts' insights). They also provide access to 'grey literature', the data within which often never make it into peer-reviewed journals – or if so, only after a time lag. Grey literature of this kind often relates to practical questions and applications; this is partly because it is usually commissioned by an organisation for a particular purpose (hence it already has 'impact').
- The downside of an expert-led call is that it is untransparent: the relationship between the sources gathered and the wider literature is unknown. A systematic search of peer-reviewed journals provides reassurance that 'nothing has been missed'. However, as was the case with the systematic element of this review, the results from database searches can be exceedingly broad, such that there is a lot of work left to do to filter out irrelevant papers by hand: from their titles, their abstracts, then based on their full text. However, so set narrower search terms would risk missing key sources – hence in this review, the broad searching plus repeated filtering by hand approach was used. Database searching identifies published journal papers, the main benefits of which are that they tend to be of a good quality as a minimum (thanks to the publication process), and they bring some helpful theoretical context which is often missing from grey literature, including commercial market research.
- In a study such as this, on a complex and systemic topic which requires collaboration, undertaking a call for information has the added value of building or strengthening the 'community of practice' of interested stakeholders. The network built through the

review process can be as of as much value as the evidence base gathered through that network

## ii) Coverage by Topics

a) Allocation of Selected Sources from Initial Call for Information (n = 100)

| [theme; total no. of sources] | [topic; no. of sources] |
|---|---|
| **Food Risks, Scares and Crime** (n = 9) | authenticity / adulteration / traceability [2] |
| | Mislabelling [0] |
| | Contamination [0] |
| | food scares [4] |
| | food safety / perceived risks [5] |
| | food crime / fraud [2] |
| **Food Production** (n = 24) | production / processing methods [3] |
| | supply chains / food system [3] |
| | food waste in the supply chain [9] |
| | food miles / local food / imports [8] |
| | Organic [2] |
| | Antibiotics [2] |
| | Fertilisers [0] |
| | Pesticides [3] |
| | animal welfare [3] |
| | grow your own [1] |
| **Food Safety** (n = 10) | food safety at home (inc 4Cs) [14] |
| | food / date labelling in the home [7] |
| | food safety eating out [6] |
| | food poisoning [2] |
| **Food Technology** (n = 22) | food technology [11] |
| | GM food [12] |
| | Nanotechnology [4] |
| | personalised advice [2] |
| | lab foods [2] |
| | future proteins (insects, algae) [1] |
| | functional foods [1] |
| **Food Non/Choice** (n = =22) | purchasing criteria [14] |
| | Affordability [3] |
| | UK food & poverty [2] |
| | food banks [4] |
| **Food Marketing and Shopping** (n = 19) | shopping patterns / venues [8] |
| | use of labelling [8] |
| | Certification [0] |
| | marketing & advertising [4] |
| | in-store promotions [3] |
| **Food and Planet** (n = 14) | 'Global Food Security' [3] |
| | climate change and food [7] |
| | environmental impacts [9] |
| **Dietary Intake** (n = 40) | healthy & sustainable diets [6] |
| | healthy eating / intake [27] |
| | less meat [13] |
| **Cooking Eating & Wasting** (n = 22) | cooking / skills / methods [6] |
| | eating patterns / meals / venues [9] |
| | wasting food / throwing / composting (at home/out) [13] |
| **Responsibility & Trust** | responsibility / governance [4] |

| | |
|---|---|
| (n = 10) | trust [2] |
| | Consumer power [5] |

b) Allocation of Selected Sources from Follow-Up Call for Information (n = 31)

| [theme; total no. of sources] | [topic; no. of sources] |
|---|---|
| **Food Risks, Scares and Crime** (n = ) | authenticity / adulteration / traceability [0] |
| | Mislabelling [0] |
| | Contamination [0] |
| | food crime / fraud [0] |
| | food scares [3] |
| | food safety / perceived risks [4] |
| | |
| **Food Production** (n = ) | production / processing methods [5] |
| | supply chains / food system [7] |
| | food waste in the supply chain [0] |
| | food miles / local food / imports [0] |
| | Organic [0] |
| | Antibiotics [1] |
| | Fertilisers [0] |
| | Pesticides [0] |
| | animal welfare [0] |
| | grow your own [0] |
| **Food Safety** (n = ) | food safety at home (inc 4Cs) [2] |
| | food / date labelling in the home [1] |
| | food safety eating out [0] |
| | food poisoning [1] |
| **Food Technology** (n = ) | food technology [0] |
| | GM food [0] |
| | Nanotechnology [0] |
| | personalised advice [0] |
| | lab foods [0] |
| | future proteins (insects, algae) [0] |
| | functional foods [0] |
| **Food Non/Choice** (n = ) | purchasing criteria [10] |
| | Affordability [7] |
| | UK food & poverty [1] |
| | food banks [2] |
| **Food Marketing and Shopping** (n = ) | shopping patterns / venues [2] |
| | use of labelling [3] |
| | Certification [0] |
| | marketing & advertising [6] |
| | in-store promotions [3] |
| **Food and Planet** (n = ) | 'Global Food Security' [3] |
| | climate change and food [2] |
| | environmental impacts [3] |
| **Dietary Intake** (n = ) | healthy & sustainable diets [5] |
| | healthy eating / intake [5] |
| | less meat [9] |
| **Cooking Eating & Wasting** (n = ) | cooking / skills / methods [5] |
| | eating patterns / meals / venues [6] |
| | wasting food / throwing / composting |

| | |
|---|---|
| | (at home/out) [0] |
| **Responsibility & Trust** (n = ) | responsibility / governance [11] |
| | trust [4] |
| | Consumer power [3] |
| | Future visions / scenarios [5] |

c) Allocation of Selected Sources from the Systematic Study (n = 52)

| [theme; total no. of sources] | [topic; no. of sources] |
|---|---|
| **Food Risks, Scares and Crime** (n = ) | authenticity / adulteration / traceability [2] |
| | Mislabelling [0] |
| | Contamination [1] |
| | food crime / fraud [0] |
| | food scares [9] |
| | food safety / perceived risks [11] |
| | |
| **Food Production** (n = ) | production / processing methods [1] |
| | supply chains / food system [4] |
| | food waste in the supply chain [4] |
| | food miles / local food / imports [1] |
| | Organic [1] |
| | Antibiotics [0] |
| | Fertilisers [0] |
| | Pesticides [0] |
| | animal welfare [1] |
| | grow your own [0] |
| **Food Safety** (n = ) | food safety at home (inc 4Cs) [1] |
| | food / date labelling in the home [1] |
| | food safety eating out [1] |
| | food poisoning [2] |
| **Food Technology** (n = ) | food technology [2] |
| | GM food [5] |
| | Nanotechnology [2] |
| | personalised advice [3] |
| | lab foods [1] |
| | future proteins (insects, algae) [0] |
| | functional foods [4] |
| **Food Non/Choice** (n = ) | purchasing criteria [14] |
| | Affordability [5] |
| | UK food & poverty [4] |
| | food banks [2] |
| **Food Marketing and Shopping** (n = ) | shopping patterns / venues [3] |
| | use of labelling [6] |
| | Certification [1] |
| | marketing & advertising [3] |
| | in-store promotions [1] |
| **Food and Planet** (n = ) | 'Global Food Security' [2] |
| | climate change and food [1] |
| | environmental impacts [2] |
| **Dietary Intake** (n = ) | healthy & sustainable diets [8] |
| | healthy eating / intake [18] |
| | less meat [5] |

| | |
|---|---|
| **Cooking Eating & Wasting** (n = ) | cooking / skills / methods [3] |
| | eating patterns / meals / venues [9] |
| | wasting food / throwing / composting (at home/out) [1] |
| **Responsibility & Trust** (n = ) | responsibility / governance [17] |
| | trust [9] |
| | Consumer power [4] |
| | Future visions / scenarios [4] |

### iii) Contributors to the Expert-Led Review (n = 76)

| organisation | contributor |
|---|---|
| Aberdeen University | Jennie McDiarmid |
| Avatar Alliance / Food Choice Task Force | Christiana Wyly<br>Samuel Lee Gammage |
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| Defra | Lucy Foster<br>David Foot (FRP)<br>Sophie Rollinson (food fraud)<br>Fahmida Qureshi, Iain Fraser (WTP project)<br>Catherine Connolly<br>David Lee |
| Divine Chocolate Ltd | Charlotte Green |
| Dundee University | Annie Anderson |
| Eating Better | Sue Dibb |
| Fabian Society | Cameron Tait<br>Geoff Tansey (chair) |
| FCRN | Tara Garnett |
| Fera (Defra) | Paul Brereton |
| First Steps Nutrition | Helen Crawley |
| Food Ethics Council. | Dan Crossley |
| Food Research Collaboration | Jane Landon |
| Forum for the Future | Mark Driscoll<br>Ivana Gazibara |
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| Mintel | Emma Clifford<br>Richard Ford |
| NatCen | Caireen Roberts<br>Ian Simpson |

| | |
|---|---|
| Newcastle University | Lynn Frewer |
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| Nourish | Pete Ritchie |
| OLR | Michael Thompson<br>Jane Buswell |
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| PHE | Louis Levy |
| Reading University | Richard Tiffin |
| Scotland's Rural University College | Cesar Revoredo Ghia |
| Sheffield University | Peter Jackson<br>Hannah Lambie Mumford |
| Surrey University | Monique Raats |
| Sustain | Alex Jackson<br>Ben Reynolds (co-ordinator)<br>Vicki (policy lead) |
| Tesco | Josh Hardie (CSR director)<br>Mark Little (Food Waste Reduction) |
| TNS | Colin Moyer |
| UK Health Forum | Helena Korjonen |
| Vegetarian Society | Jen Elford |
| Waitrose | Moira Howie |
| Warwick University | Liz Dowler |
| Westminster University | Dr Alizon Draper |
| Which? | Adam Marshall<br>Sue Davies |
| World Cancer Research Fund International | Corinna Hawkes |
| WRAP | Andrew Parry<br>Tom Quested |
| ZSL | Jennifer Howes<br>Sir Pat Bateson |

**iv) Selected Sources (ie. total relevant sources selected from the three phases of the review; n = 183)**


Ahmed H, Cullinane C, Keeble J, Kunz S, Marcinkiewicz A, & Ryley A (2015) *From Food Waste to Fighting Hunger: Exploring FareShare.* NatCen for FareShare.

Aston, L M, Smith, J N & Powles, J W (2013) Meat intake in Britain in relation to other dietary components and to demographic and risk factor variables: analyses based on the National Diet and Nutrition Survey of 2000/2001. *Journal of Human Nutrition and Dietetics* 26 96-106.

Bailey, S, Albardiaz, R, Frew, A J & Smith, H (2011) Restaurant staff's knowledge of anaphylaxis and dietary care of people with allergies. *Clinical and Experimental Allergy* 41 713-17.

Bajželj, B., Richards, K. S., Allwood, J. M., Smith, P., Dennis, J. S., Curmi, E., & Gilligan, C. A. (2014). Importance of food-demand management for climate mitigation. *Nature Climate Change*, 4(10), 924-929.

Barton, K L, Wrieden, W L, Armstrong, J, Sherriff, A & Anderson, A S (2013) Proportions of different types of fat consumed by the Scottish population: 2001-2010. *Proceedings of the Nutrition Society* 72 E103-E03.

Bates, B., Lennox, A., Prentice, A., Bates, C., Page, P., Nicholson, S., et al. (2014). *National diet and nutrition survey rolling programme (NDNS RP). Results from years 1-4 (combined) (2008/9 - 2011/12).* Natcen, MRC Human Nutrition Research (HNR) and UCL for Public Health England and the Food Standards Agency, May 2014.

BBSRC (2014) *Food, Nutrition and Health Challenges - BBSRC public dialogue: final report.* Hopkins Van Mil for BBSRC.

BBSRC (2014) *Report of the BBCRS Working Group on Sustainable Intensification of Agriculture.* Swindon: Biotechnology and Biological Sciences Research Council, September 2014.

Beeken, R J & Wardle, J (2013) Public beliefs about the causes of obesity and attitudes towards policy initiatives in Great Britain. *Public Health Nutrition* 16 2132-37.

Bilman, E.M., Van Kleef, E., Mela, D.J., Hulshoff, T., and Van Trijp, H.C.M. (2012), Consumer understanding, interpretation and perceived levels of personal responsibility in relation to satiety-related claims. *Appetite*, 59 (3), 912-920.

BIS (2011) *Public Attitudes to Science.* Ipsos MORI with the British Science Association (BSA) for the Department for Business Innovation and Skills, May 2011.

Brannen, J., O'Connell, R., & Mooney, A. (2013). Families, meals and synchronicity: eating together in British dual earner families. *Community, Work & Family*, *16*(4), 417-434.

Burgoine, T., Alvanides, S. & Lake, A. A. (2011) Assessing the obesogenic environment of North East England. *Health & Place* 17 738-47.

Caraher, M, Lloyd, S, Lawton, J, Singh, G, Horsley, K & Mussa, F (2010) A tale of two cities: A study of access to food, lessons for public health practice. *Health Education Journal* 69 200-10.

Carbon Trust (2015) *The Case for Protein Diversity*. The Carbon Trust, November 2015.

Chambers, S A & Traill, W B (2011) What the UK public believes causes obesity, and what they want to do about it: A cross-sectional study. *Journal of Public Health Policy* 32 430-44.

Chandon, P., and B. Wansink (2012). Does Food Marketing Need to Make us Fat? A Review and Solutions. *Nutrition Reviews* 70 (10): 571-593 .

Chatham House (2014) *Livestock – Climate Change's Forgotten Sector: Global Public Opinion on Meat and Dairy Consumption.* Chatham House with FCRN, Ipsos MORI, and the Avatar Alliance, December 2014.

Clonan, A, Wilson, P, Swift, J A, Leibovici, D G & Holdsworth, M (2015) Red and processed meat consumption and purchasing behaviours and attitudes: impacts for human health, animal welfare and environmental sustainability. *Public Health Nutrition* 18 2446-56.

Clonan, A, Holdsworth, M, Swift, J A, Leibovici, D & Wilson, P (2012) The dilemma of healthy eating and environmental sustainability: the case of fish. *Public Health Nutrition* 15 277-84.

De Boer, J., Schösler, H., & Aiking, H. (2014). "Meatless days" or "less but better"? Exploring strategies to adapt Western meat consumption to health and sustainability challenges. *Appetite* 76, 120-128.
De Boer, J., Schösler, H., & Boersema, J. J. (2013). Climate change and meat eating: An inconvenient couple?. *Journal of Environmental Psychology*, *33*, 1-8.
De Krom, M P M M & Mol, A P (2010) Food risks and consumer trust. Avian influenza and the knowing and non-knowing on UK shopping floors. *Appetite* 55 671-78.
Defra (2015) *Report by the Food Research Partnership Sub-Group on Competitiveness*, Defra, July 2015.
Defra (2014) *Food Statistics Pocket Book 2014*, Defra, October 2014.
Defra (2013) *Sustainable Consumption Report – Follow Up to the Green Food Project*. Defra, July 2013.
Defra (2013) *Family Food 2012* [Findings from the 2012 Family Food Module of the Living Costs and Food Survey (LCFS)], Defra, December 2013.
Defra (2011) *Attitudes and Behaviours around Sustainable Food Purchasing Report (SERP 1011/10)*. Defra with Kantar, April 2011.
Defra (2007) *Public Understanding of Sustainable Consumption of Food*. Opinion Leader Research for Defra, November 2007.
Delaney, M & McCarthy, M B (2014) Saints, sinners and non-believers: the moral space of food. A qualitative exploration of beliefs and perspectives on healthy eating of Irish adults aged 50-70. *Appetite* 73 105-13.
Dibb, S & Fitzpatrick, I (2014) *Let's Talk About Meat: Changing Dietary Practices for the 21st Century*. Eating Better, December 2014.
Divine (2016) '*Future of Chocolate' Survey*. Andrew Darnton with Opinion Leader Research for Divine Chocolate Ltd, January 2016.
Dora, C (ed.) (2007) *Health, Hazards and Public Debate: Lessons for risk communication from the BSE/CJD saga*. World Health Organisation.
Dowler, E., Kneafsey, M., Lambie, H., Inman, A. and Collier, R. (2011) Thinking about 'food security': engaging with UK consumers. *Critical Public Health* 21 (4), 403-416.
Eating Better (2014) *Public Attitudes and Behaviour Research*. You Gov for Eating Better, October 2014.
Eating Better (2013) *Public Attitudes and Behaviour Research*. You Gov for Eating Better, September 2013.
Eden, S (2011) Food labels as boundary objects: How consumers make sense of organic and functional foods. *Public Understanding of Science* 20, 179-94.
Erdem, S & Rigby, D (2013) Investigating Heterogeneity in the Characterization of Risks Using Best Worst Scaling. *Risk Analysis* 33 1728-48.
Eurobarometer (2014) *Special Eurobarometer 409 EB80.2 Climate Change*. TNS Opinion and Social for the European Commission.
Eurobarometer (2012) *Special Eurobarometer 389 Wave EB77.2 Europeans' Attitudes Towards Food Security, Food Quality and the Countryside*. TNS Opinion and Social for European Commission.
Eurobarometer (2012) *Flash Eurobarometer 344: Attitudes of Europeans Towards Water - related issues*. TNS for EU DG Environment.
Eurobarometer (2011) *Special Eurobarometer 372 Wave EB 75.4 Climate Change*. TNS Opinion and Social for EU DG Climate Action.
Eurobarometer (2010) *Special Eurobarometer 354 Wave 73.5 Food-related Risks*. TNS Opinion and Social for European Food Safety Authority (EFSA).
Eurobarometer (2010) *Special Eurobarometer 341 wave 73.1 Biotechnology Report*. TNS Opinion and Social for European Commission.
Eurobarometer (2009) *Special Eurobarometer 322 Wave 72.1 Europeans' attitudes towards climate change*. TNS Opinion and Social for EU DG Communication.

Eurobarometer (2009) *Special Eurobarometer 313 Wave 71.1 Europeans' attitudes towards climate change report*. TNS Opinion and Social for European Commission.
Eurobarometer (2008) *Special Eurobarometer 300 Wave 69.2 Europeans' attitudes towards climate change.* TNS Opinion and Social for European Commission and European Parliament.
Evans, D. (2014) *Food Waste: Home Consumption, Material Culture and Everyday Life,* London and New York: Bloomsbury Academic.
Fabian Society (2015) *Hungry for Change*: *the Final Report of the Fabian Commission on Food and Poverty,* October 2015.
Fallaize, R, Macready, A L, Butler, L T, Ellis, J A, Berezowska, A, Fischer, A R H, Walsh, M C, Gallagher, C, Stewart-Knox, B J, Kuznesof, S, Frewer, L J, Gibney, M J & Lovegrove, J A (2015) The perceived impact of the National Health Service on personalised nutrition service delivery among the UK public. *British Journal of Nutrition* 113 1271-79.
Fallaize, R, Macready, A L, Butler, L T, Ellis, J A & Lovegrove, J A (2013) An insight into the public acceptance of nutrigenomic-based personalised nutrition. *Nutrition Research Reviews* 26 39-48.
Fischer, A. R., van Dijk, H., de Jonge, J., Rowe, G., & Frewer, L. J. (2013). Attitudes and attitudinal ambivalence change towards nanotechnology applied to food production. *Public Understanding of Science*, *22*(7), 817-831.
Font i Furnols, M, Realini, C, Montossi, F, Sanudo, C, Campo, M M, Oliver, M A, Nute, G R & Guerrero, L (2011) Consumer's purchasing intention for lamb meat affected by country of origin, feeding system and meat price: A conjoint study in Spain, France and United Kingdom. *Food Quality and Preference* 22 443-51.
Fox, R & Smith, G (2011) Sinner Ladies and the gospel of good taste: Geographies of food, class and care. *Health & Place* 17 403-12.
Frewer, L. J., van der Lans, I. A., Fischer, A. R., Reinders, M. J., Menozzi, D., Zhang, X., ... & Zimmermann, K. L. (2013). Public perceptions of agri-food applications of genetic modification–a systematic review and meta-analysis. *Trends in Food Science & Technology*, 30(2), 142-152.
Frewer, L.J., Gupta, N., George, S., Fischer, A.R.H., Giles, E.L., Coles, D. (2014). Consumer attitudes towards nanotechnologies applied to food production, *Trends in Food Science & Technology* doi: 10.1016/j.tifs.2014.06.005.
FSA (2015) *Consumer Segmentation Booklet*. OMD for FSA, April 2015
FSA (2014) *The 2014 Food and You Survey (Wave 3) UK Bulletin 4: Experiences and Attitudes towards Food Poisoning*. TNS-BMRB for the Food Standards Agency, October 2014.
FSA (2014) *The 2014 Food and You Survey (Wave 3) UK Bulletin 1: Eating Cooking and Shopping*. TNS-BMRB for the Food Standards Agency, October 2014.
FSA (2014) *FSA Strategy 2015-20*. TNS BMRB for the Food Standards Agency, March 2014.
FSA (2014) *FSA Strategy 2015-20 Stage 2 Omnibus Survey:* Harris Interactive for the Food Standards Agency, October 2014.
FSA (2014) *FSA Strategy 2015-20 Omnibus Survey:* Harris Interactive for the Food Standards Agency, January 2014.
FSA (2014) *Biannual Public Attitudes Tracker, Wave 9 (November 2014)*. TNS BMRB for the Food Standards Agency, February 2015.
FSA (2013) *Horse Meat Wave 2: Changing consumer attitudes following the horse meat contamination issue*. Harris Interactive, August 2013.
FSA (2013) *GM labelling: Exploring public responses to the labelling of GM food and the use of GM-free labelling – Qualitative and Quantitative Findings*. Define for the Food Standards Agency, January 2013.

FSA (2013) *Exploring food attitudes and behaviours in the UK: Findings from the Food and You Survey Wave 2 (2012*). TNS BMRB, Policy Studies Institute and University of Westminster for the FSA, March 2013.
FSA (2013) *Domestic Kitchen Practices: Findings from the 'Kitchen Life' study*. Wendy Wills at al. at University of Hertfordshire for the Food Standards Agency, July 2013.
FSA (2013) *Consumer attitudes to towards the horse meat contamination issue*. Harris Interactive, February 2013.
FSA (2012) *Survey of Diet Among Children in Scotland 2010. Volume 1: Diet, Obesity and Physical Activity*. The University of Aberdeen with ScotCen Social Research and the University of Hertfordshire for the Food Standards Agency Scotland.
FSA (2012) *Survey of Diet Among Children in Scotland 2010. Volume 2: Food Purchasing* University of Aberdeen with ScotCen Social Research and the University of Hertfordshire for the Food Standards Agency Scotland.
FSA (2011) *Exploring food attitudes and behaviours in the UK: Findings from the Food and You Survey Wave 1 (2010)*, TNS BMRB, the Policy Studies Institute and University of Westminster for the Food Standards Agency.
FSA (2010) *Qualitative Research to Explore People's Use of Food Labelling Information*. Ipsos MORI for the Food Standards Agency, January 2010.
FSA (2010) *Food Technologies: Findings from the 2008 British Social Attitudes Survey*. NatCen for the Food Standards Agency, March 2010.
FSA (2009) *Public Attitudes to Food (PAFI) 2008*. GfK Social Research for the Food Standards Agency.
FSA (2009) *Exploring Attitudes to GM Food*. Natcen for the Food Standards Agency. November 2009.
FSA (2009) *An Evidence Review of Public Attitudes to Emerging Food Technologies*. Brook Lyndhurst for the Food Standards Agency, March 2009.
FSA (2008) *Consumer Priorities for Sustainable Development*. TNS for Food Standards Agency / COI, June 2008.
FSS (2015) *The influence of Deprivation and the Food Environment on Food and Drink Purchased by Secondary School Pupils Beyond the School Gate*. University of Hertfordshire for Food Standards Scotland, March 2015.
FSS (2014) *An assessment of out of home food and drink in Scotland*. NPD for FSA in Scotland, March 2014.
Garcia-Alvarez, A, Egan, B, de Klein, S, Dima, L, Maggi, F M, Isoniemi, M, Ribas-Barba, L, Raats, M M, Meissner, E M, Badea, M, Bruno, F, Salmenhaara, M, Mila-Villarroel, R, Knaze, V, Hodgkins, C, Marculescu, A, Uusitalo, L, Restani, P & Serra-Majem, L (2014) Usage of Plant Food Supplements across Six European Countries: Findings from the PlantLIBRA Consumer Survey. *PloS one,* 9(3), e92265.
Garnett T, Mathewson S, Angelides P and Borthwick F (2015) *Policies and actions to shift eating patterns: What works? A review of the evidence of the effectiveness of interventions aimed at shifting diets in more sustainable and healthy directions*. Food Climate Research Network, University of Oxford.
Garnett, T (2015) *Gut Feelings and Possible Tomorrows: (where) does animal farming fit?* Food Climate Research Network, University of Oxford, May 2015.
Garratt Glass, E (2015) *CSI 13 Food Insecurity & Food Bank Use*, Briefing Note for Oxford University (April 2015).
Garthwaite, K A, Collins, P J & Bambra, C (2015) Food for thought: An ethnographic study of negotiating ill health and food insecurity in a UK foodbank. *Social Science & Medicine* 132 38-44.
Gatley, A, Caraher, M & Lang, T (2014) A qualitative, cross cultural examination of attitudes and behaviour in relation to cooking habits in France and Britain. *Appetite* 75 71-81.

GFS (2016) *Food Systems Dialogue: A GFS Food Futures panel activity*. OPM Group for the Global Food Security Programme, January 2016. [draft]
GFS (2012a) *The Global Food Security Programme - A survey of public attitudes*. TNS-BMRB for Global Food Security, June 2012.
GFS (2012b). *The Global Food Security Programme - Exploring public views*. TNS-BMRB for Global Food Security, June 2012.
Grunert, K G (2010) European consumers' acceptance of functional foods. in Gershwin, M E & Greenwood, M R C eds *Foods for Health in the 21st Century: a Road Map for the Future.*
Gupta, N., Fischer, A. R. H., & Frewer, L. J. (2015). Ethics, Risk and Benefits Associated with Different Applications of Nanotechnology: a Comparison of Expert and Consumer Perceptions of Drivers of Societal Acceptance. *NanoEthics,* 1-16.
Gupta, N, Fischer, A R H, van der Lans, I A & Frewer, L J (2012) Factors influencing societal response of nanotechnology: an expert stakeholder analysis. *Journal of Nanoparticle Research* 14.
Guthman, J (2011) Fighting for the Future of Food: Activists versus Agribusiness in the Struggle over Biotechnology. *Economic Geography* 87 481-82.
Hamlin, R. P., McNeill, L. S., & Moore, V. (2014). The impact of front-of-pack nutrition labels on consumer product evaluation and choice: an experimental study. *Public health nutrition*, 1-9.
Handford, C E, Dean, M, Spence, M, Henchion, M, Elliott, C T & Campbell, K (2015) Awareness and attitudes towards the emerging use of nanotechnology in the agri-food sector. *Food Control* 57 24-34.
Henderson, J, Wilson, A, Meyer, S B, Coveney, J, Calnan, M, McCullum, D, Lloyd, S & Ward, P R (2014) The role of the media in construction and presentation of food risks. *Health Risk & Society* 16 615-30.
HSCIC (2012) *Health Social Care and Lifestyles - Findings from the Health Survey For England 2011*. NatCen and UCL for the Health and Social Care Information Centre, December 2012.
HSCIC (2009). *Physical Activity and Fitness – Findings from the Health Survey For England 2008*. NatCen and UCL for the Health and Social Care Information Centre, December 2009.
Huber, C (2014) *Changing Behaviours towards Sustainable Diets in Edinburgh Higher Education Institutions*, Celia Huber at the University of Edinburgh. [unpublished B Hons thesis]
Hussein, M, Silva, A & Fraser, I (2015) Linking intrinsic quality attributes of agricultural produce to revealed consumer preferences. *Food Quality and Preference* 41 180-88.
IGD (2015) *Shopper Attitudes to Veterinary Medicines in the Food Chain*. IGD, February 2015.
IGD (2014) *Consumers' attitudes to new and emerging food technology*. IGD, January 2014.
IGD (2014) *'Working on Waste': barriers to reducing food waste amongst 18-34 year olds*, MORI for IGD.
IGD (2013) *Sustainable Diets - Helping Shoppers*. IGD Shopper Vista, October 2013.
Ipsos MORI (2014) *Public Attitudes to Science 2014*. Ipsos MORI for BIS, the ESRC and the British Science Association, March 2014.
Ipsos MORI (2014) *'Changing Climate, Changing Diets' Global Survey for Chatham House* [data tables], October 2014.
Ipsos MORI (2013) *Climate Week 2013 Survey*.
Jackson, P (2010) Food stories: consumption in an age of anxiety. *Cultural Geographies* 17 147-65.
Jackson, P., & Viehoff, V. (2016). Reframing convenience food. *Appetite* 98, 1-11.
Johns, N, Hartwell, H & Morgan, M (2010) Improving the provision of meals in hospital. The patients' viewpoint. *Appetite* 54 181-85.
Kantar (2013) *'Horsemeat scandal - long term impact?'* Ed Garner at Kantar WorldPanel, July 2013.
Kenten, C, Boulay, A & Rowe, G (2013) Salt. UK consumers' perceptions and consumption patterns. *Appetite* 70 104-11.
Kjærnes, U., Harvey, M., & Warde, A. (2007). *Trust in food: A comparative and institutional analysis*. Basingstoke: Palgrave Macmillan.

Koteyko, N (2010) Balancing the good, the bad and the better: A discursive perspective on probiotics and healthy eating. *Health* 14 585-602.
Lane, K, Poland, F, Fleming, S, Lambert, N, Macdonald, H, Potter, J, Raats, M, Skidmore, P, Vince, C, Wellings, A & Hooper, L (2014) Older women's reduced contact with food in the Changes Around Food Experience (CAFE) study: choices, adaptations and dynamism. *Ageing & Society* 34 645-69.
Lee, L. and Simpson, S. (2016) *Report for the Vegetarian Society based on results from the British Social Attitudes survey 2014*. London: NatCen Social Research.
Leslie, W S, Eunson, J, Murray, L, Lean, M E J & Hankey, C R (2014) What, not just salad and veg? Consumer testing of the eatwell week. *Public Health Nutrition* 17 1640-46.
Macdiarmid, J. I., Douglas, F., & Campbell, J. (2016). Eating like there's no tomorrow: Public awareness of the environmental impact of food and reluctance to eat less meat as part of a sustainable diet. Appetite, 96, 487-493.
Macdiarmid, J. I. (2015) '*Eating Less Meat*' A presentation to the Eating Better behaviours workshop, 10th September 2015.
Macdiarmid, J. I., Loe, J., Kyle, J., & McNeill, G. (2013). "It was an education in portion size". Experience of eating a healthy diet and barriers to long term dietary change. *Appetite*, *71*, 411-419.
MacRitchie, L A, Hunter, C J & Strachan, N J C (2014) Consumer acceptability of interventions to reduce Campylobacter in the poultry food chain. *Food Control* 35 260-66.
Maggio, A., Van Criekinge, T., & Malingreau, J.P. (2015) *Global Food Security 2030: Assessing trends with a view to guiding future EU policies*. JRC Science and Policy Foresight Service, the European Commission, June 2015.
Marcu, A, Gaspar, R, Rutsaert, P, Seibt, B, Fletcher, D, Verbeke, W & Barnett, J (2015) Analogies, metaphors, and wondering about the future: Lay sense-making around synthetic meat. *Public Understanding of Science* 24 547-62.
Markovina, J., Stewart-Knox, B. J., Rankin, A., Gibney, M., de Almeida, M. D. V., Fischer, A., ... & Frewer, L. J. (2015). Food4Me study: Validity and reliability of Food Choice Questionnaire in 9 European countries. *Food Quality and Preference* 45, 26-32.
Marsden, T (2013) From post-productionism to reflexive governance: Contested transitions in securing more sustainable food futures. *Journal of Rural Studies* 29 123-34.
McGuffin, L E, Price, R K, McCaffrey, T A, Hall, G, Lobo, A, Wallace, J M W & Livingstone, M B E (2015) Parent and child perspectives on family out-of-home eating: a qualitative analysis. *Public Health Nutrition* 18 100-11.
McWilliams, J E (2014) Turning the GM Battleship: The Tide of Popular Opinion and the Future of Genetically Modified Foods. in Songstad, D D, Hatfield, J L & Tomes, D T eds *Convergence of Food Security, Energy Security and Sustainable Agriculture*.
Miller S, Driver T, Velasquez N, & Saunders C (2014) *Maximising Export Returns (MER): Consumer behaviour and trends for credence attributes in key markets and a review of how these may be communicated*. The Agribusiness and Economics Research Unit, Lincoln University, Christchurch (NZ).
Millward, D J (2013) Energy balance and obesity: a UK perspective on the gluttony v. sloth debate. *Nutrition Research Reviews* 26 89-109.
Moorhouse, J., Kapetanaki, A., & Wills, W. (2015) *Within Arm's Reach: School Neighbourhoods and Young People's Food Choices*. Food Research Collaboration, January 2016.
National Geographic (2014) *Greendex Consumer Choice and the Environment Survey- Focus on Food and Behaviour Change*. GlobeScan for National Geographic, September 2014.
Newson, R S, van der Maas, R, Beijersbergen, A, Carlson, L & Rosenbloom, C (2015) International consumer insights into the desires and barriers of diners in choosing healthy restaurant meals. *Food Quality and Preference* 43 63-70.

NOO (2011) *Knowledge and attitudes towards healthy eating and physical activity: What the data tell us*. National Obesity Observatory for the NHS, May 2011.
O'Connell, R., & Brannen, J. (2013). Children's food, power and control: Negotiations in families with younger children in England. *Childhood*, 0907568213476900.
O'Brien, M C, McConnon, A, Hollywood, L E, Cuskelly, G J, Barnett, J, Raats, M & Dean, M (2015) Let's talk about health: shoppers' discourse regarding health while food shopping. *Public Health Nutrition* 18 1001-10.
OLR (2014) *Wellcome Trust Social Listening Research: Food and Drink Initiative*. Opinion Leader Research for the Wellcome Trust, October 2014.
ONS (2006) *The Time Use Survey*. Office for National Statistics.
OST (2005) *Science in Society: Findings from Qualitative and Quantitative Research*. MORI for the Office of Science and Technology in the Department of Trade and Industry, March 2005.
Perrea, T., Grunert, K. G., & Krystallis, A. (2015). Consumer Value perceptions of food products from emerging processing technologies: A cross-cultural exploration. *Food Quality and Preference*, *39*, 95-108.
Piazza, J., Ruby, M. B., Loughnan, S., Luong, M., Kulik, J., Watkins, H. M., & Seigerman, M. (2015). Rationalizing meat consumption. The 4Ns. *Appetite* 91, 114-128.
Poinhos, R, van der Lans, I A, Rankin, A, Fischer, A R H, Bunting, B, Kuznesof, S, Stewart-Knox, B & Frewer, L J (2014) Psychological Determinants of Consumer Acceptance of Personalised Nutrition in 9 European Countries. . *PloS one,* 9(10), e110614.
Purdam, K., Garratt, E. A., & Esmail, A. (2015). Hungry? Food Insecurity, Social Stigma and Embarrassment in the UK. *Sociology*, 0038038515594092.
Remoundou, K., Brennan, M., Hart, A., & Frewer, L. J. (2014). Pesticide risk perceptions, knowledge, and attitudes of operators, workers, and residents: a review of the literature. *Human and Ecological Risk Assessment: An International Journal,* 20(4), 1113-1138.
Revoredo-Giha, C, Akaichi, F and Leat, P (2015) *Retailers' Promotions: What Role Do They Play in Household Food Purchases by Degree of Food Access in Scotland?* Working Paper by Scotland's Rural University College, presented at Promotions Scotland 2015.
Roberts C, Calcutt E, Draper A, Hussey D, McManus S. (2014) *Eating safe and well*. NatCen for FSA.
Roberts C, Calcutt E, Hussey D, Howard M, McManus S. (2014) *Understanding domestic food safety practices*. NatCen for FSA.
Rutsaert, P, Barnett, J, Gaspar, R, Marcu, A, Pieniak, Z, Seibt, B, Lima, M L, Fletcher, D & Verbeke, W (2015) Beyond information seeking: Consumers' online deliberation about the risks and benefits of red meat. *Food Quality and Preference* 39 191-201.
Salis S, Jabin N, & Morris S (2015) Evaluation of the impact of FHRS and FHIS on food hygiene standards and food-borne illnesses. Natcen for FSA, March 2015.
Scarborough, P., Appleby, P. N., Mizdrak, A., Briggs, A. D., Travis, R. C., Bradbury, K. E., & Key, T. J. (2014). Dietary greenhouse gas emissions of meat-eaters, fish-eaters, vegetarians and vegans in the UK. *Climatic change*, 125(2), 179-192.
Scarborough, P., Matthews, A., Eyles, H., Kaur, A., Hodgkins, C., Raats, M. M., & Rayner, M. (2015). Reds are more important than greens: how UK supermarket shoppers use the different information on a traffic light nutrition label in a choice experiment. *International Journal of Behavioral Nutrition and Physical Activity*, *12*(1), 151.
Schösler, H (2015) *Circular Economy and Food Consumers* [working draft for FSA], August 2015.
Schösler, H., De Boer, J., & Boersema, J. J. (2012). Can we cut out the meat of the dish? Constructing consumer-oriented pathways towards meat substitution. *Appetite* 58(1), 39-47.
Skafida, V (2013) The family meal panacea: exploring how different aspects of family meal occurrence, meal habits and meal enjoyment relate to young children's diets. *Sociology of Health & Illness* 35 906-23.

Smeaton, D, Draper, A, Vowden, K, Durante, L (2010) *Development Work for Wave 2 of the Food Issues Survey Draft 2*. Policy Studies Institute for the FSA October 2010.
Southerton, D. & Yates, L. (2014) 'Exploring Food Waste Through the Lens of Social Practice Theories: some reflections on eating as a compound practice', in Ekstrom, K. (ed.) *Waste Management and Sustainable Consumption: Reflections on Consumer Waste*, London: Routledge.
Spoel, P, Harris, R & Henwood, F (2014) Rhetorics of health citizenship: exploring vernacular critiques of government's role in supporting healthy living. *The Journal of medical humanities* 35 131-47.
Steedman, P. & Schultz, W. (2009) *Future scenarios for the UK food system: A toolkit for thinking ahead.* Food Ethics Council, March 2009.
Stewart-Knox, B., Kuznesof, S., Robinson, J., Rankin, A., Orr, K., Duffy, M., ... & Frewer, L. J. (2013). Factors influencing European consumer uptake of personalised nutrition. Results of a qualitative analysis. *Appetite*, *66*, 67-74.
Strachan, N J C, Hunter, C J, Jones, C D R, Wilson, R S, Ethelberg, S, Cross, P, Williams, A P, MacRitchie, L, Rotariu, O & Chadwick, D (2011) The relationship between lay and technical views of Escherichia coli O157 risk. *Philosophical Transactions of the Royal Society B-Biological Sciences* 366 1999-2009.
Thompson, C, Cummins, S, Brown, T & Kyle, R (2015) What does it mean to be a 'picky eater'? A qualitative study of food related identities and practices. *Appetite* 84 235-39.
Timotijevic, L, Barnett, J & Raats, M M (2011) Engagement, representativeness and legitimacy in the development of food and nutrition policy. *Food Policy* 36 490-98.
TNS (2013) *Food for Thought: Consumer attitudes, behaviours and concerns on food.*
University of Essex (2014) *Understanding Society Innovation Panel Wave 7 Data.* University of Essex, Institute for Social and Economic Research, Natcen and TNS BMRB [Analysis by Peter Lynn for FSA]
Van Herpen, E., and H. Van Trijp. (2011). Front-of-pack nutrition labels. Their effect on attention and choices when consumers have varying goals and time constraints. *Appetite* 57: 148-160
Van Rijswijk, W., & Frewer, L. J. (2012). Consumer needs and requirements for food and ingredient traceability information. *International Journal of Consumer Studies*, 36(3), 282-290.
Verain, M. C., Dagevos, H., & Antonides, G. (2015). Sustainable food consumption. Product choice or curtailment?. *Appetite* 91, 375-384.
Wahlich, C, Gardner, B & McGowan, L (2013) How, when and why do young women use nutrition information on food labels? A qualitative analysis. *Psychology & Health* 28 202-16.
Wellcome Trust (2013) *Wellcome Trust Monitor Wave 2 (2012)* Ipsos MORI for the Wellcome Trust May 2013.
Wellesley, L., Happer, C., & Froggatt A. (2015) *Changing Climate, Changing Diets - Pathways to Lower Meat Consumption.* Chatham House with the Glasgow University Media Group, November 2015.
Wells, R & Caraher, M (2014) UK print media coverage of the food bank phenomenon: from food welfare to food charity? *British Food Journal* 116 1426-45.
Which? (2015) *"Food System Challenges – Public Dialogue on food system challenges and possible solutions*", TNS-BMRB for Which? and the Government Office for Science, August 2015.
Which? (2013) *Consumer Report on The Future of Food,* April 2013.
Wills, W J, Meah, A, Dickinson, A M & Short, F (2015) 'I don't think I ever had food poisoning'. A practice-based approach to understanding foodborne disease that originates in the home. *Appetite* 85 118-25.
Wilson, A M, Henderson, J, Coveney, J, Meyer, S B, Webb, T, Calnan, M, Caraher, M, Lloyd, S, McCullum, D, Elliott, A & Ward, P R (2014) Media actors' perceptions of their roles in reporting food incidents. *BMC Public Health* 14.

WRAP (2014) *Household Food & Drink Waste – A People Focus*, October 2014.
WRAP (2014) *Consumer Behaviours, Attitudes & Knowledge Towards Food & Waste*; WRAP Consumer Food Waste Prevention Survey; Information for partners; November 2014 (update)
WRAP (2013) *Understanding out of home consumer food waste*
WRAP (2013) *Consumer Behaviours, Attitudes and Knowledge Towards Food and Waste*. WRAP Consumer Food Waste Prevention Survey - Information for Partners presentation.
WRAP (2013) *Consumer Attitudes to Food Waste and Food Packaging*. Icaro consulting for WRAP.
WRAP (2011) *Consumer insight: date labels and storage guidance*. Brook Lyndhurst for WRAP.
Wrieden, W L, Armstrong, J, Sherriff, A, Anderson, A S & Barton, K L (2013) Slow pace of dietary change in Scotland: 2001-9. *British Journal of Nutrition* 109 1892-902.
Yates, L., & Warde, A. (2015). The evolving content of meals in Great Britain. Results of a survey in 2012 in comparison with the 1950s. *Appetite*, *84*, 299-308.
YouGov (2015) *'Meat Consumption' [intervention] Question: Online Results*, YouGov 24th November 2015 [at: https://yougov.co.uk/opi/surveys/results#/survey/12aa9d80-9292-11e5-adf5-005056900127/question/557e76e0-9292-11e5-adf5-005056900127/age]
YouGov (2013) *Food Provenance*. YouGov for Marketing Week.

## v) Sources Cited (n = 100)


Bajželj, B., Richards, K. S., Allwood, J. M., Smith, P., Dennis, J. S., Curmi, E., & Gilligan, C. A. (2014). Importance of food-demand management for climate mitigation. *Nature Climate Change*, 4(10), 924-929.

Bates, B., Lennox, A., Prentice, A., Bates, C., Page, P., Nicholson, S., et al. (2014). *National diet and nutrition survey rolling programme (NDNS RP). Results from years 1-4 (combined) (2008/9 - 2011/12)*. Natcen, MRC Human Nutrition Research (HNR) and UCL for Public Health England and the Food Standards Agency, May 2014.

BBSRC (2014) *Report of the BBCRS Working Group on Sustainable Intensification of Agriculture.*

Beck, U. (1992). *Risk society: Towards a new modernity* (Vol. 17). London: Sage.

Bohm, D. (1996) *On Dialogue*. Abindgon: Routledge.

Bourdieu, P. (1977) (trans. Nice, R 1984). *Distinction: A social critique of the judgement of taste*. Boston, MA.: Harvard University Press.

De Boer, J., Schösler, H., & Aiking, H. (2014). "Meatless days" or "less but better"? Exploring strategies to adapt Western meat consumption to health and sustainability challenges. *Appetite* 76, 120-128.

De Krom, M P M M & Mol, A P (2010) Food risks and consumer trust. Avian influenza and the knowing and non-knowing on UK shopping floors. *Appetite* 55 671-78.

Dibb, S & Fitzpatrick, I (2014) *Let's Talk About Meat: Changing Dietary Practices for the 21st Century.* Eating Better, December 2014.

Divine (2016) '*Future of Chocolate' Survey*. Andrew Darnton with Opinion Leader Research for Divine Chocolate Ltd, January 2016.

Douglas, M. (1972). Deciphering a meal. *Daedalus*, 61-81.

Eating Better (2014) *Public Attitudes and Behaviour Research*. You Gov for Eating Better, October 2014.

Eden, S (2011) Food labels as boundary objects: How consumers make sense of organic and functional foods. *Public Understanding of Science* 20, 179-94.

Eertmans, A., Baeyens, F., & Van Den Bergh, O. (2001). Food likes and their relative importance in human eating behavior: review and preliminary suggestions for health promotion. *Health Education Research*, *16*(4), 443-456.

Erdem, S & Rigby, D (2013) Investigating Heterogeneity in the Characterization of Risks Using Best Worst Scaling. *Risk Analysis* 33 1728-48.

Eurobarometer (2014) *Special Eurobarometer 409 EB80.2 Climate Change*. TNS Opinion and Social for the European Commission.

Eurobarometer (2012) *Special Eurobarometer 389 Wave EB77.2 Europeans' Attitudes Towards Food Security, Food Quality and the Countryside*. TNS Opinion and Social for European Commission.

Fabian Society (2015) *Hungry for Change*: *the Final Report of the Fabian Commission on Food and Poverty,* October 2015.

Fallaize, R, Macready, A L, Butler, L T, Ellis, J A, Berezowska, A, Fischer, A R H, Walsh, M C, Gallagher, C, Stewart-Knox, B J, Kuznesof, S, Frewer, L J, Gibney, M J & Lovegrove, J A (2015) The perceived impact of the National Health Service on personalised nutrition service delivery among the UK public. *British Journal of Nutrition* 113 1271-79.

Fallaize, R, Macready, A L, Butler, L T, Ellis, J A & Lovegrove, J A (2013) An insight into the public acceptance of nutrigenomic-based personalised nutrition. *Nutrition Research Reviews* 26 39-48.

Fischhoff, B., Slovic, P., Lichtenstein, S., Read, S., & Combs, B. (1978). How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. *Policy sciences*, *9*(2), 127-152.

Fischler, C. (1988). Food, self and identity. *Social science information*, *27*(2), 275-292.

Font i Furnols, M, Realini, C, Montossi, F, Sanudo, C, Campo, M M, Oliver, M A, Nute, G R & Guerrero, L (2011) Consumer's purchasing intention for lamb meat affected by country of origin, feeding system and meat price: A conjoint study in Spain, France and United Kingdom. *Food Quality and Preference* 22 443-51.

Fox, R & Smith, G (2011) Sinner Ladies and the gospel of good taste: Geographies of food, class and care. *Health & Place* 17 403-12.

Frewer, L.J., Gupta, N., George, S., Fischer, A.R.H., Giles, E.L., Coles, D. (2014). Consumer attitudes towards nanotechnologies applied to food production, *Trends in Food Science & Technology* doi: 10.1016/j.tifs.2014.06.005.

FSA (2015a) *Food We Can Trust: The Food Standards Agency Strategy 2015-20*. London: FSA, April 2015.

FSA (2015b) *Consumer Segmentation Booklet*. OMD for FSA, April 2015.

FSA (2014a) *FSA Strategy 2015-20*. TNS BMRB for the Food Standards Agency, March 2014.

FSA (2014b) *The 2014 Food and You Survey (Wave 3) UK Bulletin 4: Experiences and Attitudes towards Food Poisoning*. TNS-BMRB for the Food Standards Agency, October 2014.

FSA (2014c) *FSA Strategy 2015-20 Omnibus Survey:* Harris Interactive for the Food Standards Agency, January 2014.

FSA (2013a) *Consumer attitudes to towards the horse meat contamination issue*. Harris Interactive, February 2013.

FSA (2013b) *Horse Meat Wave 2: Changing consumer attitudes following the horse meat contamination issue*. Harris Interactive, August 2013.

FSA (2010) *Food Technologies: Findings from the 2008 British Social Attitudes Survey*. NatCen for the Food Standards Agency, March 2010.

FSA (2009a) *Exploring Attitudes to GM Food*. Natcen for the Food Standards Agency. November 2009.

FSA (2009b) *An Evidence Review of Public Attitudes to Emerging Food Technologies*. Brook Lyndhurst for the Food Standards Agency, March 2009.

FSA (2008) *Consumer Priorities for Sustainable Development*. TNS for Food Standards Agency / COI, June 2008.

Garcia-Alvarez, A, Egan, B, de Klein, S, Dima, L, Maggi, F M, Isoniemi, M, Ribas-Barba, L, Raats, M M, Meissner, E M, Badea, M, Bruno, F, Salmenhaara, M, Mila-Villarroel, R, Knaze, V, Hodgkins, C, Marculescu, A, Uusitalo, L, Restani, P & Serra-Majem, L (2014) Usage of Plant Food Supplements across Six European Countries: Findings from the PlantLIBRA Consumer Survey. *PloS one,* 9(3), e92265.

Garnett, T (2015) *Gut Feelings and Possible Tomorrows: (where) does animal farming fit?* Food Climate Research Network, University of Oxford, May 2015.

Garratt Glass, E (2015) *CSI 13 Food Insecurity & Food Bank Use*, Briefing Note for Oxford University (April 2015).

Garthwaite, K A, Collins, P J & Bambra, C (2015) Food for thought: An ethnographic study of negotiating ill health and food insecurity in a UK foodbank. *Social Science & Medicine* 132 38-44.

Gatley, A, Caraher, M & Lang, T (2014) A qualitative, cross cultural examination of attitudes and behaviour in relation to cooking habits in France and Britain. *Appetite* 75 71-81.

Geels, F.W., Monaghan, A., Eames, M. and Steward, F. 2008. *The feasibility of systems thinking in sustainable consumption and production policy: A report to Defra*. London: Defra.

GFS (2016) *Food Systems Dialogue: A GFS Food Futures panel activity*. OPM Group for the Global Food Security Programme, January 2016. [draft]

GFS (2012a) *The Global Food Security Programme - A survey of public attitudes*. TNS-BMRB for Global Food Security, June 2012.

GFS (2012b). *The Global Food Security Programme - Exploring public views*. TNS-BMRB for Global Food Security, June 2012.
Grunert, K G (2010) European consumers' acceptance of functional foods. in Gershwin, M E & Greenwood, M R C eds *Foods for Health in the 21st Century: a Road Map for the Future*.
Gupta, N., Fischer, A. R. H., & Frewer, L. J. (2015). Ethics, Risk and Benefits Associated with Different Applications of Nanotechnology: a Comparison of Expert and Consumer Perceptions of Drivers of Societal Acceptance. *NanoEthics,* 1-16.
Guthman, J (2011) Fighting for the Future of Food: Activists versus Agribusiness in the Struggle over Biotechnology. *Economic Geography* 87 481-82.
Handford, C E, Dean, M, Spence, M, Henchion, M, Elliott, C T & Campbell, K (2015) Awareness and attitudes towards the emerging use of nanotechnology in the agri-food sector. *Food Control* 57 24-34.
Henderson, J, Wilson, A, Meyer, S B, Coveney, J, Calnan, M, McCullum, D, Lloyd, S & Ward, P R (2014) The role of the media in construction and presentation of food risks. *Health Risk & Society* 16 615-30.
Hussein, M, Silva, A & Fraser, I (2015) Linking intrinsic quality attributes of agricultural produce to revealed consumer preferences. *Food Quality and Preference* 41 180-88.
IGD (2014) *Consumers' attitudes to new and emerging food technology*. IGD, January 2014.
IGD (2013) *Sustainable Diets - Helping Shoppers*. IGD Shopper Vista, October 2013.
Ipsos MORI (2014) *'Changing Climate, Changing Diets' Global Survey for Chatham House* [data tables], October 2014.
Jackson, P (2010) Food stories: consumption in an age of anxiety. *Cultural Geographies* 17 147-65.
Jackson, P., & Viehoff, V. (2016). Reframing convenience food. *Appetite* 98, 1-11.
Joy, M. (2010). *Why we love dogs, eat pigs, and wear cows. An introduction to carnism*. San Francisco, CA: Red Wheel/Weiser.
Kantar (2013) *'Horsemeat scandal - long term impact?'* Ed Garner at Kantar WorldPanel, July 2013.
Kenten, C, Boulay, A & Rowe, G (2013) Salt. UK consumers' perceptions and consumption patterns. *Appetite* 70 104-11.
Kjærnes, U., Harvey, M., & Warde, A. (2007). *Trust in food: A comparative and institutional analysis*. Basingstoke: Palgrave Macmillan.
Koteyko, N (2010) Balancing the good, the bad and the better: A discursive perspective on probiotics and healthy eating. *Health* 14 585-602.
Lee, L. and Simpson, S. (2016) *Report for the Vegetarian Society based on results from the British Social Attitudes survey 2014*. London: NatCen Social Research.
Leslie, W S, Eunson, J, Murray, L, Lean, M E J & Hankey, C R (2014) What, not just salad and veg? Consumer testing of the eatwell week. *Public Health Nutrition* 17 1640-46.
Macdiarmid, J. I. (2015) '*Eating Less Meat*' A presentation to the Eating Better behaviours workshop, 10th September 2015.
Macdiarmid, J. I., Douglas, F., & Campbell, J. (2016). Eating like there's no tomorrow: Public awareness of the environmental impact of food and reluctance to eat less meat as part of a sustainable diet. Appetite, 96, 487-493.
Macdiarmid, J. I., Loe, J., Kyle, J., & McNeill, G. (2013). "It was an education in portion size". Experience of eating a healthy diet and barriers to long term dietary change. *Appetite*, *71*, 411-419.
MacRitchie, L A, Hunter, C J & Strachan, N J C (2014) Consumer acceptability of interventions to reduce Campylobacter in the poultry food chain. *Food Control* 35 260-66.
Marcu, A, Gaspar, R, Rutsaert, P, Seibt, B, Fletcher, D, Verbeke, W & Barnett, J (2015) Analogies, metaphors, and wondering about the future: Lay sense-making around synthetic meat. *Public Understanding of Science* 24 547-62.
Maslow, A. H. (1943). A theory of human motivation. *Psychological review*, *50*(4), 370.

McGuffin, L E, Price, R K, McCaffrey, T A, Hall, G, Lobo, A, Wallace, J M W & Livingstone, M B E (2015) Parent and child perspectives on family out-of-home eating: a qualitative analysis. *Public Health Nutrition* 18 100-11.
McWilliams, J E (2014) Turning the GM Battleship: The Tide of Popular Opinion and the Future of Genetically Modified Foods. in Songstad, D D, Hatfield, J L & Tomes, D T eds *Convergence of Food Security, Energy Security and Sustainable Agriculture.*
Murcott, A. (1982). On the social significance of the" cooked dinner" in South Wales. *Social Science Information/sur les sciences sociales*.
National Geographic (2014) *Greendex Consumer Choice and the Environment Survey- Focus on Food and Behaviour Change.* GlobeScan for National Geographic, September 2014.
O'Connell, R., & Brannen, J. (2013). Children's food, power and control: Negotiations in families with younger children in England. *Childhood*, 0907568213476900.
OLR (2014) *Wellcome Trust Social Listening Research: Food and Drink Initiative.* Opinion Leader Research for the Wellcome Trust, October 2014.
Piazza, J., Ruby, M. B., Loughnan, S., Luong, M., Kulik, J., Watkins, H. M., & Seigerman, M. (2015). Rationalizing meat consumption. The 4Ns. *Appetite* 91, 114-128.
Poinhos, R, van der Lans, I A, Rankin, A, Fischer, A R H, Bunting, B, Kuznesof, S, Stewart-Knox, B & Frewer, L J (2014) Psychological Determinants of Consumer Acceptance of Personalised Nutrition in 9 European Countries. . *PloS one,* 9(10), e110614.
Purdam, K., Garratt, E. A., & Esmail, A. (2015). Hungry? Food Insecurity, Social Stigma and Embarrassment in the UK. *Sociology*, 0038038515594092.
Rutsaert, P, Barnett, J, Gaspar, R, Marcu, A, Pieniak, Z, Seibt, B, Lima, M L, Fletcher, D & Verbeke, W (2015) Beyond information seeking: Consumers' online deliberation about the risks and benefits of red meat. *Food Quality and Preference* 39 191-201.
Scarborough, P., Appleby, P. N., Mizdrak, A., Briggs, A. D., Travis, R. C., Bradbury, K. E., & Key, T. J. (2014). Dietary greenhouse gas emissions of meat-eaters, fish-eaters, vegetarians and vegans in the UK. *Climatic change*, 125(2), 179-192.
Schösler, H., De Boer, J., & Boersema, J. J. (2012). Can we cut out the meat of the dish? Constructing consumer-oriented pathways towards meat substitution. *Appetite* 58(1), 39-47.
Skafida, V (2013) The family meal panacea: exploring how different aspects of family meal occurrence, meal habits and meal enjoyment relate to young children's diets. *Sociology of Health & Illness* 35 906-23.
Slovic, P. E. (2000). *The perception of risk*. London: Earthscan.
Steedman, P. & Schultz, W. (2009) *Future scenarios for the UK food system: A toolkit for thinking ahead.* Food Ethics Council, March 2009.
Strachan, N J C, Hunter, C J, Jones, C D R, Wilson, R S, Ethelberg, S, Cross, P, Williams, A P, MacRitchie, L, Rotariu, O & Chadwick, D (2011) The relationship between lay and technical views of Escherichia coli O157 risk. *Philosophical Transactions of the Royal Society B-Biological Sciences* 366 1999-2009.
Thompson, C, Cummins, S, Brown, T & Kyle, R (2015) What does it mean to be a 'picky eater'? A qualitative study of food related identities and practices. *Appetite* 84 235-39.
TNS (2013) *Food for Thought: Consumer attitudes, behaviours and concerns on food.*
University of Essex (2014) *Understanding Society Innovation Panel Wave 7 Data.* University of Essex, Institute for Social and Economic Research, Natcen and TNS BMRB [Analysis by Peter Lynn for FSA]
Verain, M. C., Dagevos, H., & Antonides, G. (2015). Sustainable food consumption. Product choice or curtailment?. *Appetite* 91, 375-384.
Wahlich, C, Gardner, B & McGowan, L (2013) How, when and why do young women use nutrition information on food labels? A qualitative analysis. *Psychology & Health* 28 202-16.
Warde, A. (1999). Convenience food: space and timing. *British Food Journal*, 101 (7), 518-527.

Wellesley, L., Happer, C., & Froggatt A. (2015) *Changing Climate, Changing Diets - Pathways to Lower Meat Consumption*. Chatham House with the Glasgow University Media Group, November 2015.

Wells, R & Caraher, M (2014) UK print media coverage of the food bank phenomenon: from food welfare to food charity? *British Food Journal* 116 1426-45.

Wenger, E, McDermott, R & Snyder, WM (2002). *Cultivating Communities of Practice* Boston, MA: Harvard Business School Press.

Which? (2015) *Food System Challenges – Public Dialogue on food system challenges and possible solutions*, TNS-BMRB for Which? and the Government Office for Science, August 2015.

Which? (2013) *Consumer Report on The Future of Food,* April 2013.

Wilson, A M, Henderson, J, Coveney, J, Meyer, S B, Webb, T, Calnan, M, Caraher, M, Lloyd, S, McCullum, D, Elliott, A & Ward, P R (2014) Media actors' perceptions of their roles in reporting food incidents. *BMC Public Health* 14.

WRAP (2014) *Household Food & Drink Waste – A People Focus*, October 2014.

Yates, L., & Warde, A. (2015). The evolving content of meals in Great Britain. Results of a survey in 2012 in comparison with the 1950s. *Appetite*, *84*, 299-308.

YouGov (2015) *'Meat Consumption' [intervention] Question: Online Results*, YouGov 24th November 2015 [at: https://yougov.co.uk/opi/surveys/results#/survey/12aa9d80-9292-11e5-adf5-005056900127/question/557e76e0-9292-11e5-adf5-005056900127/age]