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THE NUFFIELD FARMING  
LECTURE REPORT 2018

# CHANGING FOOD CULTURES: CHALLENGES AND OPPORTUNITIES FOR UK AGRICULTURE

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In addition to my time in British Columbia in the Spring of 2018, I had planned to visit Denmark, the Netherlands and Switzerland in August and September of 2017. On the final day of my trip to Denmark, just before I was due to move on to the Netherlands, I learned that my mother had been taken seriously ill. Sadly her illness and subsequent death meant that I had to forgo the planned activities in the Netherlands and Switzerland. Her career had been in agriculture, first as a demonstrator at a farm institute, then as a farmer, and later as a farm secretary; she was also a keen gardener and a marvellous and enthusiastic cook. So it seems entirely appropriate that a report on farming and food should be dedicated to her memory.

### About the Author

Michael Winter BSc PhD OBE is Professor of Land Economy and Society in the Centre for Rural Policy Research at the University of Exeter where he has worked since 2002. He graduated in Rural Environment Studies at Wye College in 1977, and worked for a year on a Hampshire farm before embarking on an academic career which took him to the Open University, the Universities of Exeter, Bath and Gloucestershire and the Royal Agricultural College. Alongside his academic duties he has held a number of public appointments, and currently chairs the UNESCO North Devon Biosphere Partnership, is a Board member of both Natural England and Rothamsted Research, and a member of Defra's Bovine TB Strategy Review Working Group. In his spare time he enjoys gardening, hedge laying, listening to music, reading novels, and supporting the Welsh rugby team, another thing he owes to his mother.

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**DEDICATED TO THE MEMORY OF NAN WINTER 1927- 2017**

## PREFACE BY IAN BOYD

FSB FRSE, Chief Scientific Adviser at the Department of Environment, Food and Rural Affairs, and Professor in Biology at the University of St Andrews.

Food is not just a necessary part of our lives. It is part of who we are and how we define ourselves. At its most basic, food gives us the calories to exist but food is much more than the currency which feeds the fire within us. The signature of our food choices is written across our bodies for all to see. It defines us morphologically, physiologically, psychologically, socially and culturally. It is therefore not surprising that the increasing appreciation of this centrality of food in our lives is leading to us giving more attention to how our food is manufactured, or grown, and where it comes from. These are all strong messages within this report from my friend and colleague, Michael Winter.

**MICHAEL HAS SKILFULLY PRESENTED A PICTURE OF AN IMMENSELY COMPLEX SUBJECT IN A FEW SUCCINCT CHAPTERS. INFORMED BY HIS TRAVELS TO STUDY FOOD SYSTEMS IN OTHER DEVELOPED COUNTRIES, HE HAS BUILT A PICTURE OF THE BRITISH FOOD SYSTEM.**

The overwhelming message for me is one of change. Before I read this report I would have characterised our attitudes to food as stubbornly unchanging because of deeply cultural, perhaps entrenched, views. But this is not what the evidence tells us. Within generations there are large shifts in demand, some of which seem to be driven by evidence itself, such as the reduced rate of consumption of red meat because of apparent adverse health effects. Doubtless some of this is about how food is part of our lifestyle choices which are an increasingly fluctuating feature of our lives driven in part by the power of advertising.

There is opportunity as well as risk in this. On the one hand, the risk comes because the power to change behaviours sits mainly in the data-rich hands of dominant retailers who, sometimes with more than a touch of ironic innocence, say that they just deliver what their customers want. In reality they have immense power over people's choices about the food they eat. On the other hand opportunities exist because our food choices are often not beneficial for health and there appear to be links between how and what we eat and our social and economic background. Understanding this and regulating how information about the food we eat is presented, and using data to provide assurance to consumers about source and quality are all good things to do and could drive positive change.

The opportunities arising from how food is presented and delivered to people could transform people's lives. They could revolutionise our health and wellbeing as well as reduce our footprint on the planet. But this will only happen if the consumer is centre stage and if all components of the food system are geared to maximising those benefits. At present the evidence shows they are not performing such a function. Indeed one of my conclusions from this report is that our food system is quite seriously broken. It is driven by special interests which, in aggregate, produce outcomes which are poorly optimised for people and the planet.

Michael Winter makes it clear that we are on a journey and, while the direction of travel is hard to predict, government policies can be pivotal and there is a need for government to be pro-active. Leaving issues about food to markets to decide is not sensible. But he is also clear that, in Britain, innovations on farms, which are currently the principal source of our food, is going to be a key part of the food system in future. I agree with him on this and I also agree with him that this will not happen by trying to turn the clock back. Traditional styles of food production only have a place in a modern context if they are embracing the principles of sustainable intensification. But my own guess is that these innovations will not by themselves be sufficient to deliver the food of the future. If there is an abiding message from Michael Winter's analysis it is that the future of food won't look like the past.

## EXECUTIVE SUMMARY

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This report considers how changing food cultures and the need for a healthier human diet might impact on agriculture in the United Kingdom (UK). I look at what people are eating, where and how, and I consider some of the key trends in food consumption behaviour, that clearly feed back into what UK farmers produce and where and how their products are marketed.

Food culture is about the what, where and how of our daily sustenance, it is about the social context and relationships in which eating take place, the meaning and significance we attach to food and what this confers on the meanings we attach to our own lives.

Increasingly, UK food culture is differentiating, even fragmenting, and this reflects a more diverse civil and consumer society. Chapter 2 of the report explores this new food culture under the headings of *availability*, looking at how food is provided and made available through production and manufacturing systems; *acquisition*, examining how food is obtained through shopping and cooking; *appropriation*, exploring how and where food is consumed; and *anxiety* uncovering the way in which food contributes to worry about health and ethical concern about the food system.

Much of the story that unfolds is about the emergence of a global food system and the ever greater role of large food retailers within this. This, coupled with wider societal changes has led to more people buying ready meals and snacks, eating out more, and the decline of the traditional family meal. But there are strong and persistent alternatives to these macro trends epitomised in the slow food movement, public interest in cuisine, the millennials' concern about health and alternative food networks (AFN).

Chapter 3 turns to the contribution of diet to ill health, especially in high income countries such as the UK. The evidence for the strong link between certain food stuffs and ill health through over-weight is explored and found to be overwhelming. Too much saturated fats, sugar, and salt alongside consumption of micronutrient-poor foods contributes to the rise of non-communicable diseases (NCD). Despite the availability of excellent guidelines, the national diet is persistently at variance with the guidance. Why this is so is explored in the final section of the chapter which looks at food availability, portion sizes, energy density, the role of meat, food retailing, eating out, food prices and marketing as key drivers.

Chapter 4 turns to agriculture and the possibility that farmers may face new market changes presenting both challenges and opportunities. The chapter looks at the 'fitness' of the industry to adapt to change and examines some of the market and science-derived opportunities for farmers to diversify the food commodities and products they produce including the breeding of improved varieties of cereals and reviving ancient varieties, and increasing the production of fruit and vegetables. Key to the approach

required is for Sustainable Intensification, as the way ahead for agriculture in a resource-constrained world, to bring human nutrition more fully into its orbit.

Chapter 5 looks at the complex challenge of bringing health and agriculture closer together in policy.

Finally, the last Chapter provides a list of recommendations for policy, practice and future research as follows:

### Policy development

- There is a need to develop a food and farming strategy for the delivery of safe, nutritious and affordable food in the UK, which will allow UK farmers to respond with confidence to the concerns and opportunities presented by civil and consumer society.
- There is a clear policy imperative to support farmers through the transition to post-Brexit agriculture and policy needs to be designed to ensure that a strong, competitive and food-health oriented industry emerges.
- Agricultural policy should be more focused on health and nutrition.
- Nutritional security should be seen as a 'public good'.
- Sustainable intensification policy and research should be broadened to include human nutrition as a core element.
- A new conversion and/or grant scheme should be developed for horticulture.
- There should be policy encouragement for the cultivation and market development of pulses.

### Innovative and dynamic market structures

- Quality assurance schemes should be deepened to include nutritional quality as a key intrinsic aspect of food at their core.
- There is a need to develop stronger and shorter supply chains focused on nutritional qualities of food.
- The lessons of the food sovereignty movement need to be considered to see whether a UK version is possible.

### Enhancing skills and developing communities of practice

- There is a need to facilitate new entrants into agriculture and to up-skill existing farmers, especially smaller farmers. An up-scaling or expansion of the Prince's Countryside Fund Farm Resilience Programme would be particularly welcome in this respect.
- Further development is needed of new communities of practice around food provisioning that can interface with innovative market structures.

## 01. INTRODUCTION

Sooner or later anyone tasked to consider the future runs into a particular problem. Should the ‘crystal-ball gazing’ be an exercise in extrapolation from current trends or a more creative attempt to imagine a better future? Thus it is that most scenario-building exercises tend to come up with a range of scenarios, some projecting ‘business as usual’ and others designed to reflect a set of potential futures, at least some of which will be ‘better’ or ‘more desirable’. This report is not a scenario-building exercise, rather it is a personal reflection on the possibilities and opportunities that lie ahead. There are no formal scenarios, though I refer to some that have been developed by others; nor have I built any sophisticated predictive models, though again I have examined some modelling outputs. I have looked at trends in food consumption and trends in diet-related human health, and I have opted to imagine a particular future, one in which human health takes centre-stage in society’s deliberations about food and agriculture. There are, in fact, plenty of indications that this shift might well happen and there are many influential people – politicians, health professionals, policy-makers – who think it should happen. So, I feel this is a plausible position to take.

My brief was to consider how changing food cultures might impact on agriculture in the United Kingdom (UK) ten or fifteen years hence, in the 2030s so, in Chapter 2, I examine how food cultures are changing. I look at what people are eating, where and how, and I consider some of the key trends in food consumption behaviour, that clearly feed back into what UK farmers produce and where and how their products are marketed. This is the longest chapter of the report because this is a complex story not least because there are seemingly contradictory forces at play: the rise of convenience foods put alongside expensive speciality items, fast food against high-end restaurants, and so forth. But, as we will see, there are discernible trends and these are highly relevant to the chapters that follow. My list of places to visit (British Columbia in Canada, Denmark, the Netherlands and Switzerland) were chosen as:

- Locations where agriculture, in broad and general terms, is similar to the range of farming and horticultural systems in the UK; in other words, there is sufficient similarity of climate and growing conditions;
- Locations where there is reason to believe that consumer and civil society concerns are on a similar trajectory to those in the UK, and perhaps further advanced due to higher incomes and more developed public concerns;
- Locations with sophisticated and advanced food supply chains largely oriented towards domestic consumption;
- Locations where there are a range of well-articulated public pressures on land so that most farmers are obliged to consider non-food uses within their agricultural operations.

However, I did not reckon with one very significant difference between British Columbia and western Europe, the importance of an indigenous or first nation population, formerly referred to as ‘Indians’, which account for some 200,000 people in British Columbia, approximately 5% of the population of the province (Muckle 2014). The museums I have visited and the writings on the first nations I encountered have enriched my exploration of food culture.

In Chapter 3 I turn to human health. I have no background in health or nutrition science and therefore the work undertaken here was a real voyage of discovery. Nuffield awards are designed to encourage travel and normally that means over land and sea but for this aspect of the inaugural Nuffield Farming Lecture it was an intellectual journey into the electronic databases of peer-reviewed science. Often the science surrounding health and diet is presented by the media with a big dose of cynicism and we are all now well used to the headlines – red wine is good for you this year but was bad last year, and so forth! This almost inevitably reflects more on sections of the media’s failure to grasp that science is an iterative and incremental process, rather than on the content of the science itself. Understanding science is always about the content *and* the context, and that has meant a great deal of reading along this particular leg of the ‘journey’. This reading left me in no doubt that, while there are some uncertainties in health science (as in any branch of cutting edge science, especially regarding human subjects), the key messages are incontrovertible. In this case, obesity increases the risk of Cardiovascular disease (CVD), cancer and many other conditions, especially musculoskeletal. The evidence is firmly established and the situation is costly enough in both human and financial terms to warrant major future policy change.

And so in Chapter 4, I turn to considering what changes in food culture, especially those brought about by a stronger emphasis on human health, might mean for agriculture. What might it mean, in practical everyday farming terms, to ‘farm for health’? Again there are no easy answers and indeed there is far less research to consider here than there is on either changing food culture or diet and health. At one level this is

understandable for, as we will also see in Chapter 5 about bringing together health and agricultural policy and in the final short Chapter 6 listing recommendations, many of the actions required to tackle the food health challenge are not for farmers to necessarily take the lead on.

Much of the policy focus hitherto has been on behaviour change amongst consumers and changes in food processing and retailing practices. These initiatives could well have effects on agriculture as the demand for different commodities shifts. But are there more profound possibilities and implications for agriculture? And are there ways in which farmers might be proactive as well as reactive to market changes? In short, can farmers play a creative and positive role in building a new food culture to nourish and sustain human health and wellbeing?

In some ways, the territory of these two chapters is very familiar to me. In my career I have devoted a good deal of attention to what drives farming outcomes and to the interactions between agricultural policy and land management. Whilst working on this report I was also finishing a book with colleagues on contemporary British farming (Lobley et al in press), which drew on a great deal of agricultural research projects conducted over the years, including my co-leadership of Defra's Sustainable Intensification Research Platform (SIP) which concluded in early 2018<sup>1</sup>. This wide ranging and multi-partnered project gave me fresh insights into the state of agricultural science research today and the tremendous capacity we have in this country to research these issues, especially if we also draw on some of the research from other countries that I have encountered in my Nuffield travels, both literal and virtual.

The SIP consortium brought together agricultural scientists, ecologists, economists, social scientists, industry representatives and others committed to exploring ways in which farming might respond to the challenge of feeding a growing world population in an environmentally sustainable way. Our language was dominated by terms such as the yield gap, performance and productivity, integrated farming, and agro-ecology. Farmers and advisors were interviewed, land use changes were modelled, on-farm interventions were made, benchmarking tools were developed, but we gave very little attention to nutritional outcomes. Our focus was in field and landscape not in homes, kitchens, supermarkets or hospitals. There were some notable exceptions, of course, such as the fascinating work at Newcastle University on the healthy properties of minor cereals, referred to in more detail in Chapter 4. But it is fair to say that human health and nutrition was not an important aspect of SIP, nor was it expected to be by Defra. This is why this Nuffield study is of such importance.

I will have more to say about the vexed issue of policy demarcation in the final chapter of the report which calls on Government to align more closely its health, food and agricultural policies.

To conclude with some words about style, I have departed from the normal conventions of academic report writing in my use of the first person. It is the tradition of Nuffield reports that they should be personal accounts. This is not to say that I have not attempted to be rigorous and thorough in my use of evidence, but I have been selective in what I have presented and chosen to emphasise, and that selectivity reflects the importance I have placed on different aspects of the topic.

There are two reasons for this. First, my chosen emphasis has been influenced by my personal position in relation to the topics under discussion, my beliefs and values. I have a strong commitment to farming as a profession and a way of life. I have spent nearly all my life living in rural areas and enjoyed close connections to farming. I have a particular interest in the contribution that small and medium size family farmers play in our rural communities, rural economies and wider society, which I have set out at length elsewhere (Carruthers et al 2013, Winter and Lobley 2016). I am committed to sustainable and harmonious farming, but I consider that there are various pathways to that end – in short I see a role for organic farming and for integrated farming, for the Soil Association *and* for LEAF<sup>2</sup>. I do not see farming as only being about profit and financial return, important though that is, for an activity that produces both landscape and the food on which people's health and wellbeing depends is also about the public good. And if farming is not all about profit, then nor is eating all about calorific consumption; it is about health, wholeness, social justice, integrity and pleasure. Springing from a faith position (see Winter 2012), I want to see a fair, just and healthy society; and food and the land are core to that vision.

The second reason for being selective is the very obvious one that by combining the fields of food culture, human health, agricultural production, health policy and agricultural policy I am engaging with very substantial areas of academic endeavour. The literature on any one of these areas is vast, hence on those grounds alone I have had to choose carefully what evidence to present here. I hope I have been discerning and shown at least some wisdom in my choices.

In order to maintain the flow of my arguments, some material is presented as stand-alone text. This additional text either provides some methodological explanation or, more often, illustrative material, sometimes drawn from my Nuffield travels. Their relevance to the text is hopefully self-evident. I have also attempted to set out 'key findings' at the close of each chapter.

Finally, I was tempted to avoid or limit the use of references but in this case the academic in me triumphed and the customary, rather long, list of references is included at the end of the report.

1 The various SIP reports are, or will be, available through [www.siplatform.org.uk/outputs](http://www.siplatform.org.uk/outputs)

2 Linking Environment and Farming (LEAF)

## 02. CHANGING FOOD CULTURES

Growing up in the 1960s, I was sent off to school each morning after a cooked breakfast, preceded it is true by cereals and followed by toast and marmalade, but still that central cooked element. At my boys' grammar school I was one of the 90% or so who had school lunches. There were no choices and certainly no vegetarian options – every day it was a variant of meat (cottage pie, toad in the hole, liver and bacon, etc), with potatoes and over-cooked veg followed by puddings rich in sugar and carbohydrates (rice pudding, spotted dick, bread and butter pudding, and so on). This was followed by more sweet stuff in the evening when we tucked into bread and butter and a range of cakes for high tea. On Sunday there was always a roast joint of meat. Rarely did we drink alcohol and if we did, on a Sunday, it was cider (a very small glass for the children after the age of around 13). We sat, always, at the table; my father, mother, brother and myself. Rarely did we go out to eat, other than the occasional picnic with more bread and cake! Mercifully I was an active youngster and a combination of football and farm work used up all those calories.

According to Lucy Long, of the United States (US) Center for Food and Culture, “food culture refers to the practices, attitudes, and beliefs as well as the networks and institutions surrounding the production, distribution, and consumption of food”. ([www.lexiconoffood.com](http://www.lexiconoffood.com)) So food culture is about the what, where and how of our daily sustenance, it is about the social context and relationships in which eating takes place, the meaning and significance we attach to food and what this offers on the meanings we attach to our own lives. Food is caught up with gender, identity, aesthetics, ethics, spirituality, ceremony and food cultures vary socially, spatially and across time.

So are my anecdotal memories of any relevance? Was my upbringing representative of even the commuter village in which I lived? In one respect I know it was not. Though my mother cooked the cakes and weekend lunches, my father cooked the breakfast, which was an unusual

gender division of labour in those days. And what of those breakfasts? Heather Arndt Anderson, a food writer, in her book on the history of breakfast argues that “the Victorian era witnessed the birth of Britain’s greatest (perhaps only) culinary achievement: the Full Breakfast” (Arndt Anderson 2013: 16; see also Spencer 2011). Although it was perhaps not quite the ‘full English’ as we know it; in 1840, Dr A.B. Granville toured the spas of Britain: “at Scarborough, Granville enjoyed an excellent breakfast at the Bell Inn of new-laid eggs, cold beef, raised pies, shrimps and other potted fish, tea-cakes and muffins...” (Burnett 2004: 72). Writing of Britain in the 1920s, John Burnett talks of “solid breakfasts, where porridge was followed by eggs and bacon, were beginning to give way to American-style cereals and toast” (Burnett 2004: 194). So when, if ever, was the ascendancy of the ‘full English’? Of course, this is a question that raises many more questions. Ascendant for whom, ascendant where? Walk into an average hotel in Britain and it is in the ascendancy still. If you were to enter a working class home in the nineteenth century, eggs and bacon would have been a rarity.

### The Potlatch: Ceremony among the First Nations on the Northwest Coast of Canada

A potlatch is a gift-giving feast often to commemorate a death and, in the past, lasting for 3-4 days, practised by indigenous peoples of the Pacific Northwest Coast of Canada and the United States.

“Finally came the feast. The host group put on the customary show of luxury, lavishing large amounts of food upon their guests – salmon, cod, and halibut, cakes made from pounded roots, seaweed and kelp dishes, all kinds of berries, and of course the ever present dish of eulachon oil, rendered from small smelt-like fish, for dipping or pouring over food. The deceased chief’s favorite foods were also served, and portions were thrown into the fire so that his spirit could enjoy the spirit of the food.” (Beck 1993: 60)

**“MOST OFTEN LUNCH IS SIMPLY LUNCH....HOWEVER, EVERY SO OFTEN, A CHEF, A DISH, A MEAL, TRANSPORTS US, OFFERING AN EXPERIENCE BEYOND THE PLATE. IF FOOD CAN BE USED AS A MEDIUM FOR CREATING AN EMOTIONAL RESPONSE OR AN ALTERED PERSPECTIVE, IF IT CAN BE USED TO MAKE THE DINER PAUSE AND THINK....THEN THESE OCCASIONS SHOULD BE CONSIDERED COMPLEX, AESTHETIC EXPERIENCES, WORTHY OF OUR TIME AND ATTENTION.” (RAVIV 2018: 208)**



In 1982, MAFF published a report based on National Food Survey (NFS) data for the years from 1975 to 1980. Within the painstaking detail we detect a decline in the great English breakfast even in the 1970s:

“The real price of uncooked bacon and ham fell steeply during the period under review, but purchases increased only from 3.99 oz per person per week in 1975 to 4.20 oz in 1980, in contrast to the rapid increase in pork. There is some substitution between the two, but bacon has been adversely affected by the decline in the cooked breakfast, continuing decline in the traditional breakfast...

Household consumption of eggs continued its long-term downward trend despite steady decreases in their real price; it fell from 4.66 eggs per head per week in 1970 to 4.14 in 1975 and 3.69 in 1980. Very little of the decrease in consumption between 1975 and 1980 can be explained by price and income changes; the one assignable cause is a steady weakening in consumer demand at the rate of about 2½ per cent per annum, probably associated with a continuing decline in the traditional breakfast”. (MAFF 1982: 14-15)

### The National Food Survey

The National Food Survey (NFS) is world’s longest-running continuous household survey Begun in the 1940s, its initial purpose was to monitor the adequacy of the national food policy, in wartime, on the diet of urban ‘working class’ households (Defra 2014b). Consequently, the Ministry of Food began to collect records of food purchases and expenditure from around 1,500 “working class” households in seven towns and one rural area (Defra 2014). Although there have been some changes over the years, the basic methodology of households keeping a diary of what they purchase and how much they spend, has continued. For example in 2001, the NFS was integrated into, the Expenditure and Food Survey (EFS), which provided more reliable estimates of food and drink eaten out than its predecessor (Defra 2014). In 2008, EFS was replaced by the Living Costs and Food Survey (LCS), with Defra becoming responsible for the ‘Family Food’ component (Defra 2014; UK Data Service 2018). Family Food differs from NFS in that only food purchases are measured (Defra 2014).

In a publication that is otherwise so dominated by numeric data on the consumption of constitutive food items, the recourse to deductive reasoning and assumption is notable. The NFS can tell us how many eggs are eaten but not how they are cooked or the meal context in which they are consumed. The decline of breakfast is assumed or self-evident as it seems to have been in the 1920s. Fortunately some ‘harder’ data are available elsewhere. A remarkable survey of eating habits, based on two face to face interview surveys (summer and winter) both with over 4,500 people, undertaken in 1955/56 showed that in Great Britain in 1955/56 between 43% and 69% of people, depending on the day and season, consumed a cooked breakfast (Warren 1958). Moreover, there is no evidence, as some might suggest, that the greater incidence of heavy manual work at that time might account for the higher level of cooked breakfasts. Indeed on an average day only 51% of ‘lower’ class men and 32% of ‘lower’ class women ate cooked breakfast compared to 64% and 39% respectively of ‘middle’ class men and women (Warren 1958). A comparative survey was undertaken for 2012 which showed that the decline in the full English is indeed very real, with just 6% of respondents, or 19% at weekends, eating cooked items for breakfast (Yates and Warde 2015). We will return to this study later.

The breakfast story reminds us that evidence, as usually understood in science, about food culture is highly diverse. Eating is both universal and intensely personal so everyone has their own story to go on, whether merely anecdotal, experiential or more systematically ethnographic. Survey-based data where they exist may or may not answer broader cultural questions. And this is only the beginning in terms of either evidence sources or topic for study. What is clear is that, increasingly, UK food culture is differentiating, even fragmenting, and that this reflects a more diverse civil and consumer society. Indeed for Mason “diversity appears to be the only adjective to describe British food culture at the present time” (Mason 2004: xi). There are ethnic, cultural and economic factors at play, and what Panayi (2008) has termed the ‘spicing up’ of British food. The retail sector itself both responds to and helps shape changing consumer tastes and requirements. Trends in UK consumer demand reflect price sensitivities, consumer concerns and changing patterns and practices of food consumption.

There is a growing concern expressed by lobby groups and commentators in UK civil society over agricultural production processes (e.g. farm animal welfare, use of pesticides, etc.), interest in provenance (food miles, localism, etc.), and concerns over health and nutrition. It is important to note, however, that these widely articulated concerns do not necessarily translate into negative public opinions of farmers. A Defra (2008) survey found that 79% of the public believed a thriving farming industry in England was very important and 19% quite important; and 88% had a very favourable (49%) or quite favourable (39%) view of farmers (Carruthers et al 2013).

Drawing, in part, on social scientific investigations of consumption by Alan Warde (2016, 2017), I have identified the following key themes for further exploration in the remainder of this chapter:

- **Availability** – the manner in which food is provided and made available through production and manufacturing systems to a point of retail;
- **Acquisition** – the manner in which food is obtained. This includes shopping and retail but also household issues such as budgeting and cooking;
- **Appropriation** – the manner in which food is consumed, including location and performative aspects of eating;
- **Anxiety** – the manner in which food contributes to worry about health and ethical concern about the food system.

## AVAILABILITY

The processes by which food gets to our supermarket shelves has been the subject of intensive study over many decades with a wide array of academic metaphors – systems, networks, chains, regimes – deployed in attempts to shed light on the complexities. This is not the place fully to review this literature and because so much of it is about food *production* it is a little at the margins of our focus here on food consumption. But there are some important issues that need highlighting because they feed into the concerns and anxieties that are fuelling change and contestation within the political economy of food.

Three issues, which I will look at in turn, are of particular importance to food culture and food consumption:

- The dependence on global trade;
- The role of manufacture and processing;
- The role of finance capital.

### The Recent Emergence of a Global Food System

Hobsbawm (1995) and Cain and Hopkins (1993) have shown how it was not until as recently as the mid-19th Century that the mass transportation of foodstuffs gave rise to a new international economic order based on colonialism and trade. But even in the late 19th Century, lands very close to the European heartland remained outside the international trading network:

“Morocco only granted foreigners the freedom to trade throughout its territory in 1862; Tunisia did not hit on the idea ... to speed its slow progress by means of loans until after 1865.” (Hobsbawm 1995: 68)

According to Goodman and Redclift (1991), the turning point in the development of a world agricultural system came only with the economic (and political) dominance of the US on the world scene in the period immediately following the Second World War.

### Global Trade

Such is the growth of trade that the UK is now both a significant exporter as well as continuing its long tradition of being a major importer. In 2016, the destinations for UK exports were the Irish Republic (17%), USA (11%), France (11%) and the Netherlands (6.5%); the most important countries of origin for the UK’s food imports were the Netherlands (12%), Irish Republic (10%), France (10%), Germany (9.3%) and Spain (7.1%) (Defra (2017a).

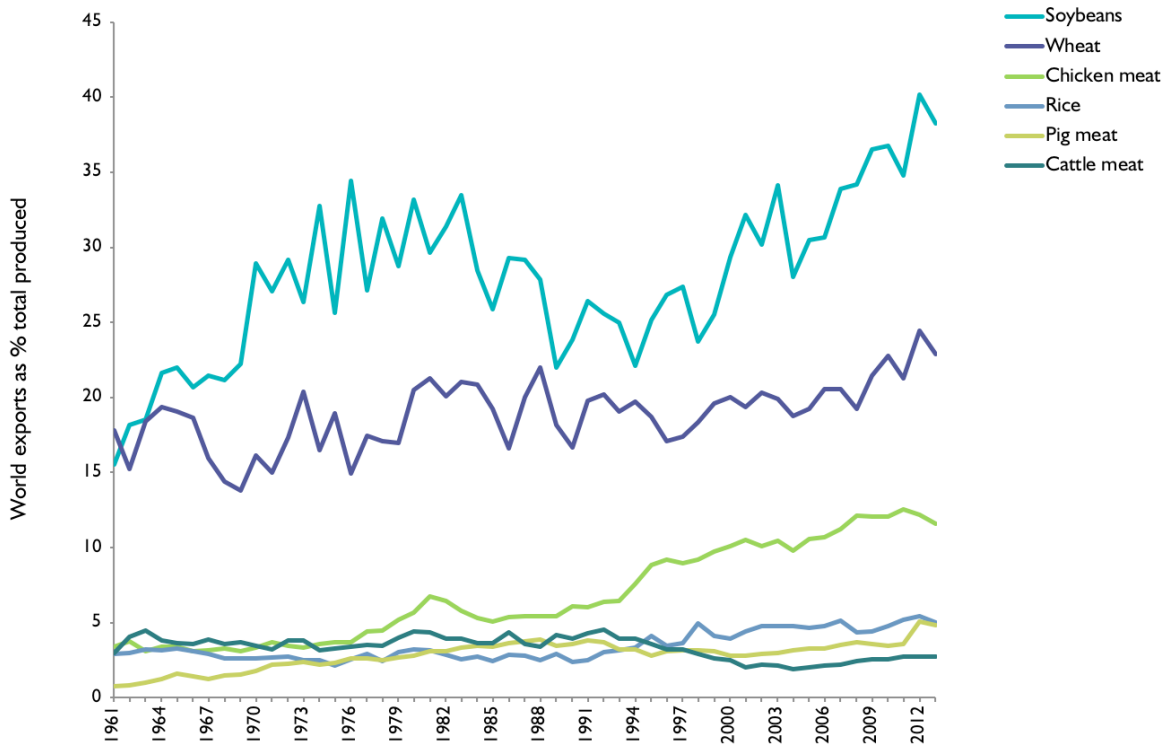
Figure 2.1 shows the extent of global trade in some key commodities. The main conclusion from the graph is perhaps the surprising one, given the attention that is given to trade by commentators, that a relatively low proportion of commodities are traded, less than 5% of cattle meat for example. It remains the case within the global food system that nation states tend to produce significant proportions of their own food commodities. Given that commodities are both bulky and perishable this is not entirely surprising.

However, there are three important caveats to this general observation. First, there are exceptions to this, such as soya beans as in Figure 2.1, and oil palm, where the proportion traded rather than retained for domestic use has increased. Secondly, considering proportions alone hides a strong growth in the volume traded as shown in Figure 2.2. Thirdly, while data on commodities like this are well known and often used, a more meaningful set of data would cover food products.

This, of course is very complicated to measure in the terms used in Figures 2.1 and 2.2. Consider another crop, barley (the 4th most widely grown cereal after maize, rice and wheat), which I return to again in Chapter 4. Approximately 20% of barley grown globally is exported, 53% is used for animal feed and 15% for processing, mostly into malt for alcoholic beverages (Newton et al 2011). One such beverage, Scotch whisky, accounts for 20% of UK food and drink exports (see Figure 2.3 for the food import/export balance in the UK and Figures 2.4 and 2.5 for other key UK trade balances).

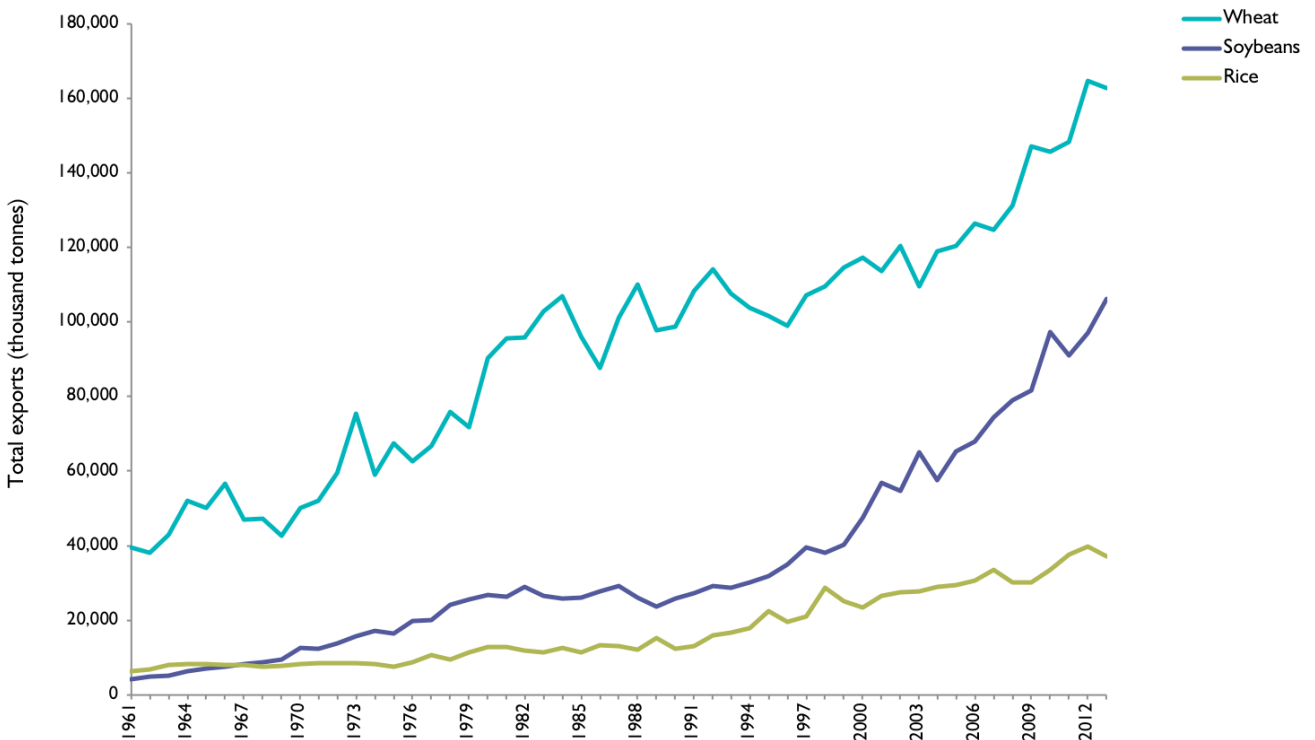
I will return to the issue of trade deficits in Chapter 4 as the potential opportunities for UK agriculture these represent are of such significant importance.

Figure 2.1 World Exports as a Percentage of Total World Production – Selected Crops and Livestock, 1961-2013



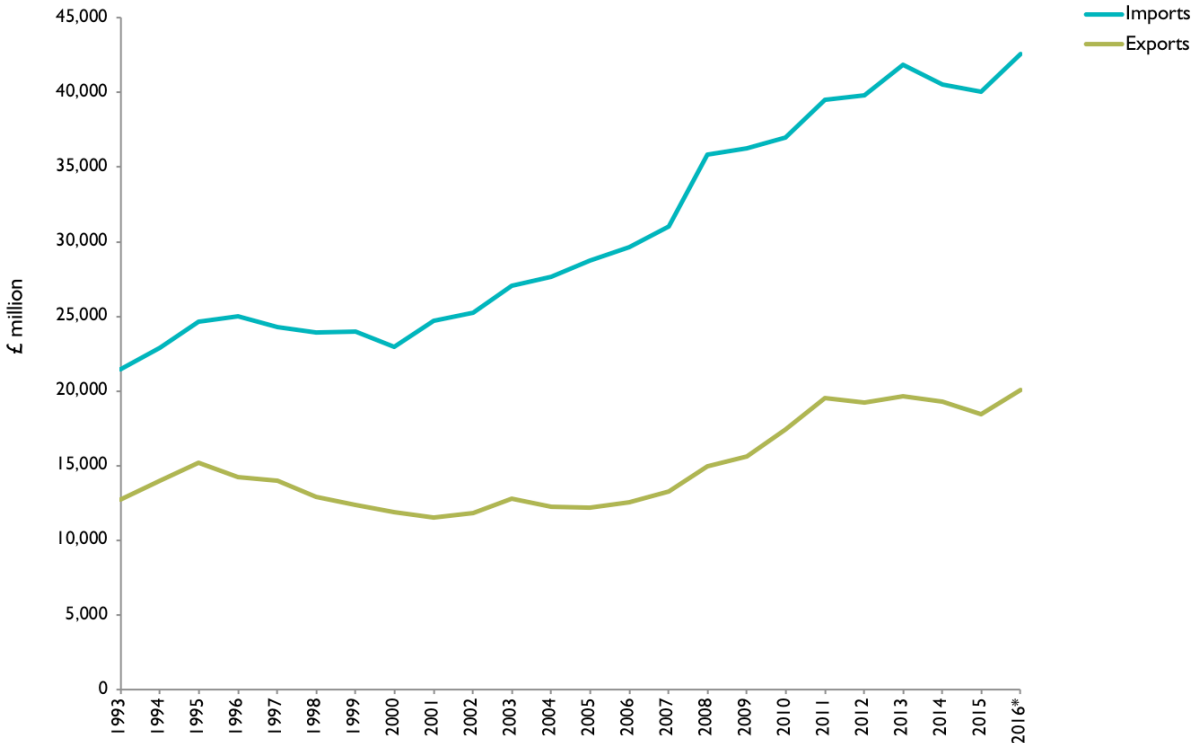
Source: FAO Statistics

Figure 2.2 Total World Exports – Selected Crops (thousand tonnes), 1961-2013



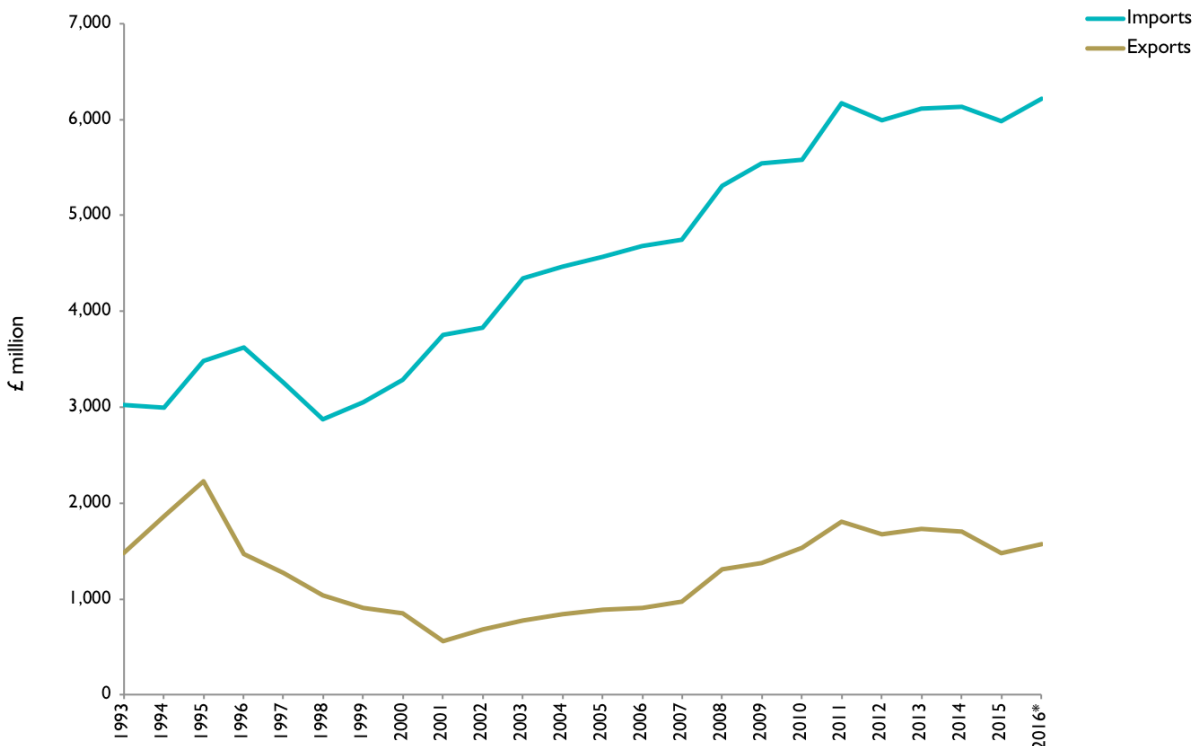
Source: FAO Statistics

Figure 2.3 Trade in Food, Feed and Drink, UK (£ million at 2016 prices)



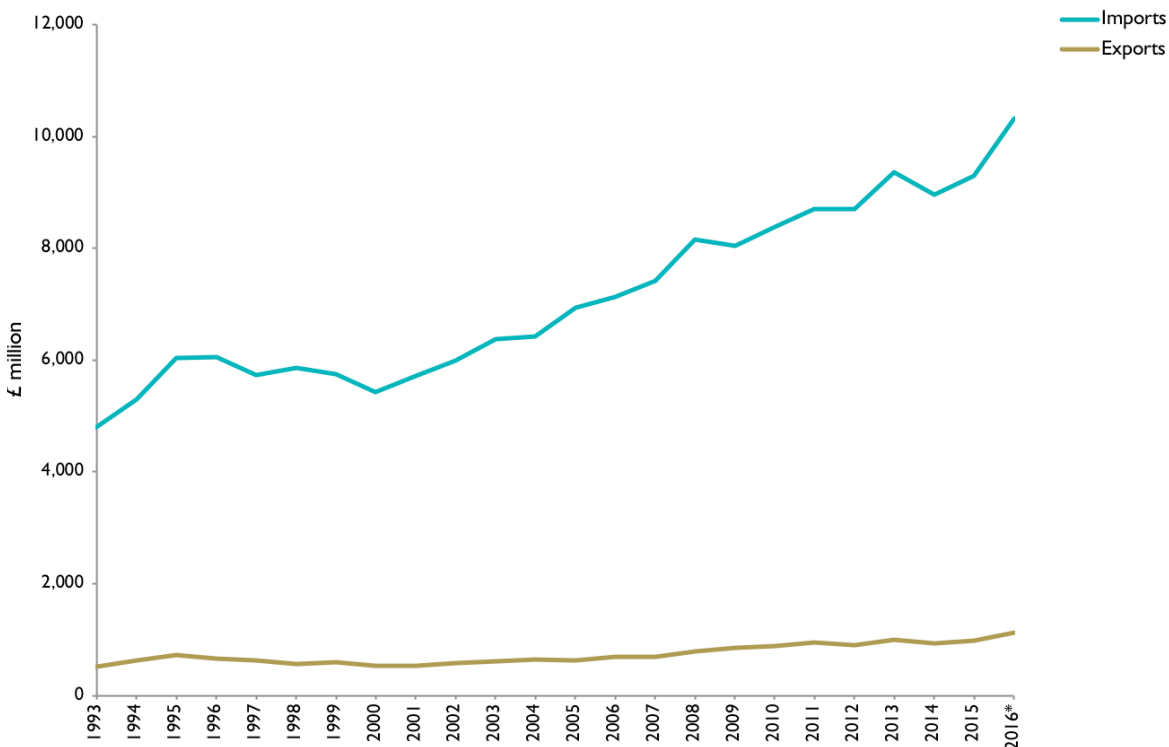
Source: Defra et al (2017a)  
\*provisional data

Figure 2.4 Trade in Meat, UK (£ million at 2016 prices)



Source: Defra et al (2017a)  
\*provisional data

Figure 2.5 Trade in Fruit and Vegetables, UK (£ million at 2016 prices)



Source: Defra et al (2017a)

\*provisional data

The implications of the growing globalisation of food brought about by the expansion of trade have been explored in considerable detail by some researchers, especially in the aftermath of the global food price increase in 2007 to 2008, where the nominal prices of almost all food commodities increased by more than 50% (Tadesse et al 2014). Khoury et al (2014) assessed global trends over the past 50 years in the richness, abundance, and composition of crop species in the food supplies of 152 countries comprising 98% of the world's population from 1961 to 2009. Whilst, national per capita intake of food supplies in terms of calories, protein, fat, and weight increased, the dominance of the most significant commodities decreased:

“As a consequence, national food supplies worldwide became more similar in composition, correlated particularly with an increased supply of a number of globally important cereal and oil crops, and a decline of other cereal, oil, and starchy root species. The increase in homogeneity worldwide portends the establishment of a global standard food supply, which is relatively species-rich in regard to measured crops at the national level, but species-poor globally. These changes in food supplies heighten interdependence among countries in regard to availability and access to these food sources and the genetic resources supporting their production, and give further urgency to nutrition development priorities aimed at bolstering food security.” (Khoury et al 2014: 4001)

### The Fragility of Global Food

“The events of the 2008 global food crisis provide (circumstantial) evidence that food trade interventions may result in a fragile global food system. For example, in response to the 2008 food-price spike, 6 out of the top 17 wheat exporters (accounting for 90% of total trade) imposed some degree of trade restrictions, while 4 out of the top 9 rice exporters did so.” (Puma et al 2015: 4)

Due to the sustained investment in producing more high-yielding starchy staples, as well as sugar and oil, linked to the growth of trade, we have a situation where of the 5,000 to 70,000 plant species documented as human food just three – rice, wheat and maize – provide half the world's plant-derived energy measured in calories (Biodiversity International 2017). There is a profound irony here in that trade clearly opens up the range of foodstuffs available.

Those of us living in prosperous Europe cannot easily imagine a world, or a diet, without a wide range of foodstuffs not grown in temperate climes from bananas and oranges to coffee and tea. Nor can we easily envisage supermarkets without what at times appears to be an almost bewildering array of choice. That choice is in many respects real, in terms of both competing brands and availability of a wide range of high-value niche products, but so too is the underlying reality that the range of crops on which we rely is narrow.

Breakfast cereals provide a marvellous example of the complexities at work – for all the appearance of choice that the large number of mainstream processed cereal brands offer, most have been traditionally based on one of the three big crops – wheat, rice or maize – with plenty of sugar as well. Therefore they are inherently linked to global commodity trade and the choice of brands belies the underlying sameness of the dietary offer. This sameness is in sharp contrast to the greater variety of foods used in diet before the globalisation of trade, particularly in the case of hunter-gatherer communities where, driven by the necessity of responding to seasonal availability, an extraordinary diversity of foods could be eaten. Of course, this was environmentally determined and the dietary range of first nations' peoples was significantly less in more austere environments such as the arctic north. I will return to some of the implications and possibilities of dietary diversity in Chapters 3 and 4.

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### BC First Nations Traditional Diet

“First Nations people incorporated many types of animals into their diet. Seafood, particularly salmon...oolichan, sturgeon, herring, trout, and cod. Clams, mussels, cockles, crabs, and urchins...seals, porpoises, and whales...grouse and ducks. Over 200 species of plants...roots, bulbs, tubers, stems, shoots, buds, leaves, and fruits all provided essential nutrients. Some groups also consumed seeds, nuts, and the inner bark of certain trees. Recent research indicates that among coastal groups alone, wild plants used for food include about fifty species of berries...twenty-five species of green vegetables,...several species of marine algae...and about fifty (other) species of plants.” (Muckle 2014: 61-62)

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### Manufacture and Processing

As just intimated with regard to breakfast cereals, another characteristic of how food is made available within the contemporary food culture is the extent to which raw food commodities, once primarily processed only through cooking and storage within a household context, are now increasingly processed in advance.

What does food manufacture involve? Well of course it varies enormously from product to product. Some manufacturing processes are industrialised versions of ancient practices, still using the same principles. The processing of dairy products into butter, cheese, cream, yoghurt, etc. is a ready example. Brewing and distilling of alcoholic drinks is another. There are some products – fresh fruit and vegetables are the obvious examples – where packaging is the key process involved, although there may also be chemicals applied to maintain freshness or delay ripening. Beyond that, there is the growth in production of convenience foods ranging from an early innovation – canned food – to the more recent production of meals ready to heat up or the trend towards prepared vegetables, such as bagged and washed salad, or ready to steam diced carrots, onions, sliced mushrooms, and so forth.

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“For most foods, the shift away from domestic production in the home to industrial processing is a relatively recent event, dating from after the mid-1800s or even a good deal later. This is true for preserved meats, milk and cheese, bread, jam, and other foodstuff...however: grinding of grain in private enterprises specifically devoted to this task occurred much earlier.” (Winson 2013: 97)

“By the mid-1980s freezers were in many households, but the sales of microwave ovens were particularly rapid and they became ubiquitous in most houses during the 1980s. Foods designed for the freezer and microwave ovens made it easier and quicker to prepare a meal than ever before – a cause, or an effect, of convenience becoming an important influence on food choice.” (Foster and Lunn 2007: 193)

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The processes required in these preparations may involve an industrialised version of traditional cooking where traditional ingredients are taken, prepared and part-cooked. But industrialisation can go further than this with product fractioning and fabricated foods. In these processes, food ingredients are broken into their constituent parts (proteins, carbohydrates, etc) and recombined to produce a range of synthetic food products such as confectionery products and soft drinks. For example, in 1938 less than 5% of industrial use of sugar was for soft drinks. Even by 1965/66 it was only 12%, but by 1989 it was nearly 23% (Fine et al 1996).

Then take the humble potato. Whilst many are still sold for home cooking, and that would have been the case for the overwhelming majority of potatoes a hundred years ago, there has been a revolution in how potato-derived foods are made available with key developments being:

- The development of potato crisps (late 19th Century);
- The development of frozen 'ready to fry' French fries or chips (1950s);
- The industrial modification of potatoes to isolate potato starch for use in processed foods and non-industrial products (1970s).

Even where the processing of some foods outside of the home, such as in the case of the milling of flour and baking of bread, is longstanding the characteristics of milling and baking have changed dramatically over time, particularly with the introduction of roller mills in place of millstones powered by wind, water or steam. Technology changes what we eat:

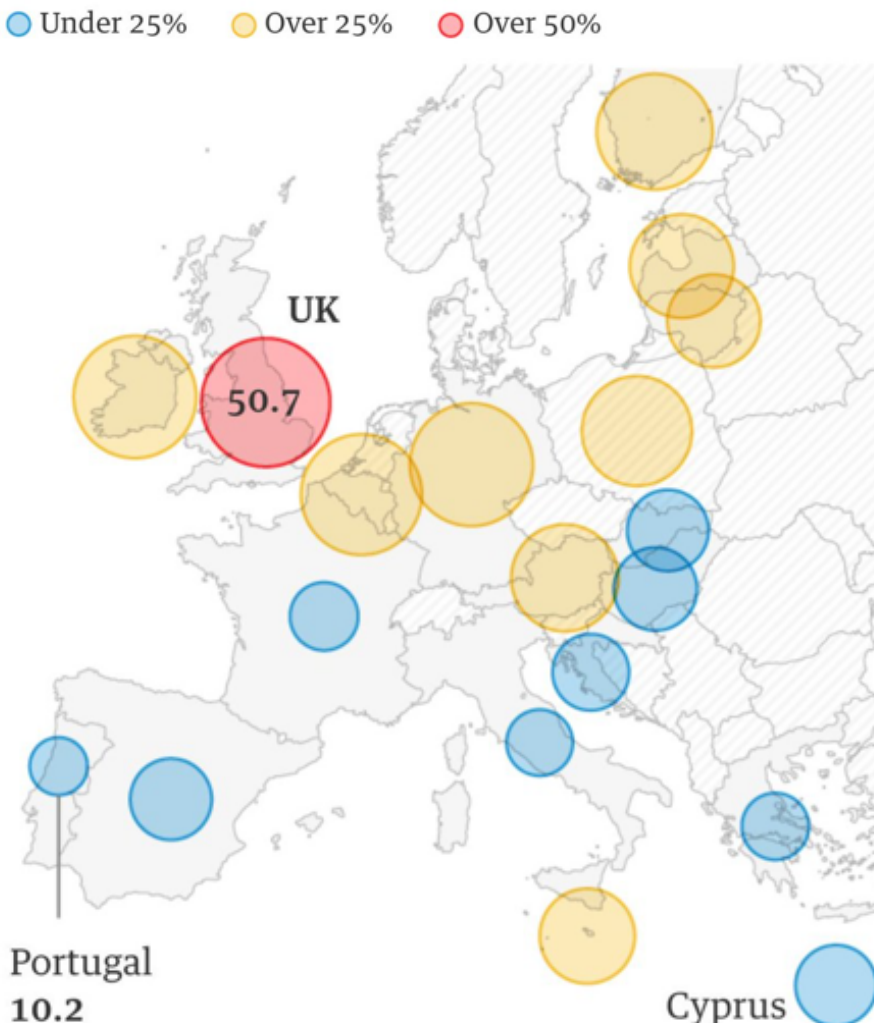
"... the new method was radically different from stone milling. In stone milling the pulverizing of the wheat was

performed in one operation producing a coarse wheat meal containing all parts of the grain mixed together. To obtain fine white flour the mixture was passed through sieves of varying mesh. But by using rollers, the process became one of gradually reducing and separating the different portions of the wheat in various stages. The first set, called the break rollers, split open the husk, and the floury part, known as middlings, was sifted out from the bran. It then passed through further pairs of fluted rollers, after each of which the stock was again sifted and any remaining coarse material removed. The chief advantages of this system were that it was mechanically more efficient, requiring less power to grind the same amount of corn, and produced a larger proportion of fine white 'patent' flour, whereas millstones produced more coarse 'household' grades." (Perren 1990: 423-424)

On the current role of processed food in our diet see Figure 2.6.

The implications of this particular move to mass production I will return to in Chapter 3.

Figure 2.6 The Role of Processed Food in our Diet. Ultra-processed food as a % of household purchases:



## Finance Capital

Trade is “oiled” as much by the lubricant of money as by fossil fuel based transport. Futures markets and the deployment of a range of financial mechanisms dominate food trade, and arguably have little to do directly with the physicality of transport or processing. As long ago as 1976, it was shown that a cargo of 25,000 tons of soya beans exported from the USA to Germany passed through the books of 27 traders, not physically but on paper, before it reached its destination and prior to processing (Pinninger 1987). But in the coffee market, one kilogram of coffee was estimated to be speculatively traded no less than **8,000** times (Breger Bush 2012). In the USA, financial speculators’ share of the trade in wheat futures market increased from 12% in the mid-1990s to 61% in 2011 (Worthy 2011).

“Futures exchanges for agricultural commodities were established in London in the eighteenth century and in the US in the nineteenth century, in part as an outcome of globalized trade. These markets provided a means by which buyers and sellers of contracts could purchase and sell agricultural commodities for delivery at a date in the future, and could hedge their risks against the uncertainty of agricultural production and long distance trade. Over the course of the mid- to late-nineteenth century, the practice of agricultural futures trading for grains became widespread in the US and later in Canada.” (Martin and Clapp 2015: 552)

## ACQUISITION

I now move closer to the consumer in turning to what has often been called the retail revolution (although acquisition covers more than supermarkets as we will see). In the UK, the large multiples more than doubled their share of total retail sales (food and non-food) from 22% to 56% between 1950 and 1982 (Wrigley 1987). In 1950, independent grocers accounted for 78% of UK grocery sales, but by 1984 their market share had tumbled to below 30% (Wrigley 1987), and by 2015 to less than 10% (Defra 2017a). Meanwhile, the growth in market share by the multiple food retailers increased from 23% in 1950 to 57% in 1990 (Burt and Sparks 1994) and to 93% in 2015 (Defra 2017a).

Table 2.1 Grocery Market Shares of Leading Companies in the UK (percent of total sales)

	1979	1979	1990/91	2000	2010	2017†
<b>Tesco</b>	7.2	13.6	12.0	25.0	30.6	27.5
<b>Sainsbury</b>	6.1	11.9	12.4	17.9	16.6	16.1
<b>Asda</b>	1.5	7.3	8.4	14.1	16.9	15.6
<b>Morrisons*</b>	-	-	1.7	4.9	12	10.4
<b>Aldi</b>	-	-	-	1.5	3.1	6.9
<b>Co-ops / The Co-operative</b>	-	17.4	10.9	5.4	6.5	6.1
<b>Waitrose</b>	-	1.3	2.0	2.7	4.2	5.2
<b>Lidl</b>	-	-	-	1.3	2.4	5.0
<b>Iceland</b>	-	-	1.4	2.8	1.9	2.2
<b>Total</b>	<b>14.8</b>	<b>51.5</b>	<b>48.8</b>	<b>75.6</b>	<b>94.2</b>	<b>95.0</b>

Sources: Smith and Sparks 1993 (using Akehurst 1984 and Mintel 1992) for 1970-1990 data, and food deserts (2017) (using Kantar and IGD) for 2000-2017 data); Lobley et al in press.

† As at July 2017

\* Morrisons bought Safeway in 2004. Safeway had held 10.4% of the market share in 2000.

Note that the columns in the table illustrate general trends but are not directly comparable as they originate from different sources.



This was a permanent revolution. Whilst Table 2.1<sup>3</sup> shows the dramatic expansion in the share of grocery sales by the big supermarkets, recently there have been a spate of new trends. Globally and in the UK, supermarkets are losing market share to e-commerce, discounters, convenience stores, cash and carry and even through some return to traditional formats (Lobley et al in press). Kantar Worldpanel (2017a) predict that by 2021 supermarkets will account for just 48% of global spend on so-called Fast-moving Consumer Goods (FMCGs), which includes food, compared to 53.2% in 2015 (Table 2.2).

Table 2.2 Global Market Shares in FMCGs, 2015-16

Channel	Global value share 2015	Global value share 2016	Percentage value increase (yoy)
E-commerce	3.80%	4.6%	26.0%
Discounters	5.5%	5.6%	5.1%
Convenience	4.6%	4.6%	4.1%
Cash and Carry	1.1%	1.4%	4.1%
Hypermarkets and supermarkets	53.2%	52.0%	0.7%
Traditional	26.1%	26.1%	3.2%
Door to door	0.8%	0.8%	0.7%
Drugstore and pharma	0.6%	0.6%	0.90%

Online sales accounted for 7.3% of the UK grocery share in 2016, which was second only to South Korea in terms of the proportion of groceries bought online (Kantar Worldpanel, 2017b). The retail revolution has been accompanied by changes in the purchasing patterns of consumers. These changes are highly significant and together amount to a significant dietary change over the last half century. Looking at Figures 2.7 to 2.10 together (see also Defra 2017b, 2017c, 2017d), the headline findings for the changes since 1974 are clear:

- A decline in whole milk consumption, which is far from fully compensated for by the increase in semi-skimmed milk;
- Current consumption of fresh potatoes at not much more than a third of 1974 levels;
- A decline in the consumption of fresh fruit and vegetables;
- Dramatic changes in how meat is consumed;
- More food eaten outside the home, which is far less well captured in surveys than household food and tends to be of a different 'type' and nutritional composition.

### Changes in Consumer expenditure

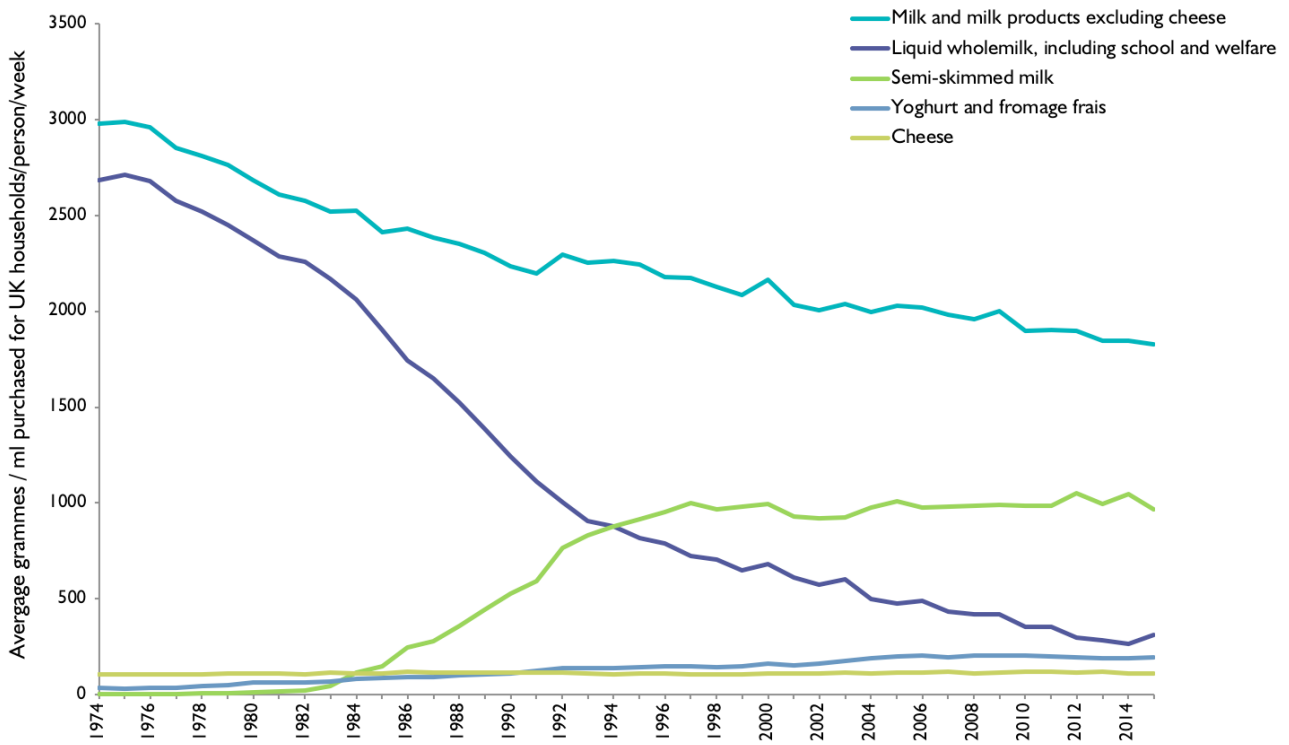
2015-2016 Changes in Consumer expenditure on food, drink and catering:

- Increased spend by 2.1% to £203 billion;
- Household food expenditure rose 0.3%;
- Expenditure on alcoholic drinks rose 4.0%.

Excluding the effects of inflation, consumers spent 1.3% less overall in 2016 than in 2007, 2.5% more on food and 3.5% more on alcoholic drinks but 12% less on catering. Source: Defra 2017a: 105.

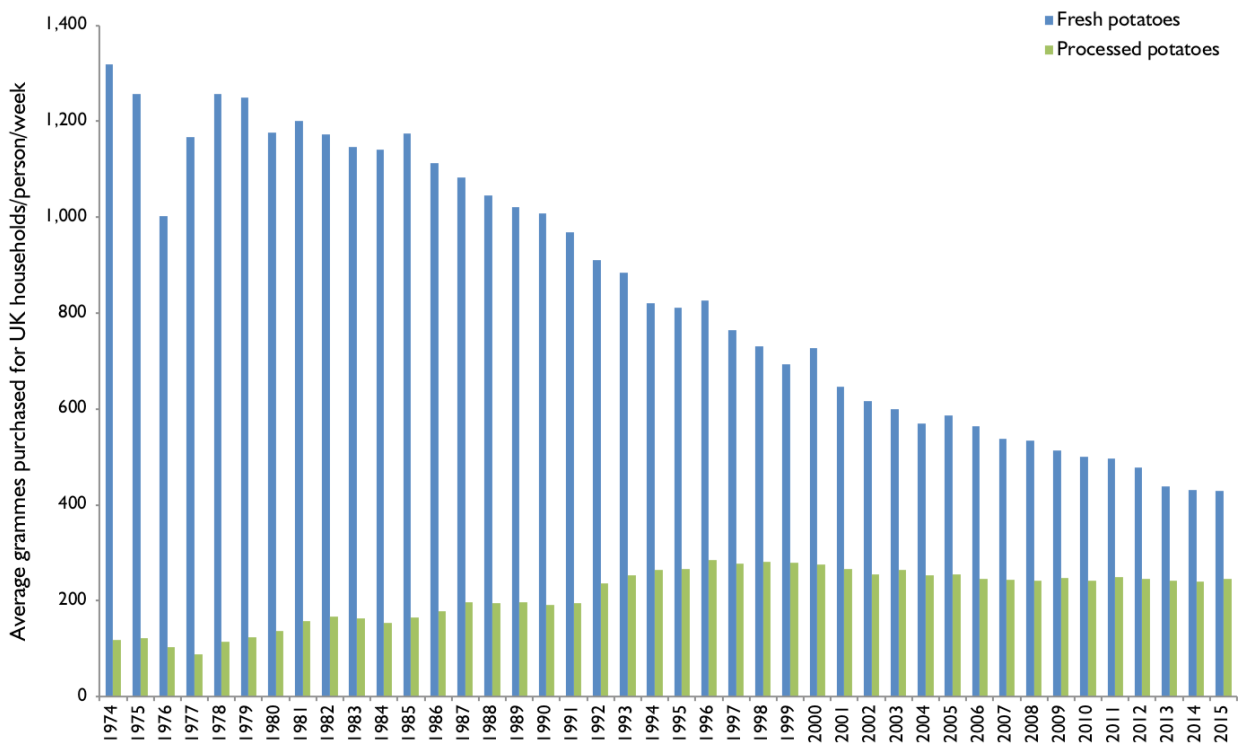
<sup>3</sup> The possible merger of Sainsburys and Asda under discussion at the time of writing this report would of course increase concentration still further.

Figure 2.7 Millilitres of Milk Purchased per UK Household (per person per week)



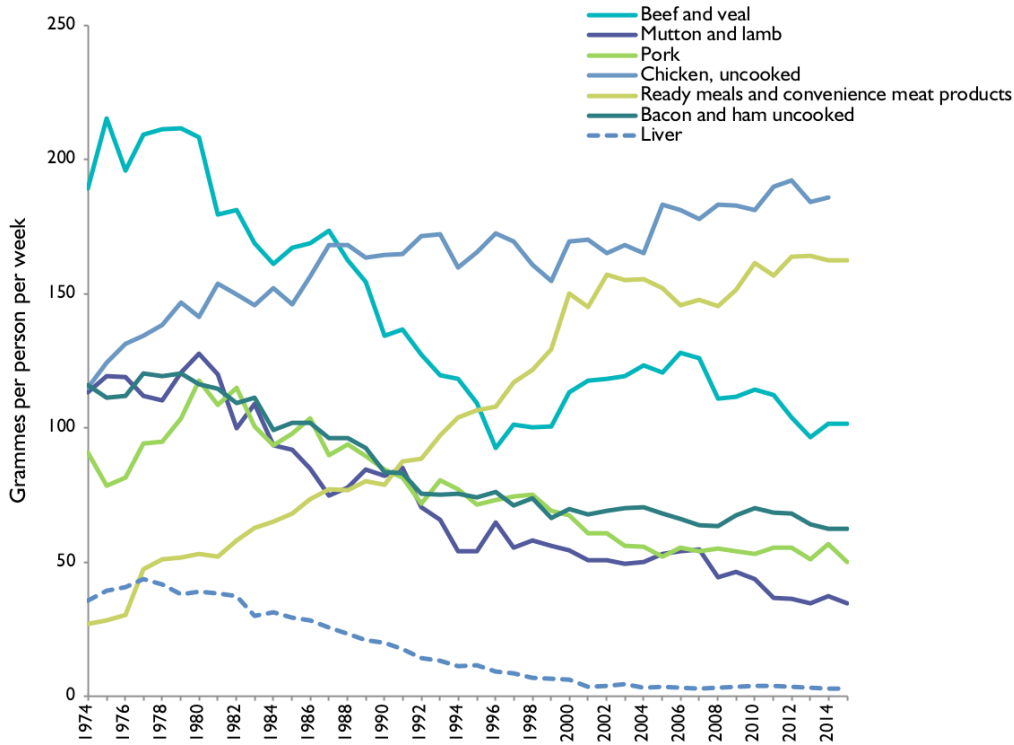
Source: UK Data Service (2018)

Figure 2.8 Changing Consumption of Potatoes



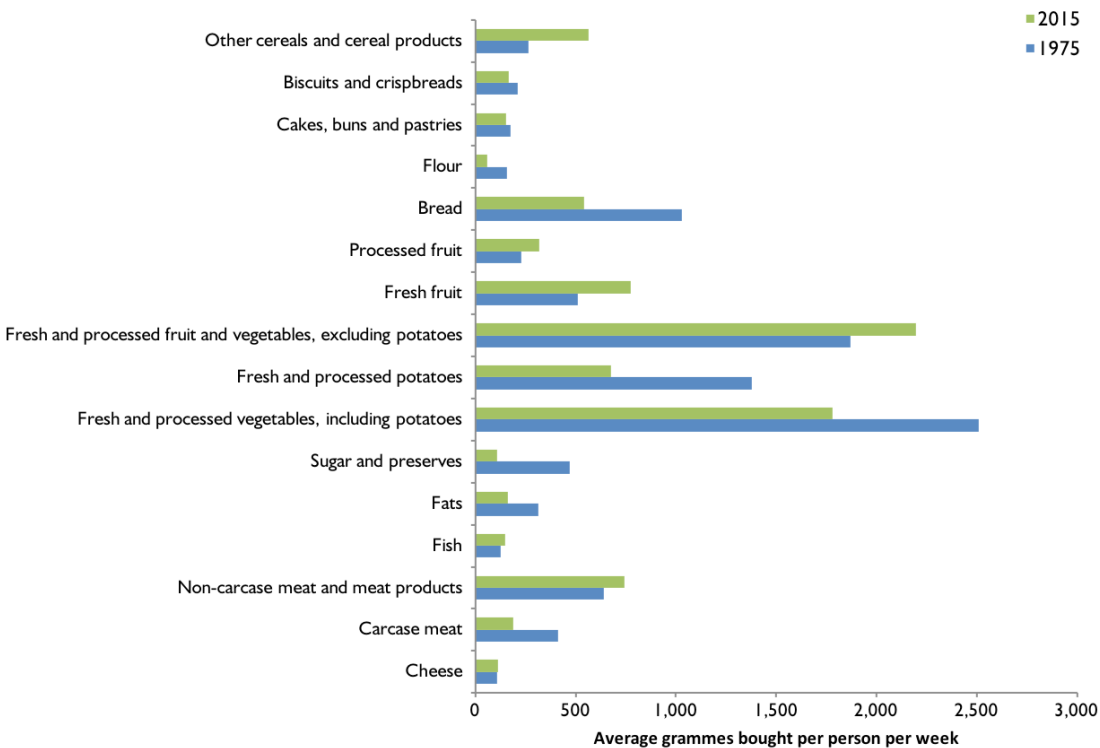
Source: UK Data Service (2018)

Figure 2.9 The Changing Pattern of Meat Purchasing by UK Households (selected products: grammes per person per week)



Source: UK Data Service (2018)

Figure 2.10 A Diet in Transition: Changes in Selected Items in UK Households



Source: UK Data Service (2018)

Of all the trends outlined here, the meat story is a particularly instructive one. In the UK, far less meat is now cooked at home in a traditional way. As consumer taste has changed, so consumption has swung away from a combination of home cooked joints, then Sunday roast, supplemented by a range of other traditional meat dishes on week days including cheaper cuts of meat and offal, to more ready meals and convenience and meat products. Whereas global demand for meat has steadily increased in recent years (Vranken et al 2014), in the UK it has plateaued or declined although it is still well above global averages. This is broadly in line with consumption rates in other rich or industrialised countries.

For example a MINTEL Report (2005) shows that although Britons use ready meals more frequently than the French do, the penetration of such items in the population is similar respectively, in the last 12 months) and attitudes to cooking and convenience are also similar...The pattern overall suggests that eating and food preparation takes up considerably less time in the USA than in Europe. Whether this is a harbinger for the future of Europe is uncertain; with the exception of France, all the other countries are clearly moving towards a smaller allocation of time to food-related activities." (Warde et al 2007: 368-69)

**AS VRANKEN ET AL (2014) PUT IT, "ON THE DEMAND SIDE, CONSUMER AWARENESS ON HEALTH, ANIMAL WELFARE AND GLOBAL ENVIRONMENTAL CHANGES MIGHT REVERSE THE TENDENCY OF INCREASING MEAT CONSUMPTION".**

They cite, for example, a study of French households showing a positive relation between education level and reduced meat consumption (Allais et al 2010). Warde et al (2007), through the use of time-use diary data, examined changes in eating habits in France, UK, USA, Norway and the Netherlands between the early 1970s and 2000. As Figures 2.11 and 2.12 show, there was a decline in the time devoted to food preparation across all of the countries and time spent eating at home declined, except in France. In the USA, time devoted to domestic food preparation and consumption is minimal:

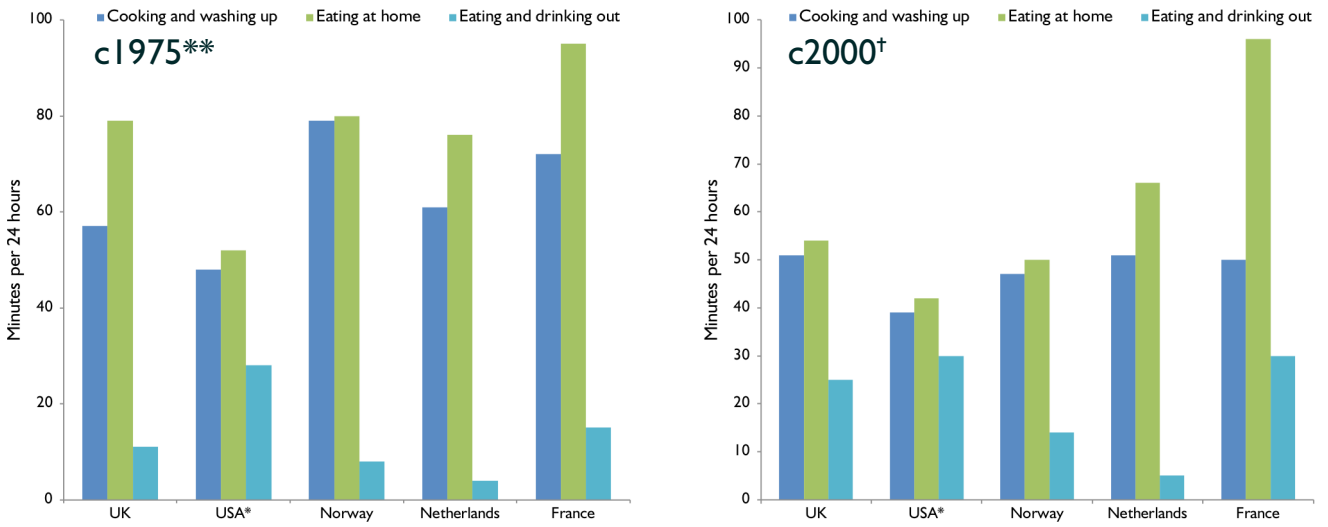
"These changes indicate a powerful convergence effect in Europe at the turn of the century, the average household in France, the UK, the Netherlands and Norway devoted between 47 and 51 minutes per day to food preparation. While the mean hides variation by household type, it nevertheless suggests that the elements of the domestic food provisioning process have grown similar. There is an institutionalization process occurring throughout Europe which we might presume to have common sources – supermarketisation, provision of part-prepared convenience foods, new kitchen technologies, etc.

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"The UK has one of the lowest intakes of red meat in Europe and consumption has been decreasing over the past 30 years. Contributors to this recent decline have been a number of food related health scares, e.g. the bovine spongiform encephalopathy or 'mad cow disease' crisis. Globally, however, a considerable amount of the increase in meat consumption may be attributed to the increase in poultry consumption worldwide. Beef is the one meat group that on a worldwide level showed no increase in consumption levels during this time. This trend reflects the fact that while beef consumption rose modestly in some regions (in developing countries such as China and Brazil), it fell very modestly in most other regions (North America, Oceania and Europe). Projecting to 2050 suggests that the consumption of meat will increase moderately, and this will largely reflect increases in pork and particularly poultry." (Hobsbawm 1995: 68)

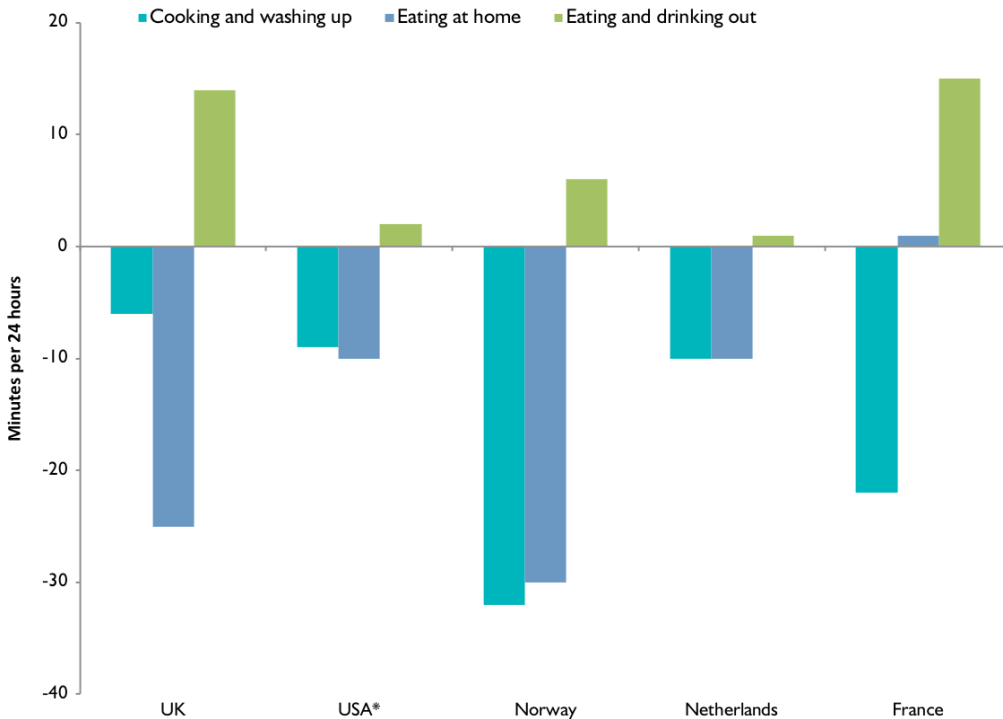
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Figure 2.11 Mean Minutes Allocated to Food Related Activities over 24 Hours (respondents aged 20-59)



Source: Warde et al 2007

Figure 2.12 Relative Changes in Time spent on Food Related Activities



Source: Warde et al 2007

Notes for Figures 2.10 and 2.11:

\* In 1998, all eating in USA was accounted for under the single heading 'Eating'. Therefore estimated.

\*\* UK, USA, Netherlands: 1975; Norway: 1971; France: 1974.

† UK, Norway: 2000; USA, France: 1998; Netherlands: 1995.

A highly important change in acquisition is the rise of convenience foods. There is nothing particularly new in the use of convenience foods if we go with the definition provided by Charles and Kerr (1988: 31) that convenience food is “any food which has had work performed on it outside the home”. Brunner et al (2010: 498) define convenience food products “as those that help consumers minimize time as well as physical and mental effort required for food preparation, consumption and clean-up”. But such definitions would include multiple food types, including bread, which we would not normally consider as convenience food. As Scholliers (2015) says,

“There is nothing wrong with these definitions and approaches, but they make little sense within a view that emphasises long term development. Getting your bread home delivered, buying salami that can readily be eaten, or opening a bottle of wine fit within the above mentioned definitions, but these products are nowadays not considered as convenience foods. Examples of such ancient, familiar and handy ways of obtaining ‘ready’ food may be extended (beer, pasta, pickled vegetables, cheese and so on). I argue against too wide definitions, and suggest that although convenience foods were conceived differently depending on time and place, there must be a common ground. This is inspired by the idea that there is huge difference between forms of convenience foods as defined above. A can of tuna fish, fresh salad wrapped in cellophane paper, a frozen pizza or sweet pastry, which all could be viewed as convenience foods, contrast greatly regarding manufacturing, use, and significance. To further complicate matters, the term can refer to food street stalls in the Middle Ages, caterers delivering food to (rich) households in the 18th century, products that are the result of industrialised processes appearing in the 19th century, such as dried broth cubes or tubes of mayonnaise, or fast food outlets in the 20th century. The concept of convenience foods expands according to the ‘modernisation’ of the food chain, ... There are many signs that indicate a much more rapid pace of change nowadays than ever before.” (Scholliers 2014: 4)

In many ways we have an intuitive idea as to what convenience food is, but we need to remember that whatever we think of as convenience is culturally and temporally specific. It is also a term laden with meaning and often an element of disapprobation (Jackson and Viehoff 2016; Olsen et al 2010). As Halkier (2017) has pointed out, it has been linked to the de-skilling and decline of cooking in the younger generation (Moisio et al 2004; Simmons and Chapman 2012). For example, in a Canadian study on traditional food knowledge, elderly women express their concern about the de-skilling of cooking competences among the next generations (Braun and Beckie 2014). Convenience foods have also been linked to concerns about sustainability (Szabo 2011) and unhealthy meals (Prim et al 2007) with, for example, Howard et al (2012), finding that not one of the 100 tested supermarket ready-meals complied with WHO dietary guidelines. Not that Howard et al’s study was confined to ready-meals; they compared them to recipes created by TV chefs and found these even more wanting than ready-meals! The growth of ready-meals has been rapid:

“Focusing specifically on ready-meals, market researchers estimate that the UK sector is now worth more than £3 billion with the chilled sector outperforming the frozen sector by a ratio of approximately 5:1 ... The UK consumption of ready-meals is estimated to be double that of France and six times more than Spain (Mintel 2010). Mintel also report that while the demand for ready-meals across Europe rose by 29% between 1998 and 2002, the UK market increased by 44% over the same period. In the UK, supermarket own-brand products dominate the ready-meal market with Tesco (24%) and Marks & Spencer (23%) having a roughly equal market share (Mintel 2013).” (Jackson and Viehoff 2016: 2)

Halkier (2017) examined the use of convenience food by young people in Denmark and the everyday lives of young Danes and found that relative to other age groups of consumers in Denmark, young consumers are more likely to use convenience food products. This link to age implies the possibility of a growing market and in this context, considerable recent emphasis has been given to the so-called millennial generation.

**“IN DENMARK, YOUNG CONSUMERS ARE MORE LIKELY TO USE CONVENIENCE FOOD PRODUCTS.” (HALKIER 2017)**

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### Brands that are winning over Millennials

“Of the dozen over-indexing brands, two are burger joints (Five Guys and Shake Shack), three are focused on premium soft drinks (Shakeaway, Creams and Joe & the Juice) and the others are fast-casual operators (Tortilla, Roosters Piri Piri, Barburrito, Wok&Go, Chilango, Chipotle and Coco di mama). Apart from speed and convenience almost all of them can be enjoyed without cutlery, most are new to the market, and they are virtually alcohol-free.” (Perowne 2017)

---

The term millennials has been coined to describe 18 to 30 year olds whose experience of the internet and the smartphone era means “they are better connected than any group before them and have choice at their fingertips. It’s their native understanding of this new two-way information channel that separates them from their forebears” (Perowne 2017). In the UK, this group accounts for 30% of total dining-out expenditure, an annual revenue of £27 billion (Perowne 2017). According to Eve Turow (2015), of the 80 million millennials living in the US half identify as “foodies”. She talks of a millennial obsession with food that will inform future US food policy:

**“KIDS WITH TOP COLLEGE DEGREES ARE APPLYING THEIR LEARNING TO HARVESTS INSTEAD OF HEDGE FUNDS. AND CERTAIN PRODUCTS LIKE QUINOA, ACAI AND KALE, HAVE BECOME THE SHINING BADGES OF “FOODIE” EATERS.”**

(TUROW 2015: 10)

But can we assume that what younger people eat during periods at university (which of course far more are attending than 50 years ago) or when setting out on their careers will necessarily stay the same? Moreover, we are contending here with some contradictory social forces and opinions: convenience and speed vying with organic and local, with cost always a factor too. If, as the evidence seems to suggest some millennials are prepared to pay more for what they consider more natural and authentic foods then there may be new market opportunities for food producers which I will refer to again in Chapter 4.

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“According to a Mintel study released last year, six in 10 consumers are willing to pay more for premium non-alcoholic soft drinks that have a clear difference in taste to cheaper alternatives. It also showed that over half (54 per cent) of craft drinkers find ‘natural’ or ‘real’ attributes most appealing or important. In the US, ‘natural’ beverages are growing 12.7 per cent annually according to Nielsen Databank. In June last year Coca-Cola acquired Hansen’s and Blue Sky’s ‘natural beverages’ as part of a play by its newly formed craft beverages team, a move that Jeremy Faa, senior vice-president and general manager for craft beverages at Coca-Cola said comes as “Consumers today, especially millennials, want products that are new and different and reflect their lifestyles. They want to know how their beverages are made and where the ingredients come from, and they want to embrace both the founder’s story and the brand’s personality.”

Source: [www.thedrum.com/news/2016/04/01/can-craft-movement-do-cola-what-it-s-done-beer](http://www.thedrum.com/news/2016/04/01/can-craft-movement-do-cola-what-it-s-done-beer)

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## APPROPRIATION

I have examined the elements of availability and acquisition within our food culture and how that is changing, but I have said little about eating, or the bodily appropriation of food, by individuals. The manner in which food is consumed, including location and performative aspects of eating, is changing too. As we have just seen, there are trends towards eating out and eating on the move as well as within the home.

### Cooking

As Burnett (2004: 288) explains, there has been “an explosion of interest in all matters to do with food, especially in cookery both in and outside the home. To turn the pages of weekend newspapers, glance at the lists of best-sellers in bookshops or switch on the television to see cookery programmes competing for top viewing-time with soap operas one might conclude that eating is a principal obsession of our consumer society”.

From the mid-1950s to 1970s, he explains how “the relics of Victorian reticence about matters gustatory were replaced by a vocabulary of appreciation, part of the wider change in modern society in which pleasure is no longer viewed as faintly immoral indulgence” (Burnett 2004: 288-289).

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“Gastronomy is the intelligent knowledge of whatever concerns man’s (sic) nourishment: it facilitates choice because it helps us to understand what quality is. It enables us to experience educated pleasure and to learn pleasure-loving knowledge. Man as he eats is culture: gastronomy is culture, both material and immaterial. Choice is a human right: gastronomy is freedom of choice. Pleasure is everybody’s right and as such must be as responsible as possible: gastronomy is a creative matter, not a destructive one. Knowledge is everybody’s right, but also a duty; gastronomy is education.” (Petrini 2007: 55)

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There are many ways in which the new vocabulary of pleasure is articulated. For example the Slow Food movement has sought to promote a modern understanding of gastronomy. As Andrews (2008: 18) argues, Slow Food gastronomy “is grounded in the costs and consequences of the modern diet, the world of globalisation and the new interest in the food culture”. Not that all food-focused pleasure-seeking is related to such ideological concerns. Much, as intimated by Burnett, is within mainstream culture as evidenced by the popularity of television programmes such as *The Great British Bake Off* and *MasterChef*. The *MasterChef* final 2018 (Friday 13 April 2018) was watched by an average of 5.2 million viewers (peaking at 6.2 million as the winner was announced) and was the second most popular programme that night (after *Coronation Street* with 6.4 million) (TellyMix 2018). The *Great British Bake Off* final 2017 (Tuesday 31 October 2017) was watched by a

live audience of 7.3 million viewers (plus another 0.4 million watching on Channel 4+1), which was Channel 4’s highest overnight ratings since the Paralympics Opening Ceremony in 2012. When the show was on BBC One (its original home) ratings were even higher, with 14 million people viewing the 2016 final live (rising to 15.9 million when including those watching on catch-up services) (BBC News 2017).

A record 1,170 food- and drink-related books were published in the UK in 2001 (Burnett 2004), and according to the industry periodical, the *Bookseller*, in 2016 more food and drink books were sold than ever before. 8.7 million books, with a value of £90.3 million, were sold; only in 2010 had a greater value of food and drink books been sold (source: [www.bbc.co.uk/news/business-41994986](http://www.bbc.co.uk/news/business-41994986)). There is, of course, much debate as to how much the vicarious pleasures associated with viewing or reading about food in this way actually translates into individuals’ food preparation and eating practices.

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**The Guild of Food Writers** is the professional association of food writers and broadcasters in the UK. Established in 1984, it now has around 425 authors, broadcasters, columnists and journalists among its members.

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### Eating out and taking away

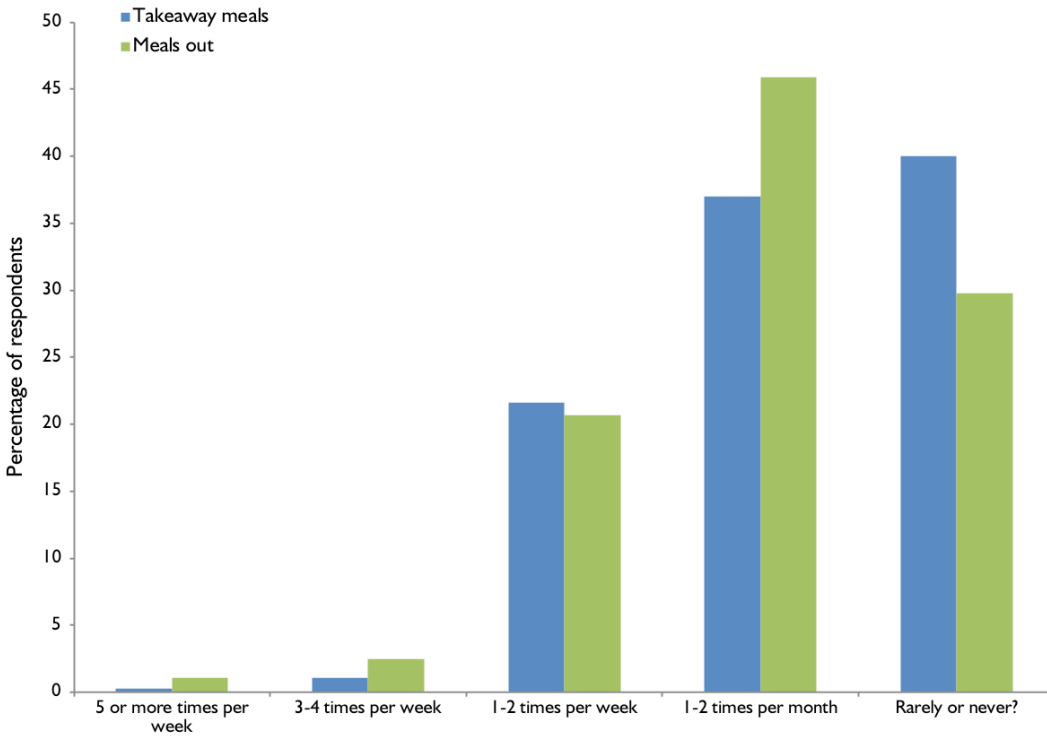
Adams et al (2015) used the UK National Diet and Nutrition Survey (NDNS) of 2008-12 to explore eating meals out and take-away meals at home. As shown in Figure 2.13, more than one quarter (27.1%) of adults and one fifth (19.0%) of children ate meals out at least once week; one fifth of adults (21.1%) and children (21.0%) ate take-away meals at home once per week or more. Adams et al (2015) found:

“no gender differences in consumption of meals out, but more boys than girls consumed take-away meals at home at least weekly. The proportion of participants eating both meals out and take-away meals at home at least weekly peaked in young adults aged 19–29 years. Adults living in more affluent households were more likely to eat meals out at least once per week, but children living in less affluent households were more likely to eat take-away meals at home at least once per week. There was no relationship between socio-economic position and consumption of take-away meals at home in adults.” (Adams et al 2015: 1)

Figures 2.13 and 2.14 examine the phenomenon of eating out (no data on eating out expenditure are available prior to 1994). Contrary perhaps to popular perceptions, eating out has been in decline with, for example, energy intake from eating out 4.9 per cent lower in 2011 than in 2008. This was due mainly to reductions in free school meals and reductions in work provided meals” (Defra 2012: viii).

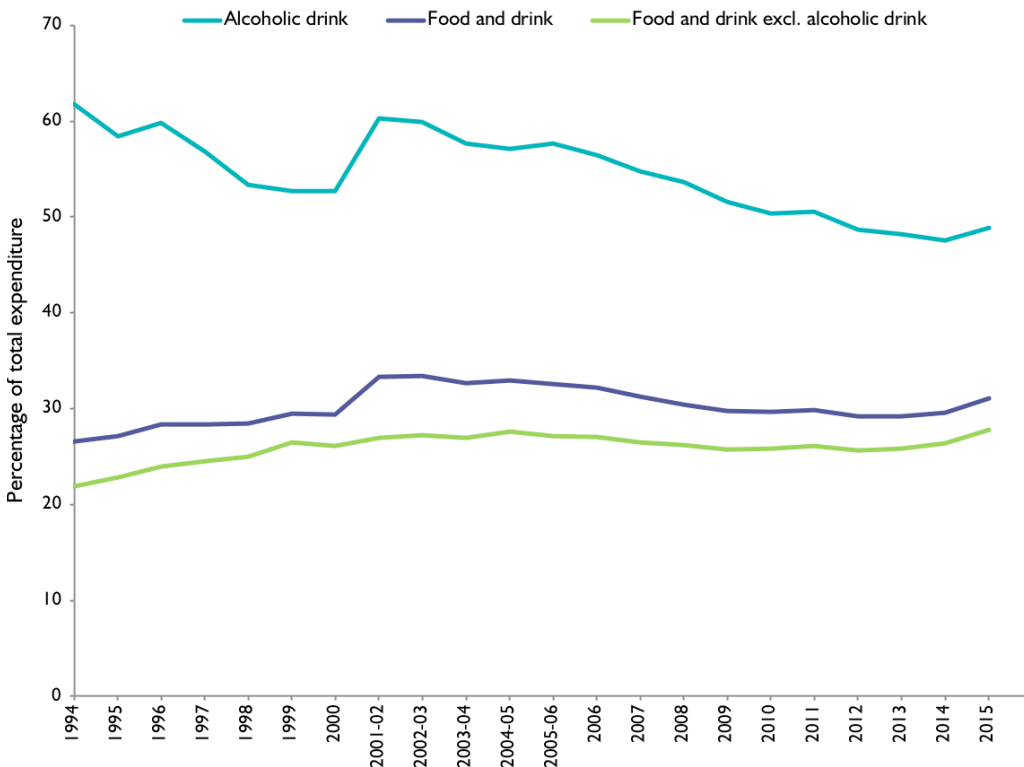


Figure 2.13 Frequency with which People Eat Takeaway Meals and Meals Out



Source: NatGen Social Research et al (2017)

Figure 2.14 Percentage Food and Drink Expenditure Spent on Eating Out\*



Source: Defra/ONS 2001 and Defra 2017

\* Figures for 1994-2000 are taken from the National Food Survey, which is considered less reliable than the Expenditure and Food Survey (2001-02 to 2007) and Living Costs and Food Survey (2008-2015)

## ANXIETY AND PRESSURES FOR CHANGE

In this final section of the chapter, I consider some of the pressures for change within contemporary food culture. As Winson (2004; 2013; Winson and Choi, 2017) has argued, diets are ultimately social, economic and political as much as they are personal and behavioural. Diets reflect the material conditions of a particular society, and specific social and economic arrangements, as well as the structures of political domination, regulation, and control (Winson 2013: 16). The concept of *dietary regime*, developed by Winson focuses analysis on an attempt to capture “the commonality of dietary experience and to guide an appraisal and understanding of the social forces and socioeconomic and technological factors that play a salient role in determining prevailing diet(s) in a society at a given point in time” (Winson and Choi 2017: 564).

It should be clear by now that these social, socioeconomic and technological forces play out across a range of human behaviours and activities. As citizens and as consumers we experience the prevailing dietary regimes as sources of both pleasure and, potentially, of anxiety. Warde (2016: 19) categorises food related anxieties as physical, social and moral, symbolic, economic, and ethico-political.

- **Physical** concern about the hazards that may be associated with modern, particularly processed or ‘de-natured’ foods, a concern fuelled by periodic food scares associated with contamination or adulteration;
- **Social and moral** concern that the changes in eating habits and practices are adversely affecting family life and social mores;
- **Symbolic** concern that the demise of a traditional menu and a troubling excess of choice symbolises consumer confusion, even identity crisis;
- **Economic** concern about the power of retailers and value for money;
- **Ethico-political** concern about animal welfare, the natural environment, the implication of trade for poorer countries, etc.

To this I would add an additional concern for **provenance** with issues of localism and national identity cutting across the other concerns (Winter 2003).

As a consequence, there are an enormous range of campaigning movements and political ideas related to food, its production and its consumption encompassing vegetarianism and veganism, organic food and all its variants, fair trade, community supported agriculture, and so forth. Some of the negative consequences of how we produce food have certainly encouraged some consumers to consider AFNs as a juxtaposition to the ‘supermarketisation’ trends explored earlier. For others, food anxieties are played out within conventional retail outlets, as supermarkets respond to new demands.

Food sovereignty has in many parts of the world, typically the global south (Jansen 2015), but also in Canada (Wittman et al 2011), acted as an umbrella term for many of these concerns. Food sovereignty at its core, “is a set of goals comprised of strengthening community, livelihoods and social and environmental sustainability in the production, consumption and distribution of nutritious and culturally appropriate food” (Desmarais and Wittman 2014: 1155). These do not seem, on the face of it, to be an unexceptionable set of goals and values but to many in policy circles and within global agri-businesses food sovereignty has been seen as antithetical to global trade and free markets, with food security a preferred means of framing what is needed. The association of food sovereignty with La Via Campesina, a radical international peasants’ movement arguing for local food under the control of local producers, has bolstered this view and in the UK has been associated with national trade protectionism and self-sufficiency (e.g. Foresight 2011). As Spencer et al (2014) have explained “this is only a partial understanding of food sovereignty”. But it is a view that has had a significant impact on debate in the UK:

“With food security the dominant framing of food provisioning, we wondered if food sovereignty was represented within UK food research agendas. We examined the published strategies and websites of the UK research councils for food sovereignty and, using suitable search terms, looked for food sovereignty research in British universities and research institutes. We found only four references, all on the ESRC site, to projects that explicitly used the food sovereignty frame on the websites of the UK research councils. All of these were projects focused on countries in the global south. Limited engagement with food sovereignty was found in searches of research institutes and, again, most were projects focused on the global south. In universities, we found eleven with dedicated food security webpages and, of these, four had some engagement with food sovereignty within those programmes. Though our research was limited to websites and published strategies, we can conclude that in agri-food research, the food sovereignty frame is a minority one in comparison with food security.” (Spencer et al 2014)

There is an embryonic food sovereignty movement in the UK, but it does not appear to be very active. Moreover, its characterisation of Britain as “long since...turned over to industrialised farming” (Source: <http://foodsovereignty.org.uk/ukfoodsov>) and its resolute opposition to genetic modification (GM) will not endear it to many in the farming community. The “Six Pillars of Food Sovereignty” are outlined overleaf.

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## The Six Pillars of Food Sovereignty

### 01.

**Focuses on food for people:** The right to food which is healthy and culturally appropriate is the basic legal demand underpinning food sovereignty. Guaranteeing it requires policies which support diversified food production in each region and country. Food is not simply another commodity to be traded or speculated on for profit.

### 02.

**Values food providers:** Many smallholder farmers suffer violence, marginalisation and racism from corporate landowners and governments. People are often pushed off their land by mining concerns or agribusiness. Agricultural workers can face severe exploitation and even bonded labour. Although women produce most of the food in the global south, their role and knowledge are often ignored, and their rights to resources and as workers are violated. Food sovereignty asserts food providers' right to live and work in dignity.

### 03.

**Localises food systems:** Food must be seen primarily as sustenance for the community and only secondarily as something to be traded. Under food sovereignty, local and regional provision takes precedence over supplying distant markets, and export-orientated agriculture is rejected. The 'free trade' policies which prevent developing countries from protecting their own agriculture, for example through subsidies and tariffs, are also inimical to food sovereignty.

### 04.

**Puts control locally:** Food sovereignty places control over territory, land, grazing, water, seeds, livestock and fish populations on local food providers and respects their rights. They can use and share them in socially and environmentally sustainable ways which conserve diversity. Privatisation of such resources, for example through intellectual property rights regimes or commercial contracts, is explicitly rejected.

### 05.

**Builds knowledge and skills:** Technologies, such as genetic engineering, that undermine food providers' ability to develop and pass on knowledge and skills needed for localised food systems are rejected. Instead, food sovereignty calls for appropriate research systems to support the development of agricultural knowledge and skills.

### 06.

**Works with nature:** Food sovereignty requires production and distribution systems that protect natural resources and reduce greenhouse gas emissions, avoiding energy-intensive industrial methods that damage the environment and the health of those that inhabit it. Source: [www.globaljustice.org.uk/six-pillars-food-sovereignty](http://www.globaljustice.org.uk/six-pillars-food-sovereignty)

**I will argue in the final chapter that the principles of food sovereignty do indeed have something to offer in a UK context but need adaptation.**

## CONCLUSIONS

In conclusion, though much of this chapter has taken a critical stance to developments in the modern food system, a theme that will be deepened in the next chapter when I come to consider the health implications of some of these food cultural changes, I want to finish with some signs of hope to be found in the interstices of the current system. There have been hints of this already – for example, the slow food movement, public interest in cuisine, the millennials’ concern about health – but I conclude with just two cases which will be picked up again in the report’s conclusions. One is very specific, the other very broad.

The specific case is a fascinating study by Braun and Beckie (2014) in which they look at a group of women and children in a small rural community in Alberta who are seeking to respond to a perceived trend of food deskilling, by finding ways to maintain and perpetuate traditional food practices, in this case gardening, cooking and canning of surplus produce. Their research uncovered four conditions influencing the continuation of these social practices among the research participants: the experience and history of scarcity; normative expectations; a close connection to family; and, development of a community of practice (Braun and Beckie 2014: 54). It is the last of these that I find particularly interesting.

Communities of practice are “groups of people informally bounded together by shared expertise and passion for a joint enterprise” that “share their experiences and knowledge in free flowing, creative ways that foster new approaches to problems” (Wenger and Synder 2000: 139–140).

“A close connection to family members and strong communities of practice serve to support the notion that practices require “changing populations of more or less faithful carriers or practitioners” (Shove et al 2012: 63). The social networks formed among carriers act as crucibles in which practices are changed, re-produced, and transformed, as conduits through which they flow and as containers that limit their diffusion and (Shove et al 2012). It was evident that without the relationships and social networks formed in Stony Plain, many of the women would not be as active in their gardening, cooking, and canning as they are today.” (Braun and Beckie 2014: 63)

A question to return to later is how might communities of *food* practice built around nutrition sensitive food provisioning be built or re-discovered in contemporary UK and, related to that, is there a role of farmers to play in new communities of food practice?

My second concluding example is the role of AFNs. The rise of farmers’ markets, box schemes, a new-found interest in local provenance and so forth, has been paralleled, perhaps at times even exceeded, by the academic interest this has excited. It would require a report in itself adequately to reflect and report on the range of studies on the various aspects of AFNs so here I merely mention some of the key overviews available (Fonte and Papadopoulos 2010; Goodman et al 2014), and suggest that the expertise that some parts of the farming community have now gained through direct engagement in shortened supply chains offers some potential for addressing concerns about contemporary food systems.

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## Chapter 2 Key Findings

### 01.

The modern food system, whilst successfully delivering vast quantities of food to increasingly urban populations across the globe, has been accompanied by a reduction in the diversity of foods.

### 02.

A paradox lies at the heart of the modern food system in that while the range of food products available on the supermarket shelves is ever expanding the global food system overall has an increasing dependence on a small number of crops.

### 03.

How and where people eat is changing with, for example, more people buying ready meals and snacks.

### 04.

There is a growing societal interest in food encompassing its impact on health, renewed interest in cooking, the slow food movement and alternative food networks.

## 03. THE HEALTH CHALLENGE

### INTRODUCTION

In the first section of this chapter I consider the contribution of diet to ill health, especially in high income countries with relatively abundant food such as the UK, including a focus on some of the wider socio-economic and geographical factors. In global terms there is, of course, a 'double burden' of diet related ill health with an estimated 2 billion people being overweight or obese and 795 million undernourished as a result of too little food (Mason and Lang 2017). We should never lose sight of the undernourished but the focus of this study is on the consequences of consuming too much food. I then turn to a consideration of how current diet compares to recommendations. In the third section, I consider the reasons for why we do not meet recommendations, referring back to some of the key findings from Chapter 2. This leads to a concluding set of issues which need to be addressed which are returned to in Chapter 5.

### DIET AND HEALTH

This section draws in part on a comprehensive review of diet and disease conducted to mark the 40th anniversary of the British Nutrition Foundation in 2007 (Foster and Lunn 2007), up-dated with more recent material where possible and particularly where there have been any subsequent changes in understanding. It has been estimated that up to a third of all deaths are attributable to dietary risk factors (Frayn and Stanner 2005). The role of dietary change in the rise of Non-Communicable Diseases (NCD) is now widely accepted (Global Burden of Metabolic Risk Factors for Chronic Diseases Collaboration 2014), through exposure to "high-(saturated) fat, high-sugar, high-salt, energy-dense, micronutrient-poor foods, particularly in conjunction with low levels of physical activity" (Mason and Lang 2017: 78).

The biggest issue for diet-related disease is Cardiovascular disease (CVD) which refers to diseases of the heart and cardiovascular system, such as Coronary Heart Disease and strokes. Although death rates from CVD have fallen since the early 1970s, they still account for more than 37% of UK deaths (Foster and Lunn 2007). Moreover, the number of people suffering from CVD has not declined as people are living longer and treatments are improving. A diet that is high in total fat, saturates and salt, and low in dietary fibre and fruit and vegetables, increases the risk of CVD (Foster and Lunn 2007: 197).

Obesity (too many calories) is a key risk factor for CVD. Obesity increases insulin resistance leading to Type 2 diabetes and on to CVD. As Foster and Lunn

(2007) explain, body weight increases induce metabolic changes, bringing about increased insulin resistance and a heightened risk of Type 2 diabetes. Obesity causes high cholesterol (as a result of too much saturated fat) and hypertension (arising from too much salt). Obesity contributes to an increasing incidence of NCDs such as CVD, cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes. The incidence of Type 2 diabetes, they argue, has more than doubled in men and increased by 80% in women since 1991. Men with Type 2 diabetes have an increased risk of Coronary Heart Disease (2 to 4 times greater) and in the case of women the risk is 3 to 5 times greater; and the impact of other risk factors for heart disease such as smoking, high blood pressure and blood cholesterol are also increased by over-weight (BHF 2006). Obesity also increases risk of CVD by mechanisms other than insulin resistance such as hyperlipidaemia (Sullivan et al 2008), hypertension (Jiang et al 2016) and chronic inflammation (Monteiro and Azevedo 2010). It is also a major cause of back and joint pain (Zdziarski et al 2015).

Dietary factors are also associated with an increased risk of several cancers and research has shown that restricting the intake of calories can suppress the carcinogenic process (Anderson et al 2015). The mechanisms linking adiposity and cancer risk include hyperinsulinaemia and insulin resistance, up-regulation of insulin-like growth factors, modification of the metabolism of sex hormones, chronic inflammation, changes in production of adipokines and vascular growth factors by adipose tissue, oxidative stress, and alterations in immune function (Hursting et al 2003; Norat et al 2015). In addition to the influence of calories, diet may influence cellular processes leading to the accumulation of the eight hallmarks of cancer cells: self-sufficiency in growth signals, insensitivity to antigrowth signals, limitless replicative potential, evasion of apoptosis, sustained angiogenesis, reprogramming of energy metabolism, evasion of immune destruction, and tissue evasion and metastasis (Hanahan and Weinberg 2011; Norat et al 2015).

The links between diet and cancer are complex: "Thousands of dietary components are consumed each day; a typical diet may provide more than 25,000 bioactive food constituents, and the amounts of bioactive components within a particular food may widely vary (WHO 1990). Each bioactive food constituent has the potential to modify multiple aspects of the cancer process, alone or in combination with several micronutrients, and the quantity, timing, and duration of exposure modulate the cell response.

Thus, it is not possible to ascribe a causal effect to specific compounds; it is more likely that the effect results from a combination of influences on several pathways involved in carcinogenesis. A growing body of evidence indicates that lowering the energy density (the amount of energy in a particular weight of food) of diets can reduce caloric intake (reviewed by Rolls 2009). Energy dense diets contain less fibre-rich foods, and are usually high in fats, processed starch, and added sugars. Trans fatty acids are used in industrially processed sweet and salty foods, such as chocolate bars, candies, biscuits, cakes, crackers, industrial bread, and packaged snacks. The array of potentially harmful effects of industrial trans fatty acids is wide, and include alterations in metabolic and signalling pathways, higher circulating levels of lipid, systemic inflammation, endothelial dysfunction, and possibly increased visceral adiposity, body weight and insulin resistance.” (Renata and Dariush 2009; Norat et al 2015: S57)

As Lozupone et al (2012) explain, although the main health concern of our modern diet is with regard to obesity and its related diseases, especially CVD and to some extent cancer, there is increasing evidence of links with other conditions. This concern focuses in particular with how diet harms natural gut microbiota which may exacerbate both risks of obesity (Ley et al 2006) and cancer (Lupton 2004), but may also have links to malnutrition (Kau et al 2011), inflammatory bowel disease (Dicksved et al 2008; Frank et al 2007), and neurological disorders (Gonzalez et al 2011). All this is rather speculative at present: diet definitely affects gut microbiota and diets rich in fibre and prebiotics promote growth of beneficial bacteria, but good quality data from intervention studies in humans is hard to come by (Susan Jebb personal communication).

Newton et al (2015) present the findings of the major Global Burden of Disease (GBD) study showing how in the UK dietary risks are the leading cause of lost Disability-Adjusted Life Years (DALYs) which quantify both premature mortality and disability within a population:

“The largest contributor to DALYs are dietary risks (10.8%, 95%), an aggregate in the second tier of the GBD risk hierarchy of low fruit consumption, low vegetable consumption, low whole-grains consumption, low nuts and seeds consumption, low milk consumption, high red meat consumption, high processed meat consumption, high sugar-sweetened beverages consumption, low fibre consumption, suboptimal calcium intake, low seafood omega-3 fatty acids consumption, low polyunsaturated fatty acids consumptions, high trans fats intake, and high sodium intake, closely followed by tobacco (10.7%).” (Newton et al 2015: 2269)

Whilst there are improvements in life expectancy in the UK driven by decreases in mortality from CVD and cancers due to improved treatments (Newton et al 2015) progress is slower than it might be due, in large part to the rising incidence of obesity. OECD (2017a) projections show a steady increase in obesity rates with, in England, levels expected to rise from around 25% to 35% between now and 2030 (this compares to a projection of 47% for the USA). In the UK, obesity generates an economic loss of more than \$70 billion a year in 2012, or 3% of GDP (Dobbs et al 2014). Not every wealthy country is as susceptible as this with, for example, Italy and South Korea, projected to have obesity rates of 13% and 9%, and France and Spain, 21% in 2030 (OECD 2017a).

The OECD report also shows that in the majority of countries, women are more obese than men – however, in most OECD countries for which data are available, male obesity has been growing more rapidly. Obesity has also been rising more rapidly in less educated men and in average-educated women, in most countries. Obese people have poorer job prospects than normal-weight people, are less likely to be employed, experience greater difficulty re-entering the labour market, are less productive at work due to more sick days and fewer worked hours, and earn around 10% less than non-obese people (OECD/EU 2016).

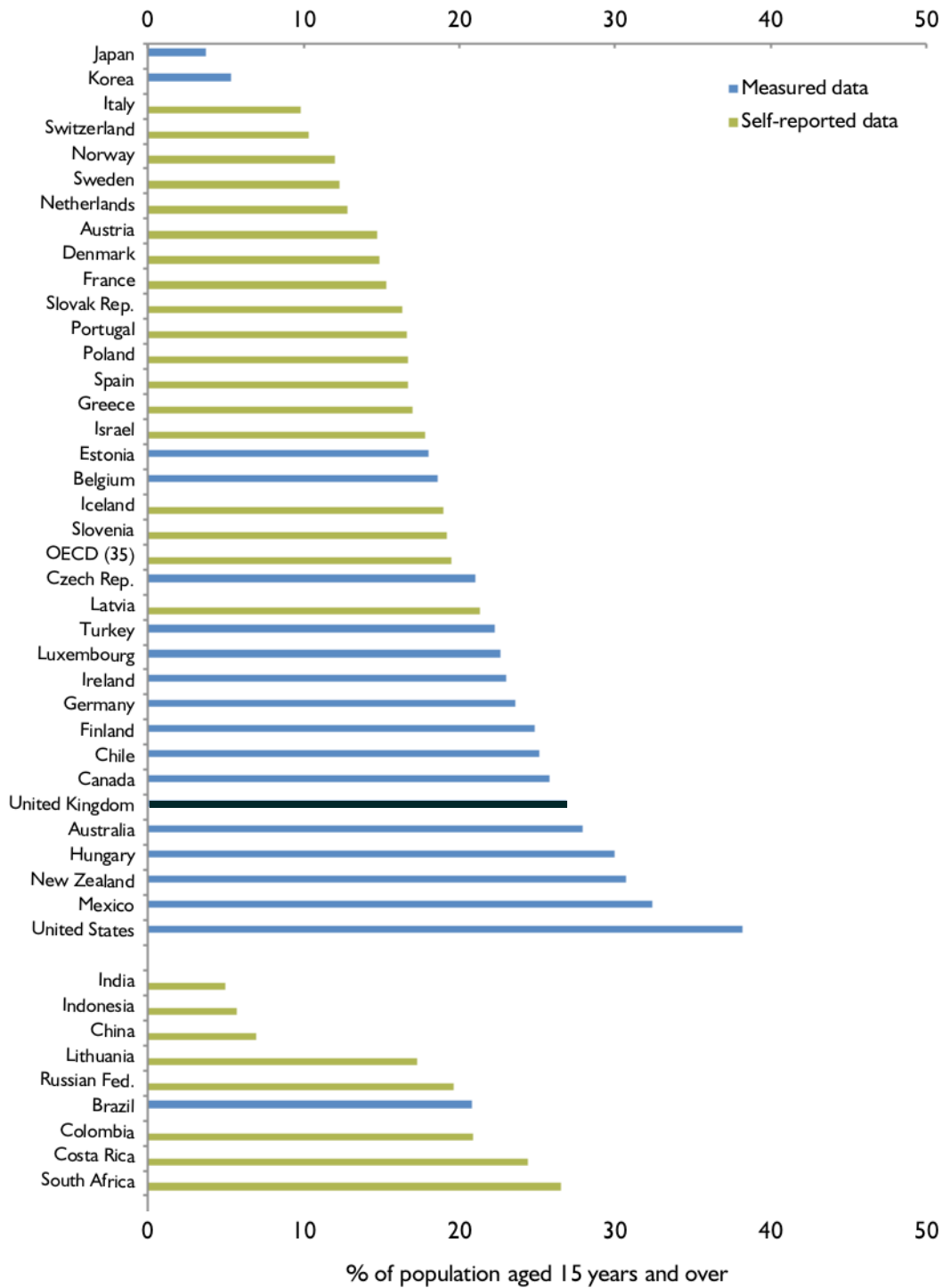
The FAO (2013) predicts that the costs of obesity to the global economy in the form of healthcare and loss of productivity could be as much as 5% of global GDP. In 2015, 40 million (70%) of the 56 million global deaths were due to NCDs (WHO 2015). The OECD work also shows, as shown in Figure 3.1, that obesity although a global phenomenon, does vary significantly between countries and that this is only partly related to economics. Wider social and cultural factors are also very important. Wealthy countries such as Japan, the Netherlands, Denmark and France have obesity rates very much lower than in the UK and there are geographical differences within the UK (see Figure 3.10 in the final section of this chapter).

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“Individuals whose microbiota has been degraded by long-term consumption of a high-fat and high-sugar diet may need long-term dietary changes to restore their microbiota to a healthy state. The lower taxonomic diversity in individuals from Western cultures who have a high-fat and high-sugar diet raises the concern that global trends in diet could result in important microbial symbionts being lost from the broader population, possibly leading to the extinction of bacterial species that can provide important health benefits.” (Lozupone et al 2012: 228)

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Figure 3.1 The Scale of the Obesity Challenge in OECD and Selected Other Countries



## DIETARY RECOMMENDATIONS AND GUIDELINES

In this section I explore how current diet matches the Eatwell guidelines in the UK as shown in Figure 3.2.

Figure 3.2 The Eatwell Guide



Source: Public Health England in association with the Welsh Government, Food Standards Scotland and the Food Standards Agency in Northern Ireland

To elaborate further, the Eatwell Guide has eight key tips for healthy eating: (Source: [www.nhs.uk/live-well/eat-well/eight-tips-for-healthy-eating/#base-your-meals-on-starchy-carbohydrates](http://www.nhs.uk/live-well/eat-well/eight-tips-for-healthy-eating/#base-your-meals-on-starchy-carbohydrates))

### 1. Base your meals on starchy carbohydrates

Starchy carbohydrates should make up just over one third of the food you eat. They include potatoes, bread, rice, pasta and cereals. Choose wholegrain varieties (or eat potatoes with their skins on) when you can: they contain more fibre, and can help you feel full for longer.

### 2. Eat lots of fruit and veg

It's recommended that we eat at least five portions of a variety of fruit and veg every day. It's easier than it sounds. Why not chop a banana over your breakfast cereal, or swap your usual mid-morning snack for a piece of fresh fruit?

Unsweetened 100% fruit juice, vegetable juice and smoothies can only ever count as a maximum of one portion of your 5 A DAY. For example, if you have two glasses of fruit juice and a smoothie in one day, that still only counts as one portion.



**3. Eat more fish – including a portion of oily fish**

Fish is a good source of protein and contains many vitamins and minerals. Aim to eat at least two portions of fish a week, including at least one portion of oily fish. Oily fish contains omega-3 fats, which may help to prevent heart disease. Oily fish include: salmon, mackerel, trout, herring, fresh tuna, sardines, pilchards.

**4. Cut down on saturated fat and sugar**

We all need some fat in our diet, but it's important to pay attention to the amount and type of fat we are eating. There are two main types of fat: saturated and unsaturated. Too much saturated fat can increase the amount of cholesterol in the blood, which increases your risk of developing heart disease. The average man should have no more than 30g saturated fat a day. The average woman should have no more than 20g saturated fat a day, and children should have less than adults. Saturated fat is found in many foods, such as: hard cheese, cakes, biscuits, sausages, cream, butter, lard, pies...

Sugary foods and drinks, including alcoholic drinks, are often high in energy (measured in kilojoules or calories), and if eaten too often, can contribute to weight gain. They can also cause tooth decay, especially if eaten between meals. Many packaged foods and drinks contain surprisingly high amounts of free sugars. Free sugars are any sugars added to foods or drinks, or found naturally in honey, syrups and unsweetened fruit juices. Cut down on: sugary fizzy drinks, alcoholic drinks, sugary breakfast cereals, cakes, biscuits, pastries.

**5. Eat less salt – no more than 6g a day for adults**

Eating too much salt can raise your blood pressure. People with high blood pressure are more likely to develop heart disease or have a stroke. Even if you do not add salt to your food, you may still be eating too much. About three-quarters of the salt we eat is already in the food we buy, such as breakfast cereals, soups, breads and sauces.

**6. Get active and be a healthy weight**

Eating a healthy, balanced diet plays an essential role in maintaining a healthy weight, which is an important part of overall good health. Physical activity can help you to maintain weight loss or be a healthy weight. Being active does not have to mean hours at the gym: you can find ways to fit more activity into your daily life. For example, try getting off the bus one stop early on the way home from work, and walking.

**7. Do not get thirsty**

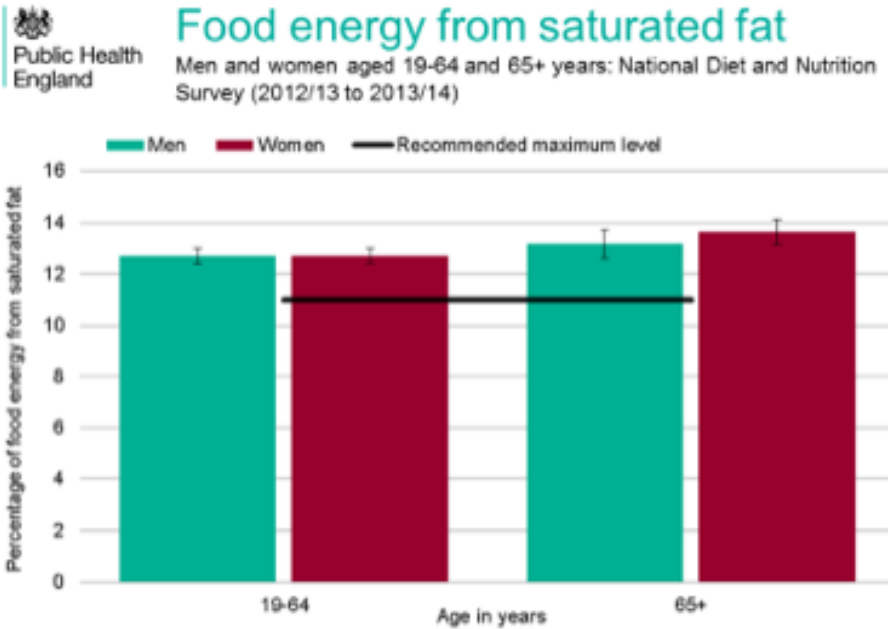
We need to drink plenty of fluids to stop us getting dehydrated – the government recommends 6-8 glasses every day. This is in addition to the fluid we get from the food we eat. All non-alcoholic drinks count, but water and lower-fat milk are healthier choices. Try to avoid sugary soft and fizzy drinks that are high in added sugars and calories, and are also bad for teeth.

**8. Do not skip breakfast**

Some people skip breakfast because they think it will help them lose weight. In fact, research shows that people who regularly eat breakfast are less likely to be overweight. Breakfast has also been shown to have positive effects on children's mental performance and increase their concentration throughout the morning.

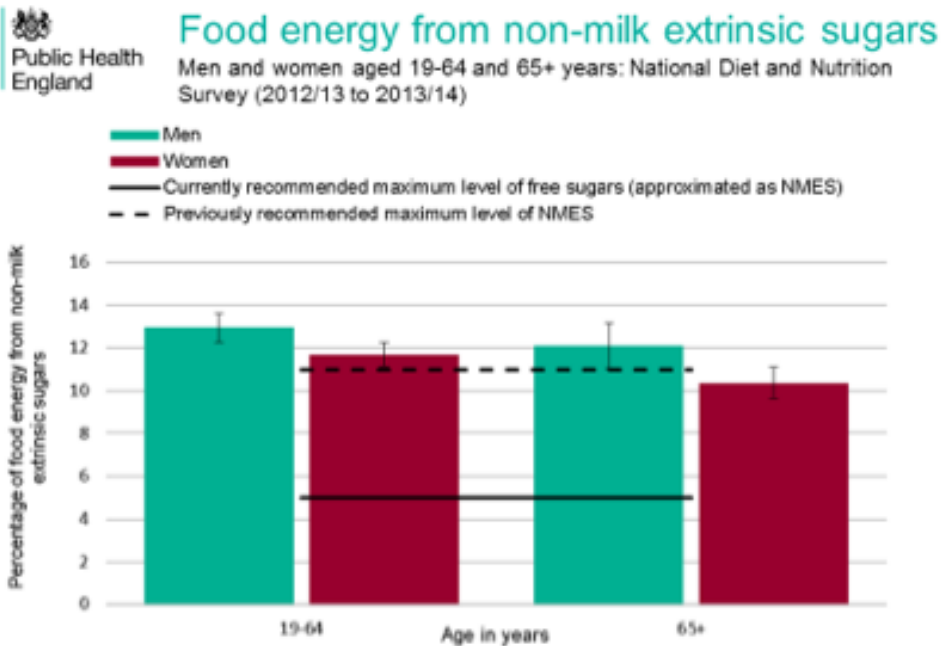
The evidence of how far adrift as a nation (England in this case) we are from achieving these guidelines is set out forcefully in Figures 3.2 to 3.7, provided by Public Health England (PHE). They basically show too many calories, too much saturated fat, sugar and salt and too little by way of fruit and vegetables and cereal fibre.

Figure 3.3 Food Energy from Saturated Fat



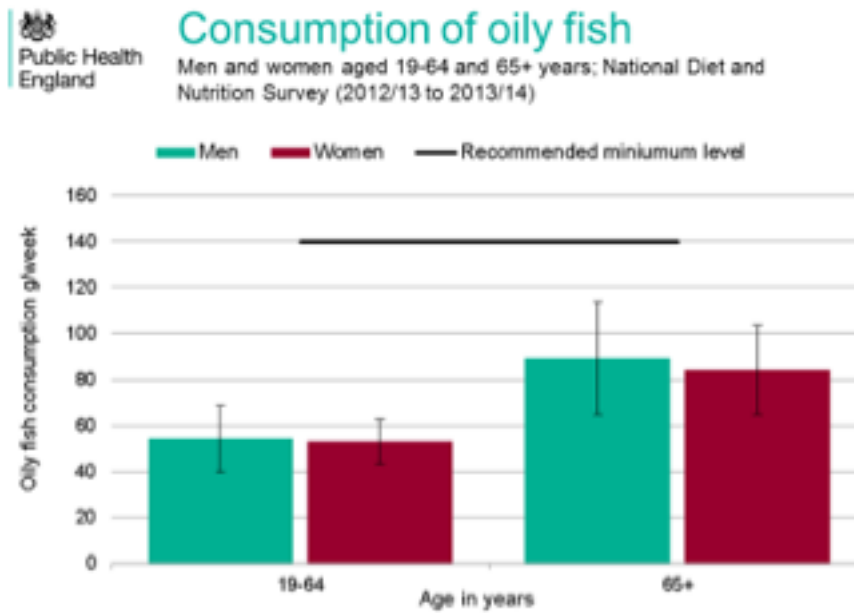
Source: <https://app.box.com/s/og3q86aqejc99okxe9xyvpfo21xai21> © Crown copyright 2018  
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Figure 3.4 Food Energy from Non-Milk Extrinsic Sugars



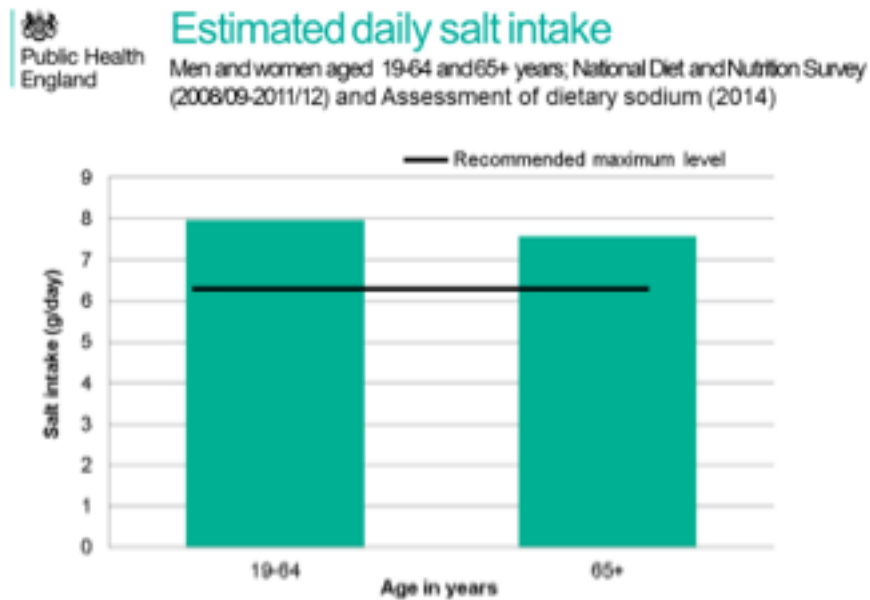
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Figure 3.5 Consumption of Oily Fish



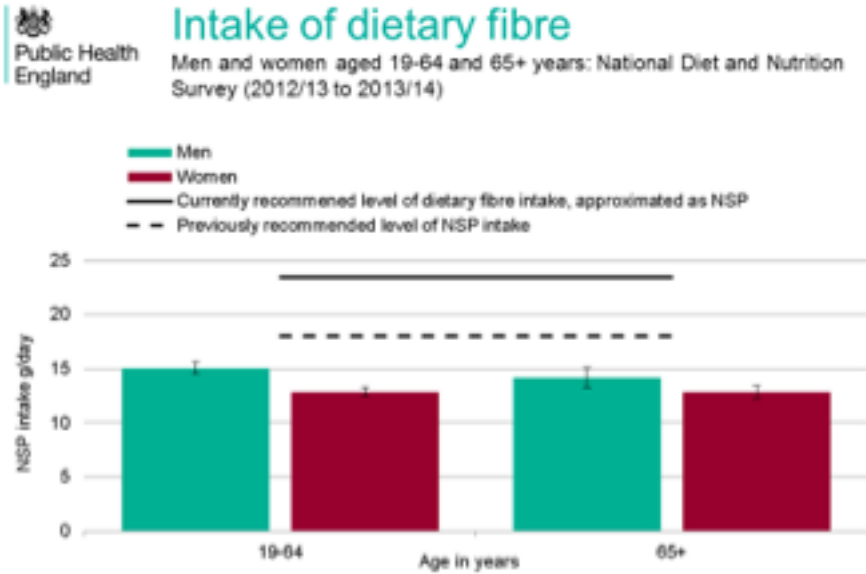
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Figure 3.6 Estimated Daily Salt Intake



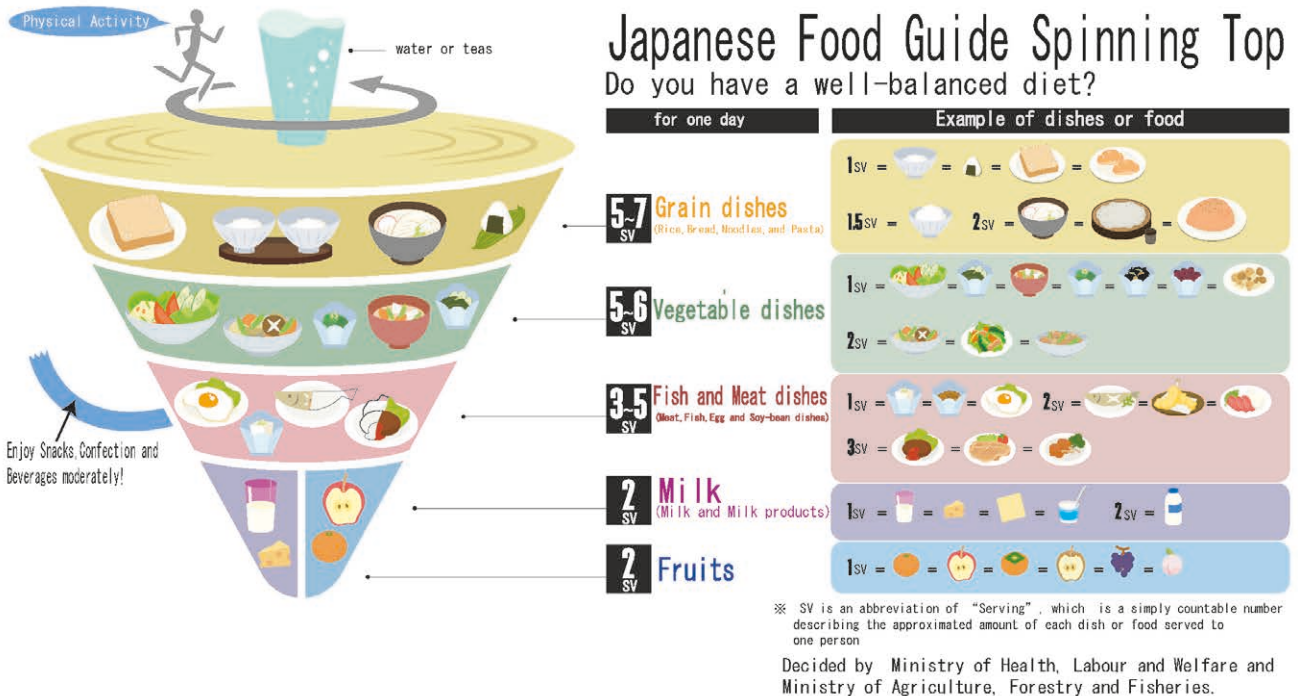
Source: <https://app.box.com/s/og3q86aqejc99okxe9xyvpfo21xai21> © Crown copyright 2018  
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Figure 3.7 Intake of Dietary Fibre



Source: <https://app.box.com/s/og3q86aqejc99okxe9xyvpfo21xai21> © Crown copyright 2018  
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Figure 3.8 Japanese Food Guide Spinning Top



Source: [www.fao.org/nutrition/education/food-based-dietary-guidelines/regions/countries/japan/en](http://www.fao.org/nutrition/education/food-based-dietary-guidelines/regions/countries/japan/en)

Given that Japan leads the way in tackling obesity, its dietary guidelines, launched in 2000, are of interest. The “Japanese Food Guide Spinning Top” (Japanese: 食事バランスガイド) was published in 2005 and revised in 2010 (Figure 3.8). Its key messages are:

- Enjoy your meals;
- Establish a healthy rhythm by keeping regular hours for meals;
- Eat well-balanced meals with staple food, as well as main and side dishes;
- Eat enough grains such as rice and other cereals;
- Combine vegetables, fruits, milk products, beans and fish in your diet;
- Avoid too much salt and fat;
- Maintain a healthy body weight and balance the calories you eat with physical activity;
- Take advantage of your dietary culture and local food products, while incorporating new and different dishes;
- Reduce leftovers and waste through proper cooking and storage methods;
- Track your daily food intake to monitor your diet.

Source: [www.fao.org/nutrition/education/food-based-dietary-guidelines/regions/countries/japan/en](http://www.fao.org/nutrition/education/food-based-dietary-guidelines/regions/countries/japan/en)

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“Why are the Japanese so slender? There are three reasons, and none of them has to do with genetics. One is the traditional Japanese diet, which is heavy on fish, vegetables, and rice. The second is Japan’s mass-transit-centered urban design, which encourages Japanese people to walk a lot more than Americans. But the third factor is paternalism. Japan’s government takes an active role in combating any hint of an upward trend in fatness. In 2008, Japan’s diet passed a law designed to combat “metabolic syndrome,” which is known to Americans as “pre-diabetes.” The so-called “Metabo Law” requires overweight individuals, or individuals who show signs of weight-related illnesses, to go to dieting classes. If they fail to attend the classes, the companies that employ them and/or the local governments of the areas in which they live must pay fines to the federal government. In addition, companies with more than a certain percentage of overweight employees are fined directly.” (Smith 2012; see also Kurotani et al 2016)

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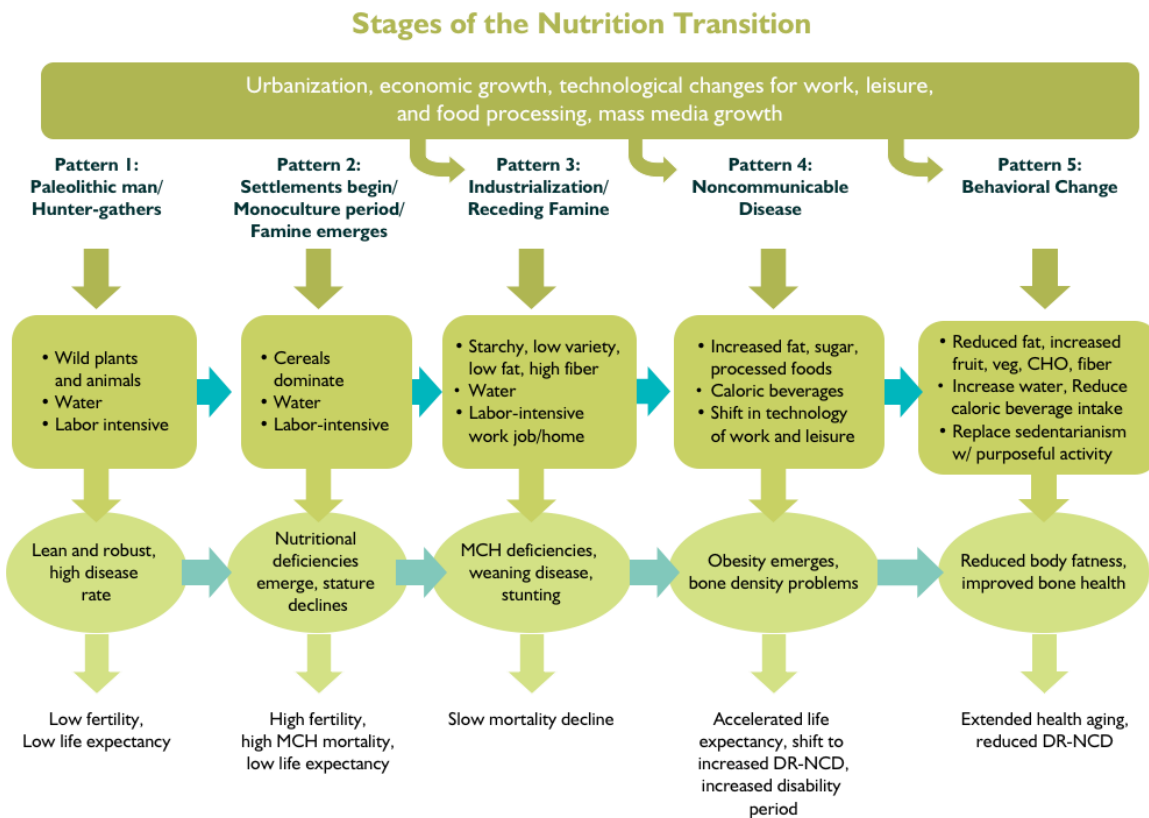
There are other countries that, like Japan, have adopted a more state-interventionist approach to diet and health such as South Korea (Park 2008) and in countries such as France, Italy and the Nordic countries civil society seems to have supported a healthier food culture and guidelines that command more respect than in the UK (Adamsson et al 2012; Ferriers 2005 and Willett et al 1995).

## WHY WE DO NOT MEET RECOMMENDATIONS

We have seen in Chapter 2 how the global food system has allowed some humans in many countries to indulge what seems to be a biological predisposition – although one that has certainly been much reinforced by marketing and advertising campaigns and changes in life and work styles – to consume energy-dense foods produced from a small number of global crop commodities. This ‘global nutrition transition’ (Popkin et al 2012) (see Figure 3.9)

is characterised by shifts towards a ‘Western diet’ which include a high intake of refined carbohydrates, added sugars, fats, and animal-source food (partly in the form of caloric beverages, processed and pre-cooked ultra-processed food), alongside a reduction in fruit, vegetable and legume intake. The result is a diet with too many ‘empty’ calories and not enough vitamins, minerals, antioxidants or fibre.

Figure 3.9 Stages of the Nutrition Transition



Source: Popkin 2006: 291. By permission of Oxford University Press.

So what, specifically, are the food provisioning issues that are particularly associated with the health issues set out in this section? The changes already outlined in the previous chapter have provided some indications already. Mason and Lang (2017) have classified the key dietary factors as food availability, portion sizes, energy density, meat, food retailing, eating out, food prices and marketing. I will briefly examine each in turn.

## Availability

Using FAO data for the UK Mason and Lang (2017) point to the increasing *availability* of calories increasing from 3,116 to 3,405 per day between 1980 and 2010. Consumption of sugar, in particular, they cite as strongly associated with weight gain. As PHE (2015) have made clear, too much sugar is a major cause of over-weight and associated disease risks and estimates of UK sugar intakes from the NDNS programme show that mean intakes are three times higher than the 5% maximum recommended level in school-aged children and teenagers (14.7% to 15.6% of energy intake) and twice the maximum recommended level in adults (12.1% of energy intake). Food products giving rise to sugar in the diet vary with age as shown in Table 3.1. Overall the main culprits are breakfast cereals, confectionery and beverages.

Table 3.1 Percentage Contribution of Food Groups to Average Daily Free Sugars Intake, 2014/15-2015/16

Food group	1.5-3yrs	4-10yrs	11-18yrs	19-64yrs	65-74yrs	75+ yrs
<b>Cereals and cereal products</b>	31%	33%	29%	24%	29%	33%
<b>Milk and milk products</b>	19%	12%	7%	6%	10%	8%
<b>Eggs and egg dishes</b>	0%	0%	0%	0%	0%	1%
<b>Fat spreads*</b>	0%	0%	0%	0%	0%	0%
<b>Meat and meat products</b>	2%	2%	3%	4%	4%	2%
<b>Fish and fish dishes</b>	0%	0%	0%	0%	0%	0%
<b>Vegetables and potatoes</b>	2%	1%	1%	3%	2%	1%
<b>Fruit</b>	1%	0%	0%	0%	1%	2%
<b>Sugar, preserves and confectionery</b>	20%	23%	21%	25%	27%	33%
<b>Non-alcoholic beverages**</b>	21%	22%	33%	21%	14%	11%
<b>Alcoholic beverages</b>	0%	0%	1%	9%	8%	3%
<b>Miscellaneous†</b>	5%	5%	4%	6%	4%	7%
<b>Average daily free sugars intake (g)</b>	<b>32.6g</b>	<b>52.2g</b>	<b>67.1g</b>	<b>57.1g</b>	<b>51.2g</b>	<b>47.8g</b>

Source: Food Standards Agency and Public Health England (2018)

\* Some oils which are used as a condiment on bread or salads are included in this food group; however this food group does not include oils or fats used in cooking.

\*\*Non-alcoholic beverages are reported as consumed with diluent water.

† In addition to dry weight beverages; soup, manufactured/retail and homemade; savoury sauces, pickles, gravies and condiments; and commercial toddler foods, Miscellaneous also includes nutrition powders and drinks.

### Portion sizes

A portion size is the amount of a food recommended or anticipated for one sitting. Research by the British Heart Foundation (2013) assessed how portion sizes in the UK's main retailers compared to Government data from 1993, comparing like-for-like portion sizes for own-brand food in Sainsbury's, Tesco, Asda and Morrisons. For example,

“While some products were relatively consistent with the old information, such as the cherry bakewell cake and sponge cake, other types of cake and biscuit showed marked increases. For plain sweetmeal biscuits, for example, the stated on-pack portion was higher in each of the brands – around 17 per cent on average compared to a 1993 portion. Assuming the biscuits have the same energy (calorie) content gram for gram, this would mean that eating one biscuit per day now, compared to in 1993, adds another 3300kcal to your diet per year. Our research highlights both the growth and inconsistency in portion size. In 1993 an average portion of American muffins was 85g – today, these portion sizes vary from 72g to 130g. As a result, the different brands had ranges in calories between 280-475kcal.” (British Heart Foundation 2013: 4)

Lewis et al (2012: 2110) conclude that “there is a lack of consistency in the portion sizes communicated to the public” and suggest the need for an “independent and authoritative scheme of suggested portion sizes for all foods, with distinct recommendations for general advice and for weight-loss advice.” (Lewis et al 2012: 2010)

### Energy density

Energy density, linked to high fat or sugary products, often acts cumulatively with portion size causing higher than required intake of calories (Mason and Lang 2017).

### Meat

Rouhani et al (2014) undertook a systematic review and meta-analysis of the relationship between red and processed meat intake and obesity, showing that red and, in particular, processed meat intake is directly associated with a higher risk of obesity.

### Food retailing

This is a complex area and we should not leap to the conclusion that proximity to supermarkets is necessarily associated with obesity. Indeed there is research in both the US (Drewnowski et al 2012) and the UK that suggests otherwise. The key to this is the outlets used when there is limited access to supermarkets such as fast-food outlets. Using data on 9,702 UK adults, one study found that participants living farthest away from a supermarket had higher odds of obesity relative to those living closer (Burgoine et al 2017). Lower education was also associated with higher odds of obesity, with the least-educated living farthest away from a supermarket having 3.39 times the odds of being obese:

“Our results suggest that public health can be improved through planning better access to supermarkets, in combination with interventions to address socioeconomic barriers.” (Burgoine et al 2017: 1)

But supermarkets are not entirely absolved from blame. Mulrooney and Bell (2016) examined food items for sale in various retail outlets and compared them to the UK guidance at the time (the ‘Eatwell Plate’, which has since been superseded by the ‘Eatwell Guide’), where it is recommended that foods and drinks high in fat and/or sugar should comprise no more than 8% of the diet. By contrast these foods and drinks accounted for 33% of the food offer in superstores, 34% in extended convenience stores and 39% in traditional convenience stores:

“Personal responsibility is an important factor here. Personal responsibility is an implicit assumption within public health and few would disagree that consumers need to be part of the solution to diet-related ill-health and their personal, societal and financial costs. However it is easier to make healthy choices in a healthy environment (Butland et al 2007) and retailers must bear responsibility for the obesogenic retail environment that faces the average consumer. Retailers may argue that they offer what consumers want, but the sheer volume and concentration of unhealthy foods stacks the odds in favour of unhealthy food choices, which then leads retailers to stock more in

**“GIVEN THE WELL DOCUMENTED PROPENSITY FOR WEIGHT GAIN AND UBIQUITOUS NATURE OF HIGH FAT, SUGAR AND CALORIE FOODS AND DRINKS IN LARGE PORTIONS, IT IS SURPRISING THAT THE CURRENT PREVALENCE OF OBESITY IS NOT EVEN HIGHER.” (MULROONEY AND BELL 2016: 116)**



response to demand, a vicious cycle which fuels ill-health and health care costs. Given the well documented propensity for weight gain and ubiquitous nature of high fat, sugar and calorie foods and drinks in large portions, it is surprising that the current prevalence of obesity is not even higher.” (Mulrooney and Bell 2016: 116)

### Eating out

Using British Household Panel Survey data, Pieroni and Salmasi (2014) examined the role that fast-food consumption plays in body weight in the UK. They find that fast-food consumption affects individuals with higher body mass index (BMI) more heavily, especially women:

“Women living in areas with prices of take-away meals and snacks higher than the median value have on average a BMI of 0.7 points lower than their counterpart living in regions with lower prices. The same result is found also when we calculate median BMIs. Consistently, the percentage of obese women living in areas with lower prices of unhealthy food is high, 20.76%, and is found to be 4% points higher than that shown in areas with prices above the median 16.56%.” (Pieroni and Salmasi 2014:100)

Cetateanu and Jones (2014) examined the incidence of children who were overweight or obese, for 6,781 geographical areas across England known at the level of as Middle Super Output Areas (MSOAs) with an average population of 7,500 in the context of the proximity of fast food outlets. Using a large cross sectional English sample, they quantified the association between weight status of children aged 4 to 5 and 10 to 11 years, the characteristics of the food environment, and area deprivation. They observed a positive association between the density of unhealthy food outlets in a neighbourhood and the prevalence of overweight and obesity in children. However, “the prevalence of fast food and other unhealthy food outlets explained only a small proportion of the observed associations between weight status and socio-economic deprivation” (Cetateanu and Jones 2014: 68). Though another study in Leeds did reveal a significant positive relationship between the density of fast food outlets and childhood obesity status, alongside the expected significant association between fast food outlet density and areas of higher deprivation (Fraser and Edwards 2010).

### Janssen et al (2006) Canadian Study Highlights

Low socioeconomic status (SES) is a risk factor for obesity. The study sample consisted of 6684 youth in grades 6-10 from 169 schools across Canada. Individual-level SES exposures included material wealth and perceived family wealth. Area-level SES exposures included unemployment rate, percentage of adult residents with less than a high school education, and average employment income from head of household. Both individual-level and all three area-level SES measures were inversely associated with obesity. The odds for unhealthy eating were increased for those living in an area with a low percentage of residents with a high school education. The odds of being physically inactive increased with decreasing levels of material wealth and perception of family wealth. Individual- and area-level SES measures were independently related to obesity, which suggests that **both individual and environmental approaches** may be required to curtail adolescent obesity.

The association between deprivation and obesity is well known, with UK studies convincingly showing that overweight and obese children are more likely to come from socio-economically deprived areas (Conrad and Capewell 2012; Cummins et al 2005; Kinra et al 2000; Macdonald et al 2007; Wilsher et al 2016). The same applies in Canada (Janssen et al 2006).

### Food prices

Mason and Lang (2017) point to research showing that lower price supermarkets can be linked to higher levels of obesity (Drewnowski et al 2012) and that less healthy foods tend to be lower in unit price per calorie than healthier foodstuffs. Jones et al (2014) examined prices of more and less healthy foods over time:

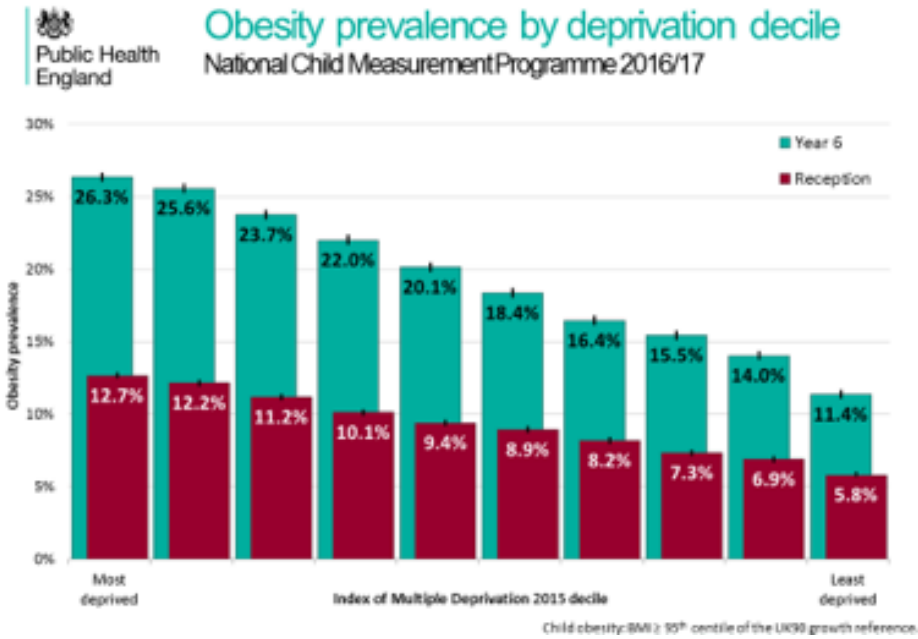
“We linked economic data for 94 foods and beverages in the UK Consumer Price Index to food and nutrient data from the UK Department of Health’s National Diet and Nutrition Survey, producing a novel dataset across the period 2002-2012. Each item was assigned to a food group and also categorised as either “more healthy” or “less healthy” using a nutrient profiling model developed by the Food Standards Agency....all prices had risen over the period 2002–2012, but more healthy items rose faster than less healthy ones in absolute terms: £0.17 compared to £0.07/1000 kcal per year on average for more and less healthy items, respectively.” (Jones et al 2014)

**Marketing**

This is a broad topic and in general terms the advertising and marketing of food is all around us. Direct specific links between marketing strategies and healthy foods are not strong in the UK.

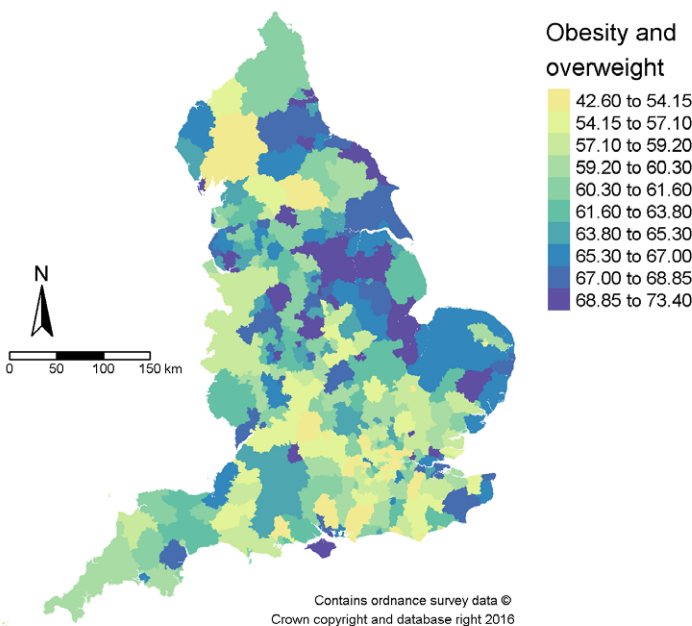
Finally in this section on food provisioning issues associated with health issues, as already indicated, there is an association between poor diets, health and geographical and socio-economic conditions as shown in Figures 3.10 and 3.11.

Figure 3.10 Obesity Prevalence by Deprivation Decile



Source: National Child Measurement Programme data: NHS Digital <http://content.digital.nhs.uk/ncmp>  
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Figure 3.11 Percentage Overweight and Obese People, 2015-16  
Lower Tier Local Authority (unitaries, metropolitan boroughs and districts)



Source: Public Health England

## CONCLUSIONS

The link between diet and health is indisputable, indeed the evidence gets stronger all the time. As indicated in the opening chapter, when I accepted the challenge given to me by the Nuffield Farming Scholarships Trust I had not anticipated delving into health issues to quite the extent that I do in this chapter. This exercise has taken me well outside my academic comfort zone into territory that I have found intellectually challenging and stimulating in equal measure. On a personal note I have been affected by what I have learned both in my food choices and in the design of a new third year module on *The Politics of Food, Farming and Nature* for Exeter Politics undergraduates.

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### Chapter 3 Key Findings

#### 01.

Food choices affect health.

#### 02.

The burden of ill health that can be linked directly to poor diet is a major challenge for UK society.

#### 03.

Dietary recommendations are clear and yet progress towards achieving them is slow.

## 04. FARMING FOR HEALTH

### INTRODUCTION

Historically, farming has been about food production in the context of the provision of basic commodities. Even in a developed trading nation such as the UK, there is a strong historic memory of war and postwar food rationing and food shortages. Ration cards were still needed for some foods well into the 1950s and food security, though hardly a driving policy imperative especially in the era of Common Agricultural Policy (CAP)-induced food surpluses in the 1970s and 1980s, re-emerged in the late 2000s in the context of global food price increases and escalating concerns about climate change and natural resources (Foresight 2011). One thing became rapidly clear with the renewed attention to food and agriculture, food security is no longer, if indeed it ever was, solely about the *availability* of food. The food security discourses and policy imperatives, certainly in a global context, now include nutritional quality and social justice. As Pinstrup-Andersen (2009) pointed out in the inaugural issue of the journal *Food Security*, the use of the term food security at the national and global level has tended to focus on the supply side. But looking beyond food availability as dietary energy we need to consider access and health:

**“... AVAILABILITY DOES NOT ASSURE ACCESS, AND ENOUGH CALORIES DO NOT ASSURE A HEALTHY AND NUTRITIONAL DIET. THE DISTRIBUTION OF THE AVAILABLE FOOD IS CRITICAL. IF FOOD SECURITY IS TO BE A MEASURE OF HOUSEHOLD OR INDIVIDUAL WELFARE, IT HAS TO ADDRESS ACCESS.”**  
(PINSTRUP-ANDERSEN 2009: 5)

For farmers, this means the potential for heightened attention to the nutritional content of their products extending far beyond the traditional concerns of safety, quality and provenance and there are clear indications of this in the increased interest in research into nutrition-sensitive agriculture interventions, in various contexts across the world (Berti et al 2016; Yu and Tian 2018) and to some extent in the UK (Freitag et al 2018). In short, as a result of the health consequences of the nutrition transition farmers *may* face new market changes presenting both challenges and opportunities. But the emphasis has to be on the word *may*. As I said at the outset, this report could be either an exercise in extrapolation or a more creative attempt to imagine a better future. By focusing so much on the health challenge emerging from various aspects of contemporary food culture, I have clearly opted for the normative approach. My commitment to a healthier

food culture has to be put alongside my commitment to agriculture, to the role played by farmers in our rural economies, environments and communities (Lobley and Winter 2016). My focus on food and health does not mean that I am anything other than deeply concerned about the challenges facing farming, particularly lowland livestock farming, as we face Brexit.

So the first section of this chapter highlights some of the economic characteristics of the industry that have been brought into sharp relief as a result of the impending overhaul of policy. The two key issues here for UK agriculture are uneven productivity across the breadth of farm businesses and the industry's dependence on CAP payments. Any ask of the UK's farmers to respond to both food cultural shifts and to the health agenda requires a proper appreciation of the industry and the difficulties it faces. Merely to heap yet more 'demands' on a beleaguered sector without such an understanding is inappropriate and unhelpful.

Continuing with the contemporary context of UK agriculture, the next section of the chapter provides a quick overview of the direction of travel for UK agriculture that was underway well before the 2016 EU membership referendum, summed up under the theme of *Sustainable Intensification* (SI). SI is a policy and research imperative, originating in the food price spike of 2008 for agriculture, to increase production, or certainly improve productivity, at the same time as facing the urgent need to tackle environmental issues. I will explore the extent to which SI might be adapted to incorporate human nutrition imperatives, something to which I will return in the final chapter.

Then I will examine a range of key commodities where there is potential scope for adaptation or diversification within agriculture in response to the food/health challenge. The chapter concludes by looking at the extent to which health and agriculture policies align.

## CONTEMPORARY AGRICULTURE AND ITS UNCERTAIN FUTURE

Although these issues have come to the fore during the Brexit era, as evidenced in the data accompanying the Government's current Consultation on the future of agriculture (Defra 2018), they were already subject to discussion in advance of the referendum. In work I undertook for the Prince's Countryside Fund, with colleagues Matt Lobley from Exeter and Paul Wilson from Nottingham University, we examined the challenges facing UK agriculture and, particularly, its smaller farmers (Winter and Lobley 2016, Wilson 2016). This included an analysis of Farm Business Survey (FBS) data and some of the findings from this aspect of the work are set out in Figures 4.1, 4.2 and 4.4 below.

Why have I put this set of graphs in a study of food culture and farming? In the first instance, quite simply to demonstrate the high level of dependency on CAP payments of many sectors of agriculture as shown so clearly in Figures 4.1 to 4.3. Nor is this dependency confined to upland and livestock farming, an impression that is sometimes given. 76% of Farm Business Income (FBI) in the cereal sector, for example, was derived from Single Farm Payment in 2014/15 (Figure 4.2), a sector that made a loss on its agricultural operations in 2015/16 (Figure 4.3).

The nature and the length of the transition from CAP-dependency to a more market-orientated agriculture (with additional payments for public goods) following the UK's departure from the EU is a crucial 'unknown', but it is clear that unless UK agriculture can make this transition creatively its ability to respond adequately to the food and health agenda outlined elsewhere in this report will be seriously compromised.

The second reason for this detour into FBS data, as shown in Figures 4.4 and 4.5, is the question of performance.

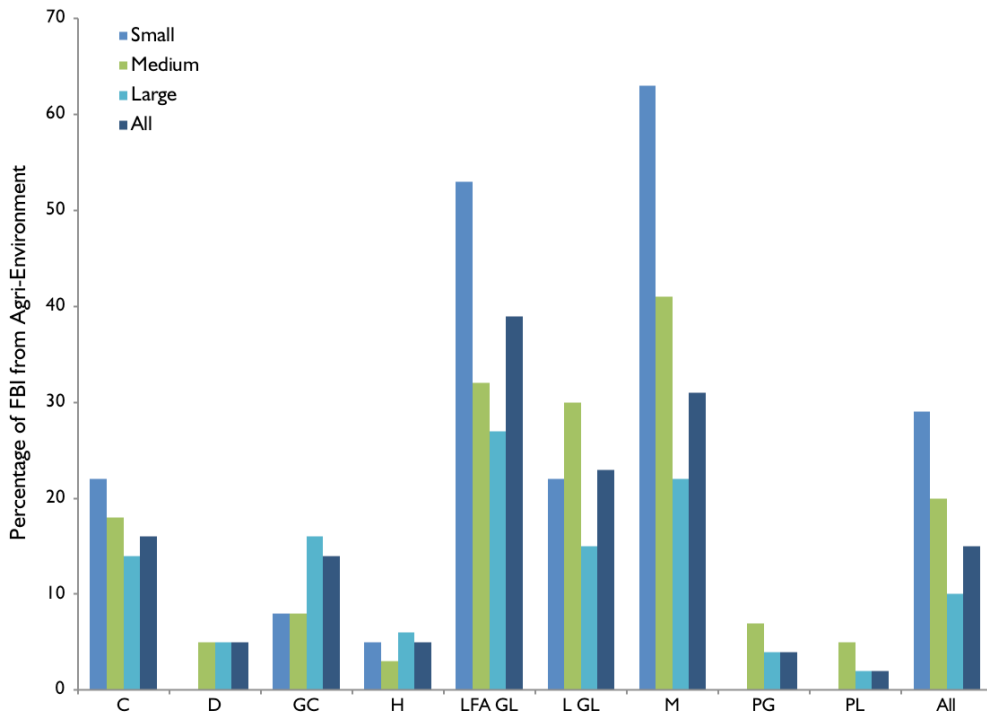
One of the positive outcomes of the Brexit debate has been a renewed attention on the question of productivity and performance in UK agriculture. The range of financial performance (Figure 4.4) is quite extraordinary. Note also that size of farm is not as an important factor as sometimes assumed. Small farms<sup>4</sup> can perform well, for as Wilson (2016) explains:

"...within the lower FBI quartile group (D), on average these businesses recorded a negative FBI outcome across all Farm Size groups, with the greatest FBI loss occurring in the Large Farm Size group (D). Hence, while FBI performance is, on average lower for the Small Farm Size group, this size group also records the lowest average range in FBI performance across the Farm Size Groups." (Wilson 2016: 9)

A measure of financial performance and potential business vulnerability is gearing (total liabilities as a percentage of net worth) which, as Figure 4.5 indicates, is lower on small farms overall business worth than larger businesses (which have typically borrowed more to expand and/or own less of their land), indicating the potential for a greater degree of financial stability (Wilson 2016; also see Andersons 2016). However, this could be seriously compromised by a sudden reduction in income.

4 The size categories used were based upon Standard Labour Requirements (SLR): Small=<2 SLR; Medium=2-<3SLR; Large=3SLR or greater.

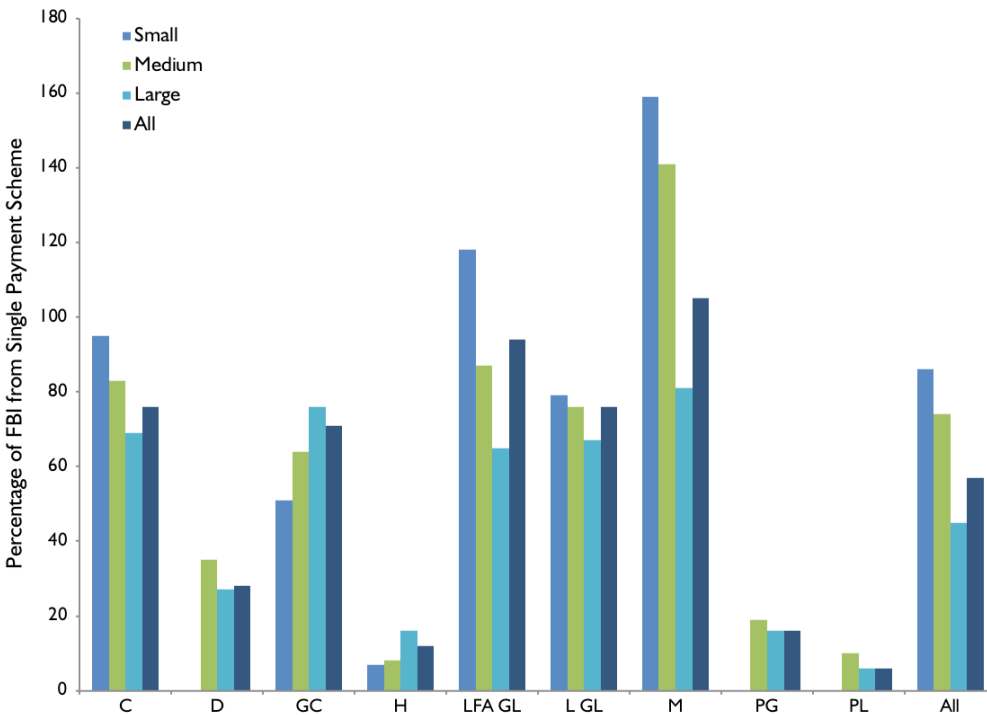
Figure 4.1 Percentage of FBI derived from Agri-Environment, by Farm Type and Farm Size in England and Wales, 2014/15



Key to farm types: C=Cereals; D=Dairy; GC=General Cropping; H=Horticulture; LFA GL=Less Favoured Area Grazing Livestock; L GL=Lowland Grazing Livestock; M=Mixed; PG=Pigs; PL=Poultry.

Source: Wilson 2016; Winter and Lobley 2016: 58.

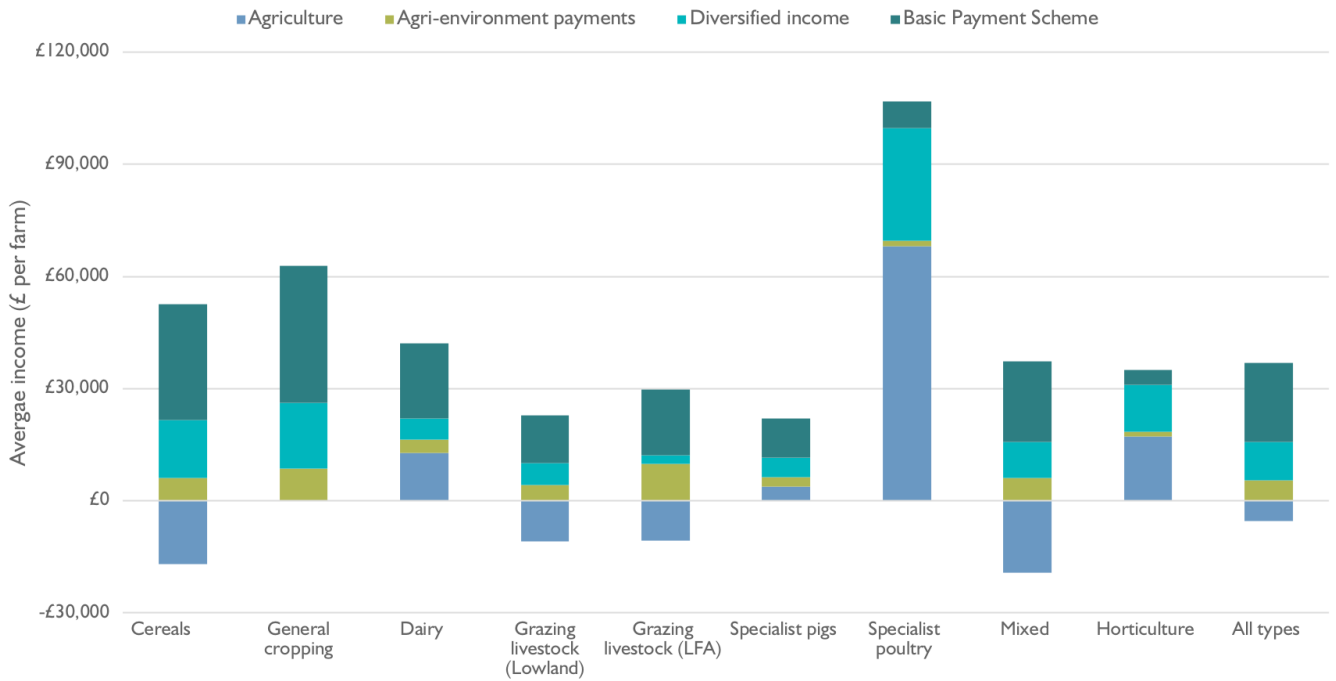
Figure 4.2 Percentage of FBI derived from Single Farm Payment, by Farm Type and Farm Size in England and Wales, 2014/15



Key to farm types: C=Cereals; D=Dairy; GC=General Cropping; H=Horticulture; LFA GL=Less Favoured Area Grazing Livestock; L GL=Lowland Grazing Livestock; M=Mixed; PG=Pigs; PL=Poultry.

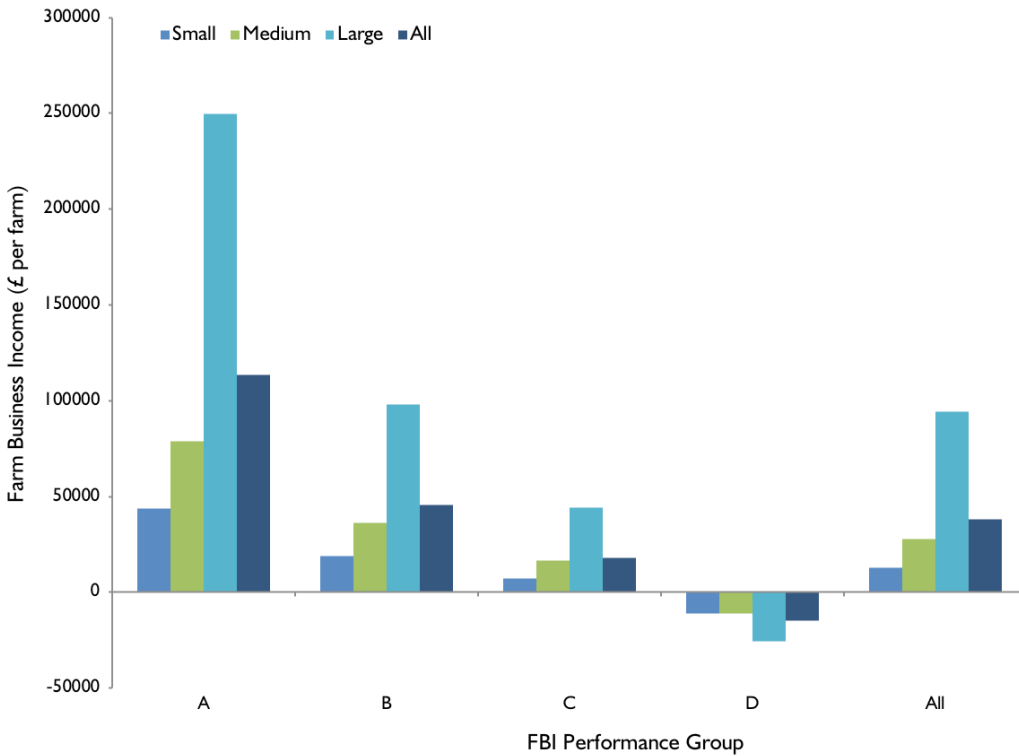
Source: Wilson 2016; Winter and Lobley 2016: 59.

Figure 4.3 FBI for each Cost Centre, 2015/16, England



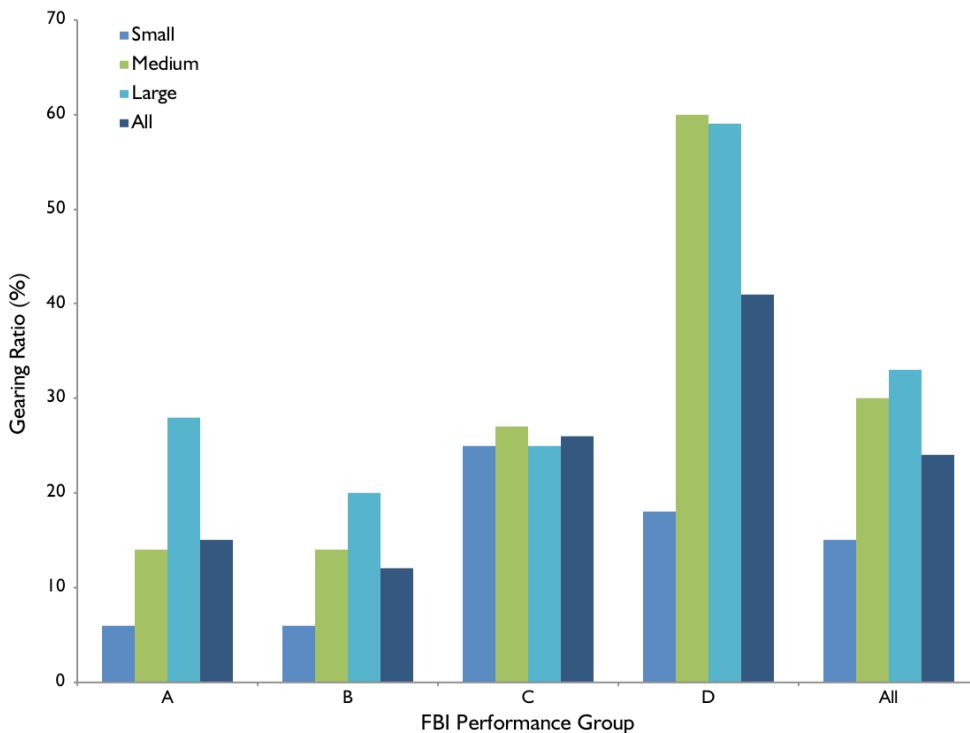
Source: Defra 2017.  
Graph reproduced with the kind permission of Matt Lobley.

Figure 4.4 FBI (£/farm) by FBI Performance Group and Farm Size in England and Wales, 2014/15



Source: Wilson, 2016; Winter and Lobley 2016: 57.  
Observations=2418. Wald Test: F=801.95; p-value<0.001.  
A – top performing through to D – worst performing.

Figure 4.5 Gearing Ratio, by FBI Performance Group and Farm Size in England and Wales, 2014/15



Source: Wilson 2016; Winter and Lobley 2016: 62.

Observations=2417 (excludes one extreme outlier).  $F=10.23$ ;  $p\text{-value}<0.001$ .

A – top performing through to D – worst performing.

## SUSTAINABLE INTENSIFICATION (SI)

Having spent a good deal of my time in the last four years working on SI, I have become convinced of four things:

- The emphasis on SI, even if the terminology changes, will not go away;
- The lessons from Integrated Farm Management (IFM) and organic agriculture are both relevant to SI but neither define SI;
- The balance between agro-technology and agro-ecology solutions within SI is unresolved;
- The place of nutrition within much SI research remains limited (though see Garnett et al 2013), and this has to change.

Let's briefly examine each of these propositions in turn as they are highly relevant to what we might expect from agriculture in terms of its response to food cultural shifts. In so doing we will also define some of the key terms set out here, such as SI, IFM, agro-technology and agro-ecology.

First, what is SI and why is it here to stay? As Lobley et al (2018) explain:

“The power of the term SI is because it is arresting and provocative. It appears to offer solutions to intractable problems by combining seemingly opposing and contradictory elements, sustainability and intensification. And, we would suggest that it has been embraced by some

in government precisely because, linguistically at least, it seems, to offer resolution and reconciliation between the competing demands for more food and a better natural environment. In that sense, although its origins lie clearly in scientific work, it is also an ideological and political construct. Its oxymoronic quality, decried by some, is deliberate, almost a dialectical approach aimed at solving some of society's most ‘wicked’ of problems.” (Lobley et al 2018)

At its simplest, SI is about efficiency, an economic concept, but while this can be, and often is, measured solely in financial accounting terms, it is *agronomic efficiency* – the ability to deliver the greatest level of food output for the lowest amount of input – that drives much of SI thinking through, for example, closing yield gaps (Mueller et al 2012) or applying agro-ecological understanding to farming systems to reduce inputs. Thus SI has often been framed as ‘producing more from less’ with the heavy lifting to address this goal to be undertaken by agricultural and ecological science. But SI really needs to cover *everything* that might be expected from land and its management, and this will encompass multifunctionality and the provision of ecosystem services (food and fibre after all are provisioning services in that framework), and maybe too the promotion of nutrition security. Its breadth and its adaptability in terms of the multiple demands made on our land base ensures that the principles and goals associated with SI will survive even if use of the term itself ebbs and flows in the years to come.



Secondly, farming systems that seek to minimise external inputs and optimise outputs with minimal environmental damage will lie at the heart of SI. Organic systems are well known and they have a part to play in SI but, hitherto, IFM has been closer to SI. Championed by LEAF over many years as *a whole farm business approach that delivers sustainable farming*, IFM according to LEAF:

“...uses the best of modern technology and traditional methods to deliver prosperous farming that enriches the environment and engages local communities. A farm business managed to IFM principles will demonstrate site-specific and continuous improvement across the whole farm addressing:

- Organisation and Planning
- Soil Management and Fertility
- Crop Health and Protection
- Pollution Control and By-Product Management
- Animal Husbandry
- Energy Efficiency
- Water Management
- Landscape and Nature Conservation
- Community Engagement”

(Source: [https://archive.leafuk.org/leaf/farmers/LEAFs\\_IFM/Whatisifm.eb](https://archive.leafuk.org/leaf/farmers/LEAFs_IFM/Whatisifm.eb))

The LEAF reference to the best of modern technology and traditional methods brings me to my third proposition, namely that the balance between agro-technology and agro-ecology solutions within SI is unresolved. The fact that both IFM and organic thinking can co-exist within the SI community is positive and I am passionately committed to moving beyond the false dichotomy, as I see it, between on the one hand agro-technology epitomised by GM technologies<sup>5</sup> but also including use of robots, drones, and global positioning systems technology in tractor cabs, and, on the other hand, the principles of organic agriculture as expressed within the agro-ecology movement. But co-existence of ideas does not necessarily mean mutual respect and understanding especially when some of the proponents of either agro-technology, for example Rickard (2015) or agro-ecology (Holt-Gimenez and Altieri 2013) express deep suspicion of the ‘other side’.

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## Defra’s Sustainable Intensification Research Platform (SIP)

SIP ran from 2014 to 2018 and involved a large and diverse collaboration of 35 project partners and engaged with a wider community of individuals and organisations in an interdisciplinary approach to evaluate and assess SI practices, opportunities and barriers in England and Wales. SIP comprised three linked and transdisciplinary research projects:

SIP Project 1. Integrated Farm Management for improved economic, environmental and social performance.

SIP Project 2. Opportunities and risks for farming and the environment at landscape scales.

SIP Project 3. A scoping study on the influence of external drivers and actors on the sustainability and productivity of English and Welsh farming.

See [www.siplatform.org.uk/outputs](http://www.siplatform.org.uk/outputs)

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<sup>5</sup> I do not wish to get into the GM debate in this report but if GM innovations had demonstrable human health and environmental sustainability benefits some of the opposition might diminish. For a strong defence of GM from a former opponent see Lynas 2018.

Finally in this section on SI, I turn to what SI might mean in practice and the extent to which human nutrition is covered. Table 4.1 lists the priority interventions for SI identified under SIP (Dicks et al 2018). It demonstrates the limited extent, so far, to which human nutrition thinking has penetrated the thinking on SI despite the breadth of the community that was involved in SIP (but see Ingram et al 2013 for greater attention to nutrition within an SI context).

The priority interventions under SIP were determined through a collaborative solution scanning and prioritisation (Sutherland et al 2011), involving key stakeholders (including 21 academic researchers, five research farm managers, nine business representatives, eight Non-Governmental Organisation (NGO) representatives, and two Government representatives (Defra and the Welsh Government). However there are some ways in which some of these interventions might be coupled with positive nutrition interventions, which are discussed in greater detail in the next section.

Two, in particular, stand out:

- Improvements to livestock systems (SIP 4, 5, 13, 4 and especially 17 in Table 4.1) that would increase possibilities for pasture-fed meat.
- Greater use of legumes (SIP 12 in Table 4.1), potentially increasing supply of pulses for human nutrition.

It should be noted that the priority interventions were identified at the start of the SIP, and by the end of the project nutrition had become a more significant part of the discussion, for example at the lowland livestock workshop at North Wyke in April 2017. But a great many potential nutrition interventions are not covered within current SI thinking. For example, as a finalé to the SIP programme the Association of Applied Biologists (AAB) held a three day conference at Rothamsted Research in December 2017. The published conference proceedings (AAB 2017) have no papers that centre on human nutrition, through a few touch on it briefly.

Table 4.1 SIP Priorities for Sustainable Intensification

- |  |  |
|--|--|
| <p><b>01.</b> Grow crop varieties with increased tolerance to stresses such as drought, pests or disease.</p>  | <p><b>10.</b> Provide training for farm staff on how to improve sustainability/environmental performance.</p>  |
| <p><b>02.</b> Reduce tillage to minimum or no till.</p>  | <p><b>11.</b> Use soil and plant analysis with technology to use fertiliser more efficiently.</p>  |
| <p><b>03.</b> Incorporate cover crops, green manures and other sources of organic matter to improve soil structure.</p>  | <p><b>12.</b> Plant legumes – includes peas and beans, for forage and other products.</p>  |
| <p><b>04.</b> Improve animal nutrition to optimise productivity (and quality) and reduce the environmental footprint of livestock systems.</p>   | <p><b>13.</b> Use animal health diagnostics to enhance livestock productivity and animal welfare.</p>  |
| <p><b>05.</b> Reseed pasture for improved sward nutrient value and/or diversity.</p>   | <p><b>14.</b> Keep more productive/prolific livestock – genetics, breeding technologies (Essential Breeding Values, Artificial Insemination, Embryo Transfer).</p> |
| <p><b>06.</b> Predict disease and pest outbreaks using weather and satellite data, and use this information to optimise inputs.</p>  | <p><b>15.</b> Controlled traffic farming to minimise soil compaction and energy use.</p>   |
| <p><b>07.</b> Adopt precision farming: using the latest technology (e.g. Global Positioning Systems) to target delivery of inputs (water, seeds, pesticides, fertilisers, livestock manures).</p>    | <p><b>16.</b> Reduce the risks associated with pesticide use by adopting Integrated Pest Management techniques.</p>  |
| <p><b>08.</b> Monitor and control on-farm energy use.</p>  | <p><b>17.</b> Optimise grazing management to reduce bought-in feeds and increase nitrogen use efficiency.</p>  |
| <p><b>09.</b> Improve the use of agriculturally marginal land for natural habitats to provide benefits such as soil improvement, pollution control or pollination, and allow wildlife to thrive.</p> | <p><b>18.</b> Benchmarking of environmental, in addition to financial, performance.</p>  |

A broader and more generic approach to SI is proposed by Rockstrom et al (2017) and although put forward as a paradigm the eight key operational strategies do not explicitly translate into human-nutrition objectives (although they are refreshingly strong on bringing agro-ecology thinking alongside agro-technology):

- “Plan and implement farm-level practices in the context of cross-scale interactions with catchments, biomes, and the landscape as a whole. Maximize farm-level productivity by maximizing ecological functions, from moisture feedback to disease abatement, across scales;
- Integrate ecosystem-based strategies with practical farm practices, where natural capital (soil, biodiversity, nutrients, water) and multi-functional ecosystems are used as tools to develop productive and resilient farming systems;
- Develop system-based farming practices that integrate land, water, nutrient, livestock, and crop management;
- Utilize crop varieties and livestock breeds with a high ratio of productivity to use of externally and internally derived inputs;
- Adopt circular approaches to managing natural resources (e.g. nutrient recycling) and mixing organic and inorganic sources of nutrients;
- Harness agro-ecological processes such as nutrient cycling, biological nitrogen fixation, allelopathy, predation, and parasitism;
- Assist farmers in overcoming immediate SI adoption barriers and build incentives for their sustained adoption, rendering the ecological approach profitable in the long run;
- Build robust institutions of small farmers, led especially by women, which enable an equitable interface with both markets and government.” (Rockstrom et al 2017: 9)

## TURNING TO COMMODITIES

In this section I look at some of the key commodities and consider how human nutritional concerns might begin to influence production processes within an SI context.

### Meat and Milk

I was at a farmers’ meeting not so long ago and we were talking about the future of livestock farming. One farmer expressed concern about the rise of veganism. Another was dismissive of the concern, “it’s only a phase,” she said and I sensed the room was with her. I would couch it rather differently. Veganism remains a minority position but it is growing. It is indicative of a much wider set of concerns about ‘meat’ that find expression in vegetarianism and more widely either in reduced or ‘guilty’ meat consumption. It is, of course, impossible to say how far this trend will go. But is the appropriate response of farming to mount a vigorous advertising campaign to encourage more meat eating and so put itself at odds with dietary recommendations? I don’t think so. But nor do I consider the farming industry should sit back and fatalistically accept a declining market position. The meat sector is one example of where the industry needs to understand and adapt to change. Legitimate health concerns over the consumption of meat, especially red meat, will not go away.

It has long been the case that white meat has been perceived as a healthier option than red meat and moreover, as pigs and poultry are more efficient feed converters, from a resource-efficiency viewpoint white meat can be seen as a more ‘sustainable’ option. What these arguments do not fully take into account are issues of animal welfare and the fact that ruminants, unlike pigs and poultry, can be fed on feed not directly palatable to humans such as grass and crop residues (Eisler et al 2014).

Crucially there is now increasing evidence of the health benefits of grass-raised beef and some producer groups are promoting their products on this basis, such as the Pasture Fed Livestock Association and “Pasture for Life” (see [www.pastureforlife.org](http://www.pastureforlife.org)).

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Growing consumer interest in grass-fed beef products has raised a number of questions with regard to the perceived differences in nutritional quality between grass-fed and grain-fed cattle. Research spanning three decades suggests that grass-based diets can significantly improve the fatty acid (FA) composition and antioxidant content of beef, albeit with variable impacts on overall palatability. Grass-based diets have been shown to enhance total conjugated linoleic acid (CLA) (C18:2) isomers, trans vaccenic acid (TVA) (C18:1 t11), a precursor to CLA, and omega-3 (n-3) FAs on a g/g fat basis. While the overall concentration of total saturated FAs is not different between feeding regimens, grass-finished

beef tends toward a higher proportion of cholesterol neutral stearic FA (C18:0), and less cholesterol-elevating SFAs such as myristic (C14:0) and palmitic (C16:0) FAs. Several studies suggest that grass-based diets elevate precursors for Vitamin A and E, as well as cancer fighting antioxidants such as glutathione (GT) and superoxide dismutase (SOD) activity as compared to grain-fed contemporaries. Fat conscious consumers will also prefer the overall lower fat content of a grass-fed beef product. (Daley et al 2010: 1)

There has also been research in the dairy sector emphasising the importance of grass-fed milk (Lee et al 2017). Dairy products are, of course, an important source of calcium and protein. The precise balance of FAs they contain is important for human health and is determined by the feeds given to cows and how these are metabolised in the rumen. Stergiadis et al (2012) have shown how grazing fresh pasture produces milk with higher concentrations of beneficial polyunsaturated FAs. Work at Newcastle University under SIP has also looked at how milk quality might be affected by different feeds when grass is seasonally unavailable examining in particular rapeseed (Davies et al 2017 Stergiadis 2014). And other work on oats as part of the dairy-cows' diet shows potentially healthier FA profile compared to wheat (Moorby 2015).

### Fruit and Vegetables: The New Opportunity?

As shown in Chapter 2, Defra (2017a) has some interesting data on the balance of imports and exports in various key food commodities. In 2016 whisky was exported to the value of in excess of £4 billion compared to imports of £171 million. At the other end of the trade gap scale are fruit and vegetables. We imported £2.3 billions' worth of fresh vegetables and conversely exported £109 million of produce. In the case of fresh fruit, the respective figures are £3.6 billion and £113 million. This massive trade deficit has not gone unrecognised by the sector and this gap has expanded significantly in recent years. Of course, no-one is pretending that the gap could be filled entirely. It includes crops, such as bananas and citrus fruit which we cannot produce in the UK, but the potential scope to expand production of a range of soft fruit, apples, pears and plums, nuts and many vegetables is enormous and plays well to both the health and local provenance agendas.

There is a particular challenge of potential shortages of seasonal labour hinging on the Brexit negotiation that may well slow the sector's expansion in the short term and this has received a great deal of publicity. But I would argue that there is also a more generic skills issue in terms of farming itself. These crops tend to be grown by a relatively small number of highly specialised and knowledgeable growers.

The skills, knowledge and capital required to successfully engage with some specialist crops is such that expansion is not a given, whatever the apparent consumer demand might be, especially where there is a long lead-in time before income flows are assured. Where opportunities can be grasped the potential for growth is very real as in the case of asparagus.

There is potentially a big opportunity for the fruit and vegetable sector through the adoption of new technologies such as robotics, imaging, mapping, storage, yield, irrigation and nutrient modelling<sup>6</sup>. Some of the big producers are doing their own research, but typically the manufacturers/service suppliers have focused on the broadacre crops.

Sometimes the innovation can take place at a farm-scale without recourse to laboratory-based research or high levels of technological investment. For example, John Chinn in Herefordshire has extended the season for the cultivation of asparagus by the use of polytunnels and also growing so-called 'reverse season' asparagus, based on a principle developed more than two thousand years ago: "the Romans used to send runners to take the asparagus up to the Alps to store it in ice so they could have it fresh later in the year". Adapting this idea so as to produce asparagus later in the season, Chinn allows the plant to fern from March to August without harvest. He then cuts all the ferns, thereby encouraging them to spear in September and October. Half of Chinn's Herefordshire farm of 3,000 acres is now devoted to the cultivation of asparagus.

### Asparagus

High in vitamin K and folate (vitamin B9), asparagus is extremely well balanced, even among nutrient-rich vegetables. "Asparagus is high in anti-inflammatory nutrients," said San Diego-based nutritionist Laura Flores. It also "provides a wide variety of antioxidant nutrients, including vitamin C, beta-carotene, vitamin E, and the minerals zinc, manganese and selenium."

Source: [www.livescience.com/45295-asparagus-health.html](http://www.livescience.com/45295-asparagus-health.html)

<sup>6</sup> I am grateful to Stuart Knight of NIAB for drawing my attention to these possibilities.

<sup>7</sup> [www.telegraph.co.uk/foodanddrink/recipes/11838908/Asparagus-in-autumn-Meet-the-man-behind-its-extended-season.html](http://www.telegraph.co.uk/foodanddrink/recipes/11838908/Asparagus-in-autumn-Meet-the-man-behind-its-extended-season.html). I am grateful to Professor Sir David Baulcombe for drawing my attention to the asparagus story.

## Cereals

As we have seen, healthy eating guidelines invariably list foods made with whole grains as important to health and wellbeing. Whole grains provide nutritional benefits to consumers connected to the many individual nutrients and bioactive compounds also called phytochemicals) they contain. Cereal fibre and whole-grain intakes have been consistently associated in the epidemiological literature with reduced mortality and risk of chronic disease including obesity, CVD and Type 2 diabetes (Smith and Tucker 2011).

Historically there has been some variation in the definition of “whole grain”. However since 2010 the EU-funded project HEALTHGRAIN identified the need to develop a European definition. There is now a growing international consensus that whole grains “consist of the intact, ground, cracked or flaked kernel”, which, “after removal of the inedible parts such as the hull or husk”, must contain “the same relative proportions of starchy endosperm, germ and bran found in the intact kernel. Small losses of components, that is less than 2% of the grain or 10% of the bran, that occur through processing are allowed”.

Whole grain can be a food on its own such as oatmeal, brown (red, black, or wild) rice or popcorn. Alternatively, it can be processed and used as an ingredient in a product.

Source: [www.eufic.org/en/whats-in-food/article/whole-grains-updated-2015](http://www.eufic.org/en/whats-in-food/article/whole-grains-updated-2015)

Recently some emphasis has been given to researching the health and nutrition claims of some of the non-wheat cereals (see Gilissen 2015 on oats). For example, Newton et al (2011) have reported on the nutritional characteristics of barley, stemming from the cholesterol-lowering effect of  $\beta$ -glucan, a cell-wall polysaccharide found in barley and also in oats (Wood et al 1989; Newman et al 1989; Newton et al 2011). This has led to initiatives to incorporate barley flour into wheat-based foods including bread (Izydorczyk et al 2001) and pasta (Cavallero et al 2000). As Newton et al (2011) point out there has been relatively limited commercial development in terms of mainstream bread suppliers but some artisanal bread producers have begun to explore the possibility. Beta glucan ( $\beta$ -glucan) is a soluble fibre derived from oats or barley grains that has benefits in insulin resistance, dyslipidemia, hypertension, obesity, and lowering cholesterol:

“The fermentability of  $\beta$ -glucans and their ability to form highly viscous solutions in the human gut may constitute the basis of their health benefits.” (Khoury et al 2012: 1)

And then there is BarleyMax™ an enhanced wholegrain discovered by Dr Morell and his team at the CSIRO in Australia which contains twice the dietary fibre and four times the resistant starch of a regular grain and 70% more  $\beta$ -Glucan than oats. NIAB is currently working on the development of UK-adapted BarleyMax™ varieties for possible use in breakfast cereals (Stuart Knight personal communication). Also at NIAB there is the Smart Carbohydrate Centre, a joint initiative with the John Innes Centre focusing on starches in barley.

## Barley Uses – Old and New

*Beremeal* is a speciality barley flour long produced in the Highlands and islands of Scotland. In Orkney Beremeal is derived from a traditional variety called Scots Bere believed to have been brought to the islands by Viking invaders (Jarman 1996). *Argo's Bakery* in Orkney still uses it to make breads, bannocks and crackers.

*Leeds Bread Co-op* is a Leeds based artisan bakery. Like a number of new ‘real-bread’ producers up and down the country it includes a range of non-traditional cereals in its breads.

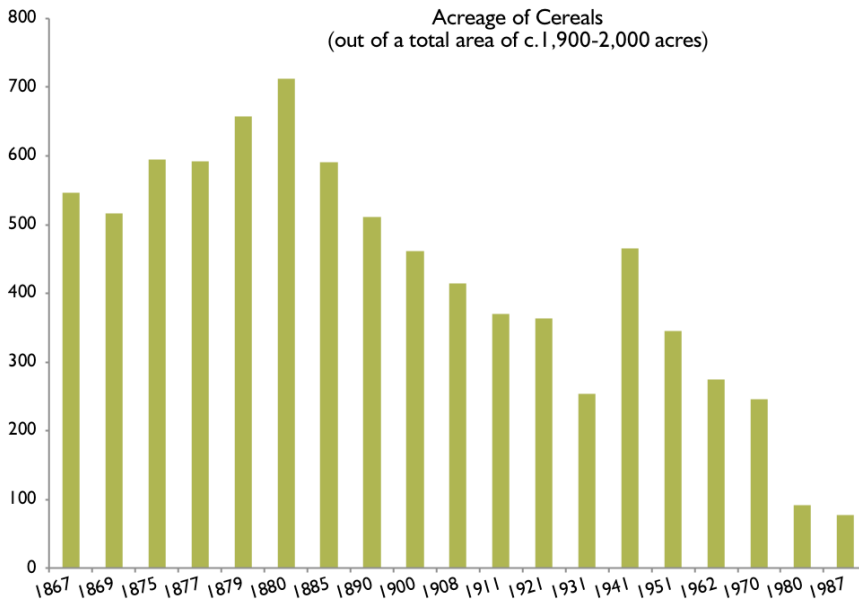
*Barliv™* – derived from barley, this new ‘functional food’ developed by Cargill is a source of  $\beta$ -glucan, a soluble fibre, which can be added to foods and beverages (Palmer 2006).

In agricultural terms, barley and oats are less demanding than wheat in terms of soil type and weather (for example, barley and, especially, oats are more tolerant to frosts during reproductive development), although barley and oats are more prone to certain diseases than wheat. Certainly barley and oats were frequently grown in the past in areas of England now given over predominantly to grass:

“On a global scale, however, it is the adaptability of barley to a very wide range of environments compared to other cereal crops, rather than its nutritional properties, that has been the main driver for food use. Barley can be cultivated at latitudes up to 70°N (Grando and Gomez Macpherson 2005), where six-row varieties, selected for extreme earliness and high harvest index, out-compete all other cereal species (Fischbeck 2002). Barley thus persisted as a major cereal for food in many parts of northern Europe into the 20th century...” (Newton et al 2011)

In the UK, the decline in the cultivation of oats and barley in the north and west of the country and the prevalence of wheat and oilseed rape in the east has led to a level of regional specialisation that many now take for granted. But it was not always so. Exworthy (not its real name) is a village in west Devon which I have been researching with colleagues for a number of years (see Lobley and Winter 2016). With a rainfall of in excess of 40 inches and heavy soils it is nowadays seen as grass-growing country. This is consistent with the regional specialisation that has taken place in agriculture in the post-war period but Figure 4.6 shows that this has not always been the case with cereals accounting for up to a third of the farmed area in the late nineteenth century.

Figure 4.6 Exworthy Agricultural Census



Might this decline in cereals in the north and west be reversed by a greater demand for oats and barley, especially in the context of pressures on the livestock sector? And what about other cereals? Recently there has been a revival of market interest in so-called minor cereals, in particular spelt (*Triticum spelta*), emmer (*T. dicoccum*), einkorn (*T. monococcum*), old varieties of wheat, rye (*Secale cereale*) and oats (*Avena sativa*) (Oehen et al 2015).

Marketing claims for the health benefits of minor cereals are common, but robust research results less so. As Shewry (2018: 469) puts it, in a review of the research on the health benefits of ancient and modern wheats, “further studies are urgently required, particularly from a wider range of research groups, but also on a wider range of genotypes

of ancient and modern wheat species”. But importantly, some of the research that has been undertaken tends to back up the claims. For example, Biskup et al (2017) found that spelt and rye induced a lower acute glycemic response (increase in blood glucose levels) compared to refined wheat, providing strong evidence that spelt might play an important role in the prevention or delay of diabetes development. However einkorn, emmer, spelt, rye and barley do contain proteins related to gluten and those with a genetically prone to celiac disease, or are allergic to wheat proteins, will need to look to other minor crops such as teff, amaranth, oat, quinoa, and chia (Brouns et al 2013). There is a case for these grains just as part of increasing dietary diversity.

“In comparison to conventional common wheat, minor cereals (MC) typically grow well in poor soils or under low input conditions, and there are hints that the nutritional quality is high. Hence, expansion of minor cereals in the European arable sector could be a benefit (i) for the environment and crop diversity, (ii) for the economic viability particularly of small and medium enterprises (SME) and arable farmers, (iii) for the diversity and nutritional quality of cereal-based foods offered to consumers. However, the MC have been hardly developed as commercial crop varieties, with virtually no major investment in exploiting genetic diversity, breeding programmes, and optimising of agronomic and food industry processes. Typically, farmers have access to an insufficient number of varieties, and yields are not high enough in most cases. In the EU funded project, HealthyMinorCereals (HMC) the potential of these crops in terms of yield, disease and drought resistance, nutritional quality, and suitability for various food products is exploited.” (Oehen et al 2015: 4)



## Pulses

The United Nations declared 2016 as the International Year of Pulses (IYP) such is the importance attached to pulses (beans, lentils, peas etc) as an alternative source of protein and fibre. And yet despite a growth in pulse production in some parts of the world, such as Australia, Canada there has been a decline in some traditional pulse growing regions such as Europe (Joshi and Rao 2016) alongside an under-investment in research and development. Consequently in the period since 1961, whilst global cereal yields increased from 1,450 to 3,900 kg/ha, pulse yields only grew from 550 to 1,000 kg/ha (Joshi and Rao 2016: 11). In the UK pulses account for less than 2% of total protein consumption, whereas in India protein from pulses account for 12.7% of the Indian diet (McDermott and Wyatt 2016). The human health benefits of pulses are widely accepted. For example, legume consumption in a Mediterranean diet has been shown to reduce CVD risk (Grosso et al 2017; Vigiuliouk et al 2016).

The IYP certainly had an impact in some parts of the world, for example 1,257 new pulse-containing products were launched in North America in 2016 (Hunter and Der 2017). 'Eating for Energy' base in Vancouver, Canada was one of the responses to the IYP with its Just Add Pulses campaign.

### Just Add Pulses

Pulses are iron rich, fibre filled, protein packed, gluten-free, affordable, sustainable and have a low carbon footprint. Pulses are nutrition powerhouses. ½ cup lentils provides 115 calories, 8.9 grams protein, 20 grams carbohydrates, 7.8 grams fibre, 365 mg potassium and 3.3 mg iron.

Regular consumption of pulses can help maintain healthy body weight and help reduce risk for disease such as diabetes. The fibre in pulses acts as a pre-biotic fuel for the bacteria in your gut, improving gut health. Regular consumption can also help reduce blood pressure.

Pulses are extremely versatile and can be used in countless ways to boost the nutritional value in meals. Toss ½ cup cooked pulses onto salads, into soups or pasta sauce, roll them into tortillas or blend them into smoothies or muffins.

Take the ½ cup habit challenge and aim to include ½ cup of pulses three times a week for four weeks.

Source: [www.eatingforenergy.com/just-add-pulses](http://www.eatingforenergy.com/just-add-pulses)

## CONCLUSIONS

In the opening chapter I asked whether the urgent priority to tackle the diet-related health crisis might throw up profound possibilities and implications for agriculture. I believe it does. Consumption patterns, and therefore demand for food will change as a consequence of both increased consumer awareness and new policy imperatives. Farmers can either react as these developments unfold or they can be proactive. Svend Brodersen, an inspirational farmer I met in Denmark was in no doubt of the role that farmers can play in helping to create and build a new food culture to nourish and sustain human health and wellbeing. We will look in more detail at his story in the next chapter.

In order for agriculture to flourish in a health-oriented food culture we need an industry that is rooted in research, innovation and in engagement with civil society – both as citizens and consumers.

## Chapter 4 Key Findings

### 01.

Agriculture faces a highly uncertain future as a result of Brexit and farmers will need to be supported through the transition from a high dependency on direct payments under the CAP.

### 02.

The new emphasis on food and health potentially offers the agricultural industry fresh opportunities for expansion and business diversification, especially to plug the trade gap in fruit and vegetables.

### 03.

Science has a big role to play in researching how food commodities may be developed through plant breeding and production methods that lead to more nutritious outcomes.

## 05. BRINGING TOGETHER HEALTH AND AGRICULTURE IN POLICY AND PRACTICE

### INTRODUCTION

Currently, the typical policy approach to the obesity challenge is primarily based on the need for behavioural change amongst consumers and within food supply chains. And the typical policy approach to agriculture is about how to balance food production and environmental impact. This binary approach is not helpful. Moreover, the policy worlds of agriculture and of health are very different.

### POLICY CONSIDERATIONS

Health policy advocates tend to make rather sweeping and highly generalised claims for what is needed in agricultural policy. Thus although the McKinsey Global Institute (2014) suggests eighteen areas of intervention, covering *inter alia* physical exercise, food advertising and labelling, education, and public health initiatives. Just one directly concerns agricultural subsidies, taxes, and prices and in that instance the following suggestions are made:

Relative price increase: regulated



Government introduces a tax in order to drive price increases on certain types of food or nutrient.

Relative price increase:  
reduced agricultural subsidy



Government reduces subsidies on certain food commodities that drive prices (e.g. processed foods such as corn, sugar, and palm oil).

Relative price decrease on fresh produce  
and staple foods: increased agricultural  
subsidy



Government subsidises fresh food such as fruit and vegetables.

Relative price decrease on fresh produce  
and staple foods: personal subsidies



Government provides personal subsidies (e.g. food stamps for low-income individuals for sole use on certain healthy food types).



Similarly, Hawkes et al (2013), for the World Cancer Research Fund International, argue that food system and nutrition policies will inevitably have an impact on agricultural policy, but provide little detail on what that might mean. There is a tendency to blame agricultural 'subsidy'. I have heard subsidy decried at workshops about food and health, but without recognising that, and certainly in an EU and UK context, the majority of subsidy has been area-based for some time. By and large, notwithstanding some trade distorting policies that remain under the CAP, farmers' decisions on what to produce are market-determined. If market demand changes farmers will adapt. However this is not to suggest that policy is unimportant, merely to point out that a knee-jerk blaming of agricultural subsidies is not very helpful, especially at a time when the whole support system is under such intense review.

So what policy agriculture/health framework might be helpful? In *A Food Brexit: Time to get Real*, Tim Lang et al (2017) urge change:

"Our main concern is that civil society, academics and external voices – whatever their specialisms – should unite around the call for the new Food Brexit Framework to locate food as a central (and cross-departmental) part of UK public policy in progressing and creating a more resilient, robust food system in the UK. This should be one which is capable of delivering sustainable and future generational diets, healthy lifestyles and environments for its increasing and diverse population...In order to achieve these goals the UK will need a statutory framework which creates and promotes a unique and novel UK approach to One Nation Food. The new UK statutory framework will need cross-departmental and devolved authority support and commitment and not just be associated with Defra or any other single department. It should include the creation of a Standing Committee or Commission on Food and Agricultural Policy." (Lang et al 2017: 76)

But even in their passionate and articulate report there is little by way of *detail* about what a new policy might look like. Their aims are clear, almost a wake-up call, and I endorse them. But we need detail at a time when the thrust of current Government policy seems to be to transition away from any public sector support towards payments solely for public goods. The conceptualisation of public goods is of great interest here and it usually revolves around natural capital and is delivered through agri-environment schemes. However, Michael Gove in his speech to the Oxford Farming Conference in January 2018 as Secretary of State for Defra signalled a welcome broadening of the concept public good to include the health agenda:

"But Government does have a public health role. As Education Secretary I introduced a School Food Plan not just to ensure school meals were healthier but also to educate children about where food came from and how to make healthy choices about buying, preparing and enjoying food. And in this role now, I have a responsibility to ask if public money supporting food production is also contributing to improved public health." (Michael Gove Oxford Farming Conference 2018)

There is strong tendency, and it is reflected in much of the rest of Michael Gove's speech, to equate payment for public goods with those things markets cannot provide, hence the customary, and of course welcome, emphasis on the natural environment, heritage and recreation. But to have the notion of 'public good' framed only in terms of market failure, i.e. the provision of goods that the market does not provide, is unhelpful on two grounds. First, the market failure argument tends to side-line the issues of policy coherence and cross-policy co-ordination and even of public exchequer savings. Yes markets provide food, and plenty of it, but at a cost to the public exchequer, in terms of NHS spending, that warrant greater consideration of public intervention and market regulation. Secondly, it narrows society's notion of 'the public good' so that we find ourselves in the curious position of having to make a case for what to most people is something – healthy food – that is palpably in the public interest. We need to shift our framing of these issues from economics to ethics and philosophy and accept that characterising what is 'good' must come before we decide how best we ensure a 'good life' (see Skidelsky and Skidelsky 2012). National food security, linked to the public health agenda, surely falls into the categories of 'good' and 'public good' in ethical terms.

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"9p in every £1 we spend in the NHS is spent on diabetes. We estimate from the evidence that the Health Committee took during our hearings that the overall cost of obesity to the NHS is now £5.1 billion a year, and the wider costs to society have been estimated to be as high as £27 billion, although the estimates vary. We simply cannot afford to take no action..." First Report from the Health Committee, Session 2015-16. HC 465. Chaired by Dr Sarah Wollaston.

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So, in this context, what policies might be adopted? It is a profound paradox that the sector that receives the least support from the public purse (see Figure 4.3) is the one that has the most to offer to the healthy eating, namely horticulture and, as we have seen earlier, the trade gap in fruit and vegetables suggests a real opportunity for UK farmers and growers. I am not suggesting direct subsidies for horticultural products. This would not be WTO-compatible, nor is it in line with current Government thinking or, indeed, with the sector's own desires. But we could consider capital grants or loans to encourage appropriate investment, start-up assistance in marketing, and, perhaps, a conversion scheme similar to the successful Organic Conversion Scheme, to help fund the transition to what would be a very new type of business for some farmers. Marketing assistance and capital grants relevant to the production of 'new' cereals and pulses for human consumption might also be considered.

## RESEARCH AND SCIENCE CONSIDERATIONS

There are a range of science and research issues that have emerged from my studies. At the strategic level, future Government or Research Council funded SI and related research needs to have human nutrition at its heart. This means that research on mainstream agricultural systems and commodities might need to shift in emphasis and also that horticultural research needs to climb higher up the research agenda.

More specifically there are a range of issues that need to be explored. As Caroline Drummond has suggested, we need to:

“Develop new more integrated approaches to health and diet that links in with farm production. It appears we have only just started to get to grips with the breeding pathways, the single issue nutrients, epi-genetics, how foods interact in vitro and in vivo, our gut organisms and so much more is needed to be done to understand how we can deliver ‘health by stealth’.” (Drummond 2014: 65)

Another important issue is the imperative to ensure the conservation of a wide a range of genetic diversity within crops (Gepts 2006, Khoury et al 2014). Looking at the major crop commodities:

“Current patterns of production...are not guaranteed given ongoing and predicted changes in climate, the decline in availability of nonrenewable inputs, and increasingly severe impacts of agriculture on soil, water quality, and biodiversity. Such trends may impact food security in regard to crop commodity trade, **decrease the nutritional quality of major crops, and enhance the attractiveness of underresearched crop species.** Moreover, the importance of crop commodities in food

supplies, particularly in contribution to protein and fat, may shift in response to health, natural resources, and climate pressures, counteracting the trend demonstrated over the past 50 years in increased animal as well as energy-dense plant food commodity consumption...Providing that alternative food crops may still be encountered, **a further diversification of food supplies with interesting and nutritious crop plants may bolster this evolution.**” (Khoury et al 2014: 4005) *my emphasis*

Dwivedi et al (2013) have shown the increased risk from climate change, to food and feed contaminated by mycotoxin-producing fungi and the importance of preserving crop wild relatives to assist in the evolution of new varieties, which may contribute to addressing new challenges to agricultural production. They suggest that a “paradigm shift is needed to include biofortification in core breeding programs to assure that no crop cultivars that do not meet the minimum quality attributes are released for cultivation” (Dwivedi et al 2013: 93).

And research priorities are not only about the science of agriculture. Researching how farmers might adapt to and benefit from new markets is important as is research on markets and consumers. To take one example, “the pulse research agenda must focus first and foremost on how to shift behaviour of nonpulse or limited pulse consumers” (Curran et al 2016: 4).

## MARKET CONSIDERATIONS

The range of possibilities here is enormous. We tend to assume that markets are impersonal and entirely based on contractual relationships governed by law and regulation. Yet even the most formal of market relationships requires a degree of trust and usually at least some human interaction and relations alongside the formal and contractual. And in many instances market relations are much more interpersonal than that. Authenticity, trust, regard and vision are all terms that help to define many market relations. In Denmark, the organic farm at Gram Slot sells its range of organic dairy and cereal products partly through its own farm shop, but primarily through the 259 Rema 1000 supermarkets in Denmark, which has an exclusive rights to selling Gram Slot products (Laursen et al 2015). Why is this significant? Because Rema 1000 is a discount supermarket chain. Svend Brodersen, the part owner of Gram Slot and driving force behind the business, wanted to establish trust and confidence in organic products across a much wider public than is the norm for organic products:

“The communication between Gram Slot and Rema 1000 takes place mainly as a personal communication between Svend Brodersen and Anders Rene Jensen...the chief buyer at Rema 1000 and (also) a board member at Gram Slot. According to Svend Brodersen they are in contact on an almost weekly basis...To get a cooperation, like the one between Gram Slot and Rema 1000 to function, Anders Rene Jensen (16) points at two decisive factors...



Organic milk for sale in Rema 1000.

© Michael Winter.

**the success criterias for such a cooperation to work is that both parties has the same visions, that they want the same...and that there is a good personal relation because we come from to different worlds, so we encounter a lot of tasks and challenges and the way one thinks is different. So mutual respect for each other and the other's knowledge is really important.**

The cooperation between Gram Slot and Rema 1000 was not initiated because of specific economic expectations but precisely because of the share vision of creating another direction for the food production in Denmark.” (Laursen et al 2015: 33-34<sup>8</sup>)

I would add that what also makes the relationship so strong is the agricultural success: the yields match or exceed conventional agriculture, the quality and cleanness of the crops are exemplary, the combination of organic methods with cutting-edge technology (e.g. robotic weeding of onions) deeply impressive.

What Gram Slot has achieved both in its relations with consumers in its own high-end farm and through its close identification with reasonably priced products for lower-income consumers through Rema 1000 is the establishment of strong communities of practice. As Wenger and Synder (2000) explain, communities of practice comprise “groups of people informally bounded together by shared expertise and passion for a joint enterprise” that “share their experiences and knowledge in free-flowing, creative ways that foster new approaches to problems” (Wenger and Synder 2000: 139–140).

We need to enable and establish strong communities of practice around markets, whether that be through deepening (and health-proofing) the relationships around Quality Assurance Schemes or building robust alternative food networks or supply chains. An important element of any new market developments based around strong communities of practice is the development of skills and training in both farming and food businesses. As a recent AHDB (2018) report puts it “as businesses restructure and adapt, their skills will need to evolve, with business and leadership skills becoming more important... evidence shows that British farmers and growers under-invest in new skills and training relative to their competitors”.

The key findings from this chapter are articulated in the next chapter on recommendations from the study. I have written this chapter to draw together the previous chapters in the report in order to reflect and draw conclusions on how policy can be developed to bridge the gap that exists with embedding aspects of health in the agricultural policy agenda.



Oat field at Gram Slot. © Michael Winter.

<sup>8</sup> Also borne out by my own conversation with Sven on my visit.

## 06. RECOMMENDATIONS

### INTRODUCTION

The last chapter drew together the health agenda and how it can inform policy. The recommendations I make here have been framed under three themes: policy development, the promotion of innovative market structures and enhancing skills and communities of practice.

### POLICY DEVELOPMENT

- There is a need to develop a food and farming strategy for the delivery of safe, nutritious and affordable food in the UK, which will allow UK farmers to respond with confidence to the concerns and opportunities presented by civil and consumer society.
- There is a clear policy imperative to support farmers through the transition to post-Brexit agriculture and policy needs to be designed to ensure that a strong, competitive and food health-oriented industry emerges.
- Agricultural policy should be more focused on health and nutrition.
- Nutritional security should be seen as a 'public good'.
- Sustainable Intensification policy and research should be broadened to include human nutrition as a core element.
- A new conversion and/or grant scheme should be developed for horticulture.
- There should be policy encouragement for the cultivation and market development of pulses.

### INNOVATIVE AND DYNAMIC MARKET STRUCTURES

- Quality Assurance Schemes should be deepened to include nutritional quality at the core.
- There is a need to develop stronger and shorter supply chains focused on nutritional qualities of food.
- The lessons of the food sovereignty movement need to be considered to see whether a UK version is possible

### ENHANCING SKILLS AND DEVELOPING COMMUNITIES OF PRACTICE

- There is a need to facilitate new entrants into agriculture and to up-skill existing farmers, especially smaller farmers.
- An up-scaling or expansion of the Prince's Countryside Fund Farm Resilience Programme would be particularly welcome in this respect.
- Further development is needed of new communities of practice around food provisioning.

As I have outlined previously in the report whilst the modern food system has successfully delivered vast quantities of food to increasingly urban populations across the globe, this has been accompanied by a reduction in the diversity of foods with an increasing dependence on a smaller number of crops. But there is a growing societal interest in food, its impact on health, and the development of alternative food networks. The impact of poor diet and burden of ill health is a major challenge for UK society. A new focus on food and health potentially offers the agricultural industry opportunities to broaden and deepen through expansion and business diversification especially to plug the trade gap in fruit and vegetables.

The UK agricultural sector faces a highly uncertain future as a result of Brexit and farmers will need to be supported through the transition from a high dependency on direct payments under the CAP. Science and research have a big role to play in the development of food commodities at all stages from plant breeding and production methods through to the retail shelf with a focus on driving more nutritious outcomes.

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**“Michael Winter has brought his unique insight and intellectual rigour to this important report which effortlessly brings together the issues surrounding our modern food systems. His approach is particularly refreshing because it is not driven by an assumption that the only way forward is for ever larger farms; that there is an important place for the smaller farm – indeed a necessary place for them – and that human health should be at the very heart of what our food systems should be delivering. There could not be a better time for Michael to deliver this report when we have the greatest opportunity in 70 years to reset the clock for our food, farming, environment, health and education policy.”**

Elizabeth Buchanan C.V.O., FRAgS, Special Adviser to Waitrose and Dairy Crest plc, a Trustee of the Prince’s Countryside Fund and a non-executive member of the Defra Board.

**“Through this report it is a delight to join Michael on his journey of self-discovery in uncharted waters. Radical thinking is needed to reform our food systems and culture and Michael brings depth, evidence and ideas to where we can start in order to accelerate change and deliver a ‘healthy food and farming system – fit for the future’ ...read, enjoy, digest and learn!”**

Caroline Drummond MBE, LEAF (Linking Environment And Farming) Chief Executive

**“When it comes to challenges and opportunities, Michael Winter could not have chosen a better subject for his Nuffield report than the interrelationship between agriculture, food and health. His reflections on the role that food played in his own upbringing will strike a chord with those of a similar generation, and underline just how much the context for UK food production has changed over the last five decades. Few would argue against diversity, but Michael highlights how food production has focused on quantity and how consumption has been driven by convenience. His report concludes by considering the role that post-Brexit UK Agriculture could play in the supply of ‘healthy foods’, and makes a compelling case for a food and farming strategy that will enable this and support a varied and progressive industry.”**

Stuart Knight. Deputy Director of NIAB (National Institute of Agriculture Botany) and President-Elect of the Association of Applied Biologists

**“This is a timely contribution. Michael Winter has brought together topics – food, farming and health – that so obviously belong together but are rarely considered collectively, either in academic work or policy considerations. His enthusiasm and commitment shine through the report which sets out an inspiring new agenda for the future of UK food and farming.”**

Matt Lobley is one of Michael’s long-time colleagues and collaborators. He is Co-Director of the CRPR (Centre for Rural Policy Research) at the University of Exeter and Professor of Rural Resource Management.

**“The changes precipitated by Brexit mean that we have an extraordinary opportunity to structure our food system differently. Most people agree that business as usual is not a good option, but the decisions we make will affect our health and that of the planet long into the future. We have a huge responsibility to give food policy the attention it needs to set a new course towards a more sustainable future. I welcome this thoughtful report as an important step towards integrating agriculture and nutrition in the public interest.”**

Susan Jebb OBE, FMedSci, Professor of Diet and Population Health, University of Oxford