



# A Menu for Change

---

Using behavioural science to promote sustainable diets around the world



THE  
BEHAVIOURAL  
INSIGHTS  
TEAM

Toby Park, Head of Energy & Sustainability, The Behavioural Insights Team  
toby.park@bi.team

# Acknowledgements

---

**This report has benefitted from several individuals' contributions.**

*With particular thanks for substantive research support and contributions to early content and the structure of the report, to **Emma Garnett** (University of Cambridge) and **Brittney Titus** (University of Oxford), both supporting us while at placement at BIT.*

*With thanks also to **Elisabeth Costa** (BIT), **Dr Filippo Bianchi** (BIT), **Dr Jessica Barker** (BIT), and **Dr Christian Reynolds** (University of Sheffield) for their valuable feedback and comments.*

This is a long report. We hope you'll read it cover-to-cover, but if not, it's written to allow you to dip into individual sections. Look out for the short **orange descriptions** at the beginning of each chapter to keep track of where you are.

**Sections 1.1-1.2** introduce the problem, and make the rationale for shifting global diets. This will be familiar ground for environmental scientists. **Section 1.3** looks at the current state, and emerging trends, in diets around the world, and **Section 1.4** highlights the many historical occasions when diets have radically changed through technological innovation or deliberate intervention from government and industry.

**Section 1.5** acknowledges the sensitivities of this topic, and offers some reflections on how we might navigate public and political consent. We don't have all the answers here but give a series of recommendations for building public support and developing effective policy.

**Section 2** explains the main drivers of our food choices (and by extension the barriers to and opportunities for behaviour change). Here we consider factors that influence us at three levels: the individual factors (**Section 2.1**), social influences (**Section 2.2**), and material context (**Section 2.3**). This leads to **Section 3**, the heart of this report, which presents 12 concrete behavioural strategies for promoting sustainable diets, building on three core concepts: making sustainable food appealing (**Section 3.1**), normal (**Section 3.2**), and easy (**Section 3.3**).

**Section 4.1** concludes, and FAQs on the environmental science can be found in the **Appendix**.

# Aperitif

---

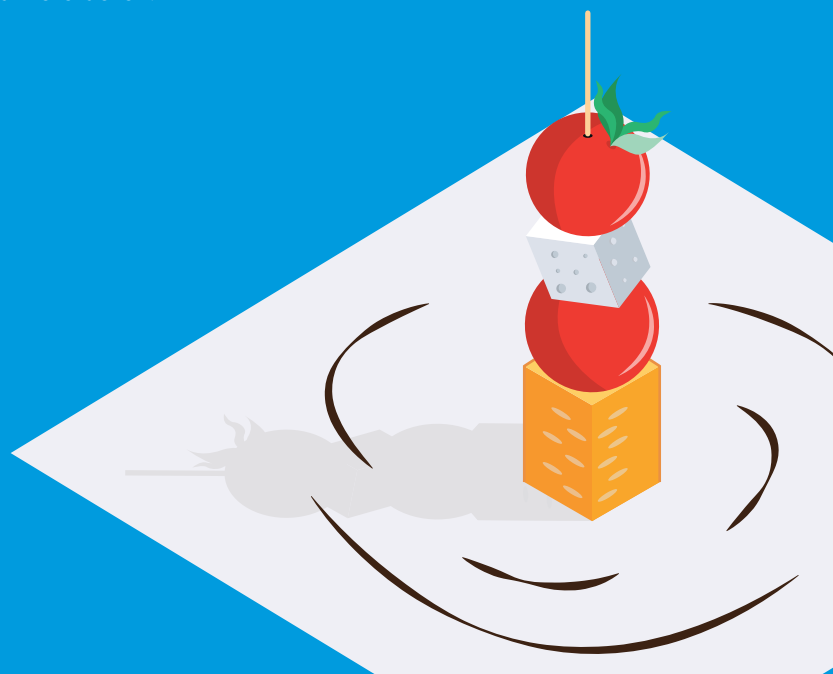
The human story has long been one of food, and of climate.

Around 12,000 years ago the last glacial cycle came to an end, and we entered a period of uncommon stability in global temperatures known as the Holocene. Though biologically modern humans were hunting and gathering for the previous 200,000 years (global population: 10,000-30,000), it was only this gift of a temperate and predictable climate that enabled us to settle, domesticate crops, and form populous communities. The entirety of recorded human history sits within these fleeting and clement millennia, from the birth of agriculture around 9,000 BC in the Fertile Crescent to our current globalised society, and every well-known civilisation in between. The crucial fact rarely mentioned is that this sudden success as a species was sparked by our ability to grow food, and in turn, is so utterly dependent upon the weather.

But the climate is once again changing, this time due to human activity. A warming world brings risk of more extreme weather events, acidified oceans, regional biodiversity collapse and the disruption of established farming systems, which our now-crowded planet depends upon.<sup>1</sup> Beyond these symptoms of climate change, our profligate use of land and other resources, and the pollutants produced in the process, pose several other environmental threats: deforestation and habitat loss, mass species extinction, freshwater scarcity, widespread pollution, and ocean eutrophication. Alongside energy production, industry and transport, the agricultural system is a major, and often the dominant, contributor to these challenges.

In this report we make the case for a global shift towards more sustainable (and healthier) diets. Though impacts vary greatly between regions and production processes, at the global scale this is principally about reducing our consumption of ruminant meat (beef and lamb) and dairy. That said, the 12 strategies presented in this report could equally be applied to other high-impact products such as palm oil.

The ideas in this report are borne from the latest and most well-evidenced behavioural science, and offer routes through which governments, retailers, producers, restaurants, campaigners and others can all help deliver a more sustainable food system. We also discuss some of the political challenges that come with such an agenda, and consider how best to understand and build public support for strong policy. For many reasons, this is not an easy challenge to address. But we think it's an important one that deserves more discussion, more research, and more action.



# Who is this report for?

Our hope is that this report fills a gap. A more sustainable food system needs several elements: at a minimum, more intensive production but with less environmental damage; greatly reduced food waste; greatly reduced over-consumption where obesity is a problem (and increased or better consumption where under-nutrition remains); and a shift towards more sustainable (and healthier) diets.<sup>2</sup> This report focuses on the last of these because not only is it fundamentally about behaviour change, but the question of how to achieve this change has not yet been answered.<sup>3</sup>

To this end, we've targeted this report at four groups of stakeholders: the sustainability community, the food industry, consumers, and governments. This report is meant to be internationally relevant, though the problem of unsustainable diets is predominantly one of wealthier countries (for now).

## The sustainability community

Among sustainability leaders, passion for this issue is plentiful, but we need more sophisticated ways to shift consumer behaviour. Traditional campaigns have tended to emphasise awareness and attitudes but overlook many of the more influential drivers of our behaviour. Robust evaluation of interventions is also frequently absent, meaning we don't learn what works and what doesn't. For you, this report aims to summarise the best evidence on what works, and present actionable strategies and interventions that can be adopted and evaluated across a variety of contexts.

## Consumers and citizens

In the wealthiest parts of the world, low-meat diets are encouragingly on the rise, as is concern for the environment more broadly. However, this is still a small movement, and in many developing and middle-income countries, meat consumption is still rising rapidly. Awareness of the issue also remains quite low compared to other environmental issues, and it's not yet clear how accepting we will be of governments or industry promoting more sustainable diets.

As members of the public, we need to be on board with this debate, both to embrace what we can achieve as individual citizens (learning some new meat-free recipes, for example) but also to voice our support for that which is beyond our individual control (such as regulatory or fiscal policies that impact the industry).

## The food industry

Restaurant managers, canteen staff, chefs, producers,

supermarkets: you are all critical, because you hold some of the most effective levers for behaviour change. The science shows us that the design of these eating and purchasing environments, and the nature of the products available to us, are profoundly influential to our diets. So, whether you are reformulating and re-inventing products, or altering the layout of supermarkets, canteens and restaurant menus, we need you on board to help implement and evaluate many of the ideas proposed in this report.

## Governments

For now, this topic remains politically contentious, and is conspicuous by its absence from national policies. Decarbonisation efforts are mostly being focussed on electricity generation, building efficiency and transport. Yet in addition to these vital efforts, governments will need credible food strategies to meet their Paris 2015 commitments and ultimately net-zero emissions.

We believe there is a path through the main political barriers. Notably, the public health agenda may prove a useful ally: worldwide adoption of a healthy diet would generate over a quarter of the emission reductions needed by 2050.<sup>4</sup> Furthermore, research suggests the public expects government to lead on environmental issues,<sup>5</sup> and the mandate for bold environmental policy is ever-increasing as we witness global protests and growing concern among the public.<sup>6</sup> Behavioural science offers insights into how to navigate public consent, develop a strong mandate, and ensure the public are empowered by policy, not disenfranchised. The time for bold policy from our elected officials is now.

# Menu

---

02	Acknowledgements
03	Aperitif
05	Menu
06	Appetisers
06	1.1 Introduction
08	1.2 The meat of the problem
16	1.3 A growing problem but a moment to embrace
19	1.4 Diets in flux: historical and cross-cultural perspectives
22	1.5 A behavioural approach to building public consent
28	Main Course
30	Drivers of food choice: Individual, social and material
30	2.1 Individual drivers of diet
33	2.2 Social drivers of diet
37	2.3 Material drivers of diet
41	Twelve strategies for promoting sustainable diets
44	3.1 Make it appealing
50	3.2 Make it normal
54	3.3 Make is easy
60	Dessert
60	4.1 Final Remarks
61	Side Dishes
61	FAQs
64	References



# Appetisers

---

## 1.1 Introduction

The environmental cost of our agricultural system has recently, but quite rapidly, begun to enter mainstream debate. The most recent cause for optimism in the UK is the Committee on Climate Change's 2019 report for achieving net-zero emissions, now passed into legislation, which explicitly advises a 20% reduction in beef and lamb consumption.<sup>7</sup> A handful of other progressive countries, including Sweden, Germany and Denmark, are also beginning to put this issue on the policy agenda, responding to stark warnings from the United Nations Intergovernmental Panel on Climate Change's (IPCC) 2018 report, which also highlighted the need for radical changes to the systems of food production, including diet shift.<sup>8</sup>

Causes for optimism also exist outside of government. Every month we see increased coverage of the topic in certain corners of the mainstream media, and some food industry players, large and small, are signalling movements towards plant-based alternatives to conventional meat products. Consumers themselves are also taking an increased interest in vegetarian or low-meat diets, with supermarkets reporting rapid growth in the sales of meat-free products. This goes hand-in-hand with recent protests around the world, showing that civil society is increasingly putting its concern for the planet front and centre.

Yet these are still early days. To our knowledge, no ambitious sustainable food policies have yet been implemented by any government. And although national diets do constantly change (**as discussed in Section 1.4**), intentionally guiding those changes will be difficult, even with the combined tools of policy-makers, marketers, campaigners, suppliers and producers. Such an effort also raises questions of ethics and personal sovereignty over our lifestyle choices (**discussed in Section 1.5**). These concerns are more acute with food than many other consumer choices because food is so personal, and so enshrined in tradition and identity. It clearly takes a degree of political bravery to propose the bold policies that might be necessary.<sup>9</sup>

But still, it would be rash to discard this issue as 'too difficult' when there have, as yet, been no serious attempts. As one pair of health researchers reflect:

***"...In fact, policies on diets have been so timid to date that we simply do not know what might be achieved by a determined drive..."*** <sup>10</sup>








## What does a more sustainable and healthy diet look like?

### At its simplest, less red meat.

There have been several studies showing that it is possible to flourish on a diet that is both healthier, and more sustainable, than current consumption habits.<sup>11 12</sup> The global average consumption of the most carbon-intensive produce (in particular red meat) is above health guidelines, and so the health and environmental agendas are well aligned. Worldwide adoption of a healthy diet would generate over a quarter of the emission reductions needed across all sectors by 2050.<sup>13</sup>

The most recent and comprehensive of these studies is the EAT-Lancet Commission on food, planet, health.<sup>14</sup> This study takes a two-pronged approach, drawing on the best available evidence to independently ascertain what the healthiest diet would look like, and what is feasible with 10 bn mouths to feed within the bounds of

planetary systems. Achieving the most sustainable and healthy diet is complex, as environmental impacts vary by regional production methods and ecosystems, and some highly sustainable foods are unhealthy (such as heavily processed plant-based foods). However, significant improvements can be achieved with some simple changes. Relative to typical diets in the Americas, Europe, China and most other wealthy nations, [the headline change required of us is a significant reduction in ruminant meat \(beef and lamb\), offset by an increase in legumes, whole grains, vegetables and nuts.](#)<sup>15</sup> This landmark report builds on an established body of evidence showing [that reduced red meat consumption would contribute to at least 9 of the 17 UN Sustainable Development Goals.](#)<sup>16</sup>

	Macronutrients intake grams per day (possible range)	Caloric intake kcal per day	
 <b>Whole grains</b> Rice, wheat, corn and other	232	811	
 <b>Tubers or starchy vegetables</b> Potatoes and cassava	50 (0-100)	39	
 <b>Vegetables</b> All vegetables	300 (200-600)	78	
 <b>Fruits</b> All fruits	200 (100-300)	126	
 <b>Dairy Foods</b> Whole milk or equivalents	250 (0-500)	153	
 <b>Protein sources</b> Beef, lamb and pork Chicken and other poultry Eggs Fish Legumes Nuts	14 (0-28) 29 (0-58) 13 (0-25) 28 (0-100) 75 (0-100) 50 (0-75)	30 62 19 40 284 291	
	 <b>Added fats</b> Unsaturated oils Saturated oils	40 (20-80) 11.8 (0-11.8)	354 96
	 <b>Added sugars</b> All sugars	31 (0-31)	120

*'The EAT-Lancet recommended daily intake for a sustainable and healthy diet. Just 14g of beef, pork or lamb, and 29g of poultry, is a stark reduction compared to current European and American levels of more than 250g per day.'*

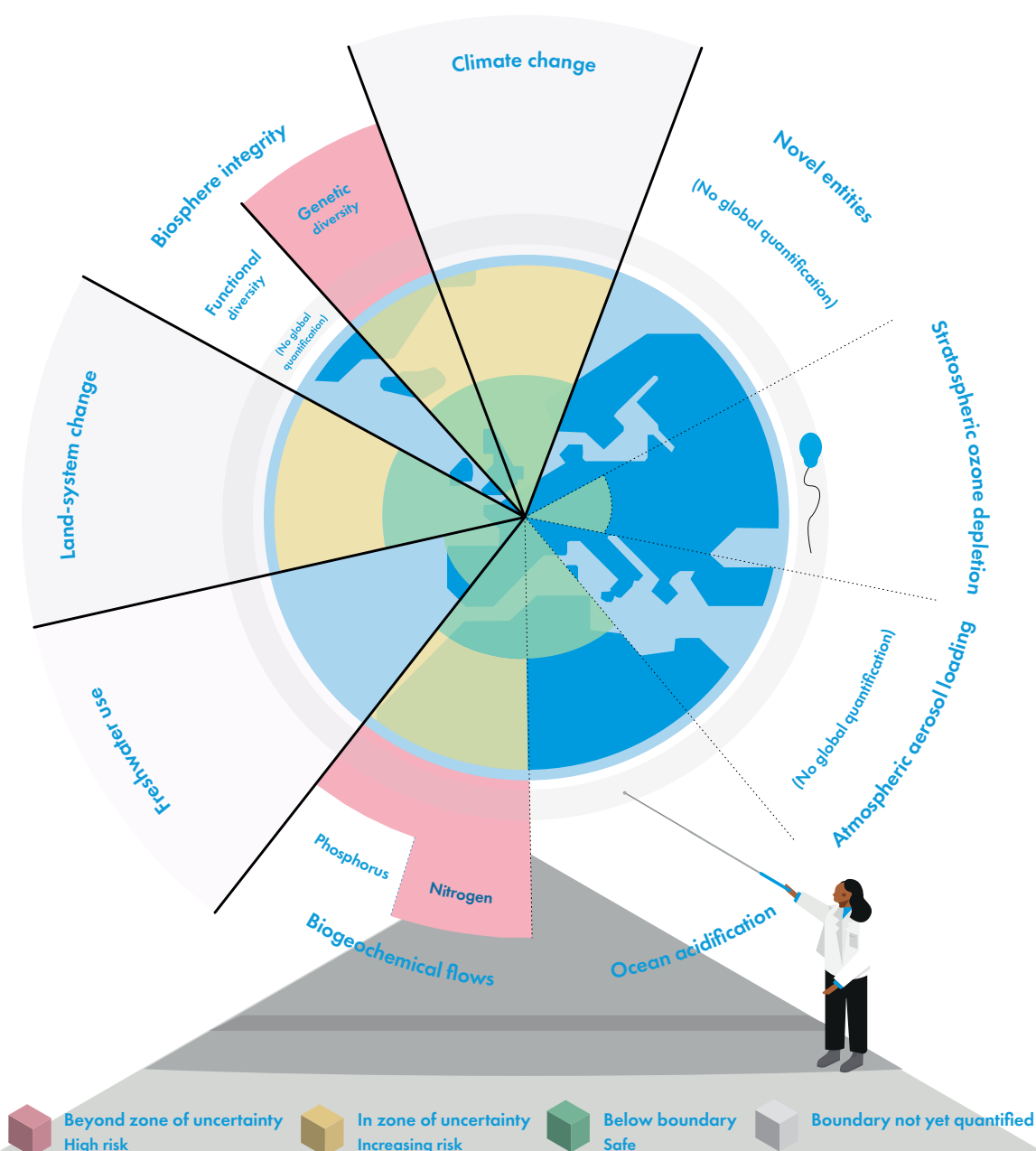
<sup>a</sup>SDG2: zero hunger. SDG3: good health and wellbeing. SDG6: clean water. SDG7: affordable and clean energy (since land could be freed for biofuels). SDG11: sustainable communities. SDG12: responsible consumption and production. SDG13: climate actions. SDG14: life below water. SDG15: life on land. It's no stretch to say that the food system has a bearing on all SDGs.

## 1.2 The meat of the problem

In this section we outline the contribution of agriculture, and in particular livestock production, to the environmental and public health threats we face today. If you are already well versed with the environmental science, skip through to Section 1.3 onwards.

From climate change to plastic pollution, we are faced with a multitude of environmental threats. The Planetary Boundaries model, illustrated below, offers a coherent whole-Earth assessment of these threats, and identifies nine critical limits that define a safe operating space for human activity, four of which are already breached.<sup>17</sup> In summary, we are consuming Earth's resources 70% more quickly than they can replenish, effectively using up our ecological budget by August each year.<sup>18</sup> Like a family whose living costs exceed their income, there is only so long we can survive on finite savings and overdrafts, particularly when the family is soon to have 10 bn hungry children, all with increasing appetites for energy, food, and material consumption. Over the next few pages we highlight the impacts of food production (and in particular livestock) on five of the nine planetary boundaries: climate change, chemical flows and pollutants, freshwater use, land use and change, and genetic diversity (species loss).

Figure 1: The 9 critical planetary boundaries





## Climate Change



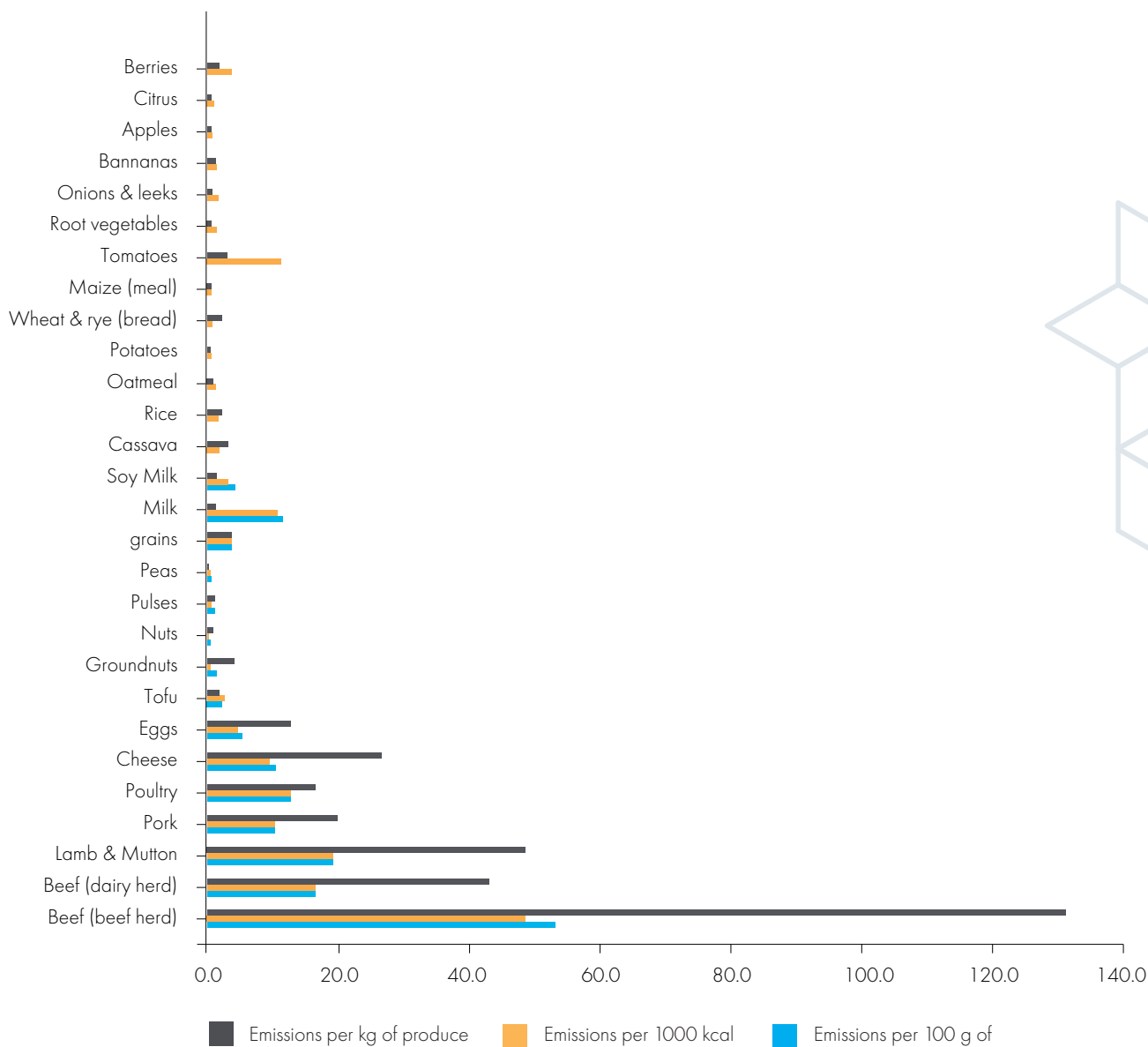
The emissions from beef are 2 to 10 times greater than direct substitutes such as pork or chicken, and up to 100 times greater than plant-based alternatives such as lentils and beans. Dairy is also significantly more carbon-intensive than alternatives such as soy and oat milk. This is the case whether comparing per calorie, per gram of protein, or per kg of produce.<sup>23 24 25 26 27</sup>



<sup>b</sup>In the UK, food accounts for 19% of GHG emissions, though this excludes emissions from land-use change for imported goods.

**Figure 2:** GHG emissions from different food products, with comparisons made per 100 g of protein, per 1000 kcal, and per kg of produce. Source: Poore & Nemecek 2018. All data are global means, with significant variation not shown (e.g. mean for beef = 50 kg CO<sub>2</sub>e/100 kcal, but 10th percentile = 10 kg, and 90th percentile = 105 kg.)

**GHG emissions in CO<sub>2</sub>e from different food products, by per 100 g of protein, per 1000 kcal, and per 1 kg of produce**

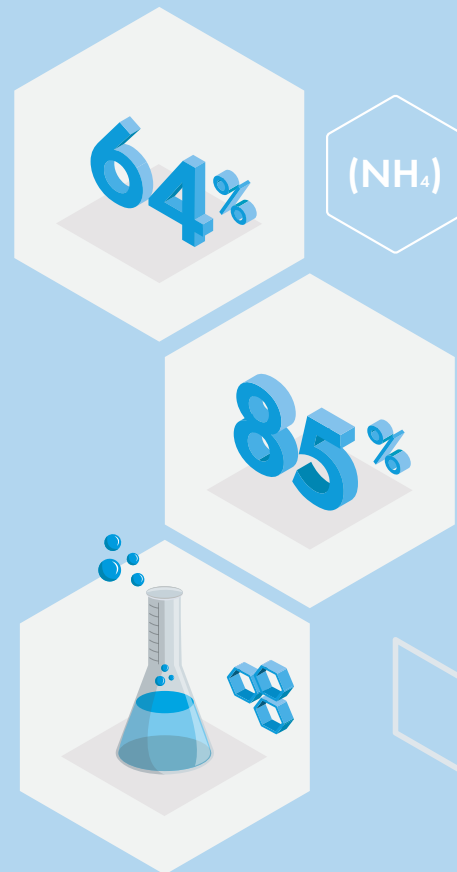


## Chemical flows and pollutants

64% of human-made ammonia ( $\text{NH}_4$ ), a leading cause of ocean acidification, is from livestock production,<sup>28</sup> mostly from manure processing.

Nitrate pollutants from fertiliser are estimated to cause €70-320 bn damage per year to the environment and human health. Livestock are responsible for 85% of their use.<sup>29</sup>

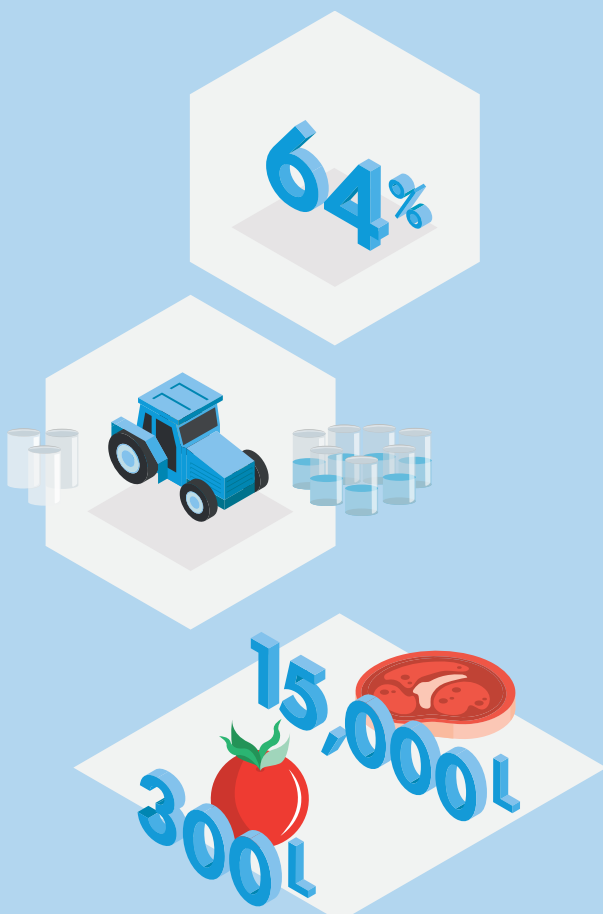
Animal waste, chemicals from tanneries, pesticides, antibiotics, hormones, and sediments from eroded pastures all leach into waterways, causing human health problems, antibiotic resistance, and coastal 'dead zones' unable to support marine life.<sup>30</sup>



## Freshwater

64% of the world's population are expected to live in water-stressed basins by 2025.<sup>31 32</sup>

Irrigation and food production are responsible for 70% of global freshwater use, or 90% when weighted by regional scarcity.<sup>33 34</sup>

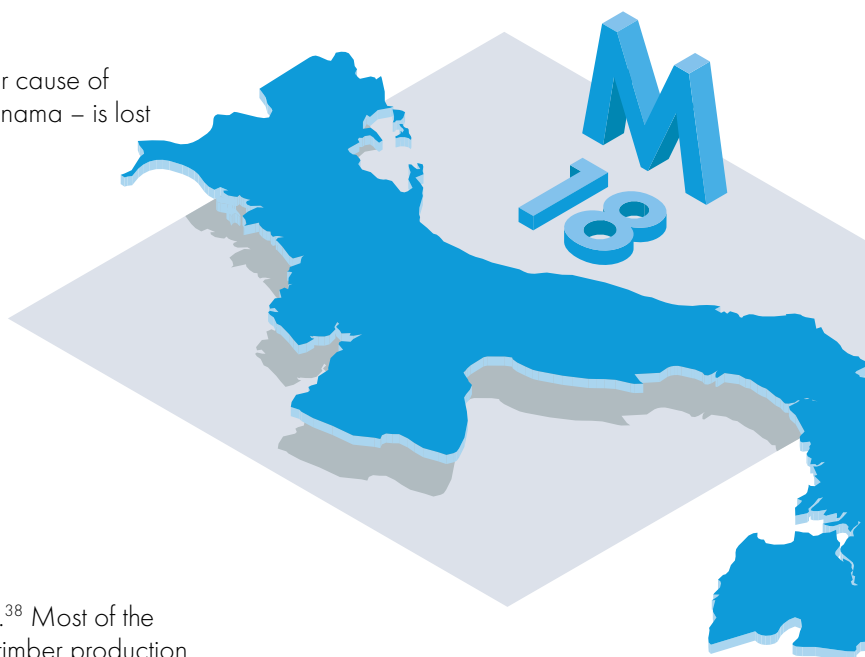


1 kg of beef requires around 15,000 l of water to produce.<sup>35</sup> 1 kg of chicken requires ~4,300 l, and 1 kg of tomatoes, cabbages or potatoes require less than 300 l.<sup>36c</sup>

<sup>c</sup>This is not to say all plant-based foods are perfect. For instance some fruits and seeds, which require the irrigation of orchards for small volumes of produce (including almonds, chocolate and coffee), are also highly water intensive, though do tend to be consumed in far smaller quantities than meat.

## Landuse and deforestation

Agricultural expansion for livestock is the major cause of deforestation. 18 million acres – the size of Panama – is lost to livestock production each year.<sup>37</sup>



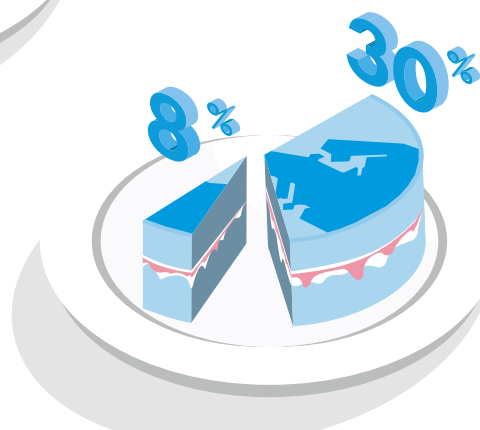
43% of the earth's surface is now agricultural.<sup>38</sup> Most of the rest is ice, desert, mountain range, urban, or timber production. 98% of land suited to growing the major crops (rice, wheat, maize) is in use.<sup>39</sup>



Of this 43%, the great majority (38% of land) is used for food.



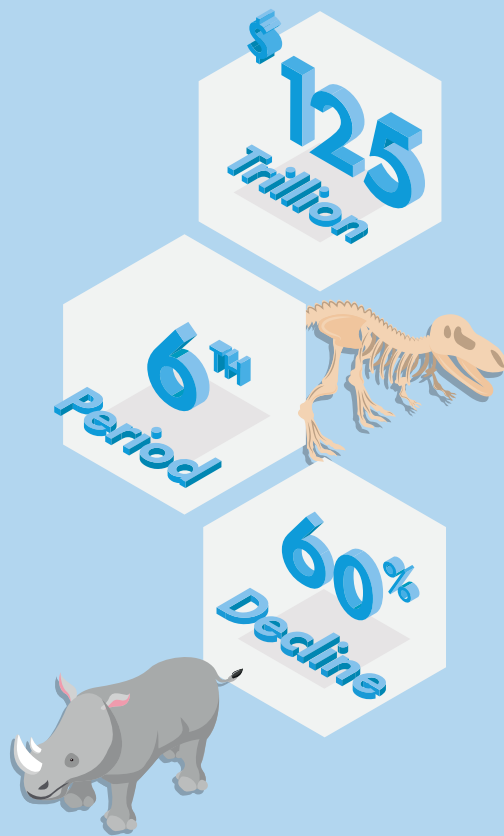
The great majority of this (30% of land) for livestock production, despite providing just 18% of our calories.



The other 82% of our calories come from crops for human consumption, on just 8% of the land. Clearly, feeding crops to animals for human consumption is inefficient compared to eating crops directly, especially when we need land for biofuel production and reforestation.<sup>d40 41 42</sup>

<sup>d</sup>Not all animal products are so land inefficient. For example industrially-farmed chickens, though bringing a host of other ethical, health and environmental problems, convert around 2 kg of grain (some of which might be unfit for human consumption) into 1 kg of meat.

## Species loss



A diversity of species and well-functioning ecosystems provide the foundations of human life and our economy, worth \$125 trillion annually, and serve critical functions in pollinating our food crops, creating healthy soil, regulating the climate and water cycles, providing medical resources and beyond.<sup>43</sup>

Due to deforestation, pesticide and fertiliser use, soil degradation and climate change, agriculture is the leading cause of habitat and species loss.<sup>44</sup> We are currently in the '6<sup>th</sup> period of mass extinction' with species loss thousands of times the natural background rate.

Wild vertebrate populations (all non-agricultural mammals, fish, amphibians, birds and reptiles) have fallen by 60% since 1970.<sup>45</sup>

96% of mammals on earth are now either humans or our livestock – just 4% are wild. Similarly, 70% of birds on the planet are now farmed poultry.<sup>46</sup>

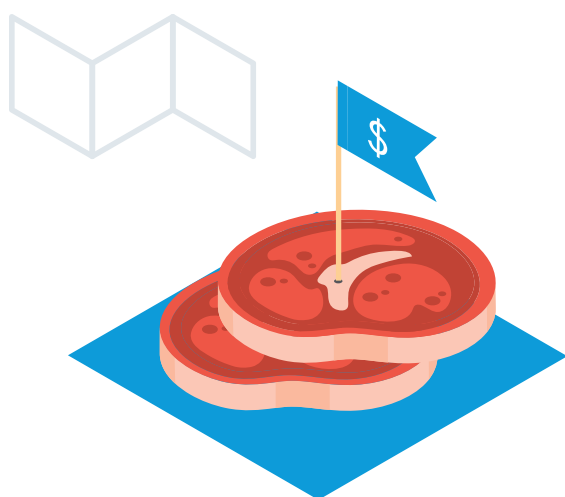
Insects are in mass decline due to pesticide use. Studies in Germany show a 75% reduction in flying insects in just 27 years.<sup>47</sup>

One million species are at risk of extinction, and this constitutes an 'existential threat to human society' - The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

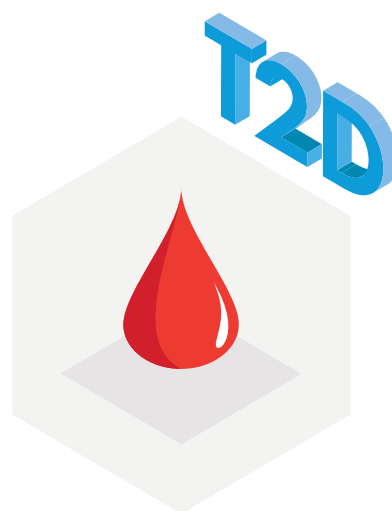


## Public health

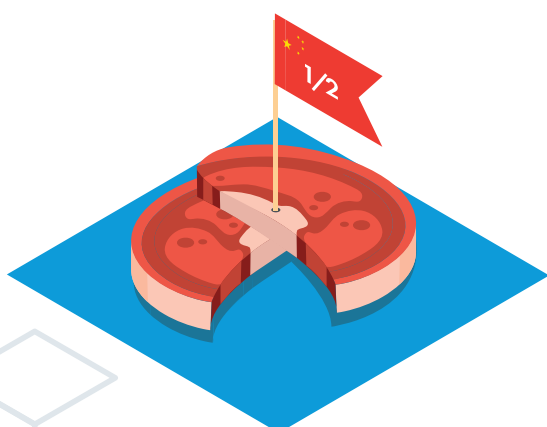
Red and processed meat consumption is well above health guidelines in many developed countries, and is linked to cardiovascular disease, type 2 diabetes,<sup>48</sup> and bowel cancer.<sup>49 50 e</sup>



Many health professionals have become proponents for a meat tax to save lives.<sup>51</sup>



If the US population reduced meat consumption to within modest health guidelines, by 2050 savings would reach US\$197 bn per year, \$180 bn of which comes from healthcare costs. Globally, the annual savings would be \$970 bn.<sup>52</sup>



China has recently introduced efforts to halve meat consumption, driven by the Ministry of Health, but finding strong support among environmentalists.<sup>53</sup>



\*Some research highlights health benefits of modest meat consumption. For a more pro-meat overview, see McAfee, J et al (2010) Red meat consumption: an overview of the risks and benefits. Meat Science, 84-1 pp 1-13.

### What about animal welfare?

We've chosen not to substantively engage with the ethical debate in this paper, but it is unavoidable that intensive animal husbandry raises serious ethical concerns. It's also relevant to our agenda, because research suggests animal welfare is a more common reason for adopting meat-free diets than environmental concerns<sup>54</sup> (for now, noting that awareness of the environmental issues is still relatively low but rapidly increasing<sup>55</sup>). It's therefore useful to recognise the trade-offs. Specifically:

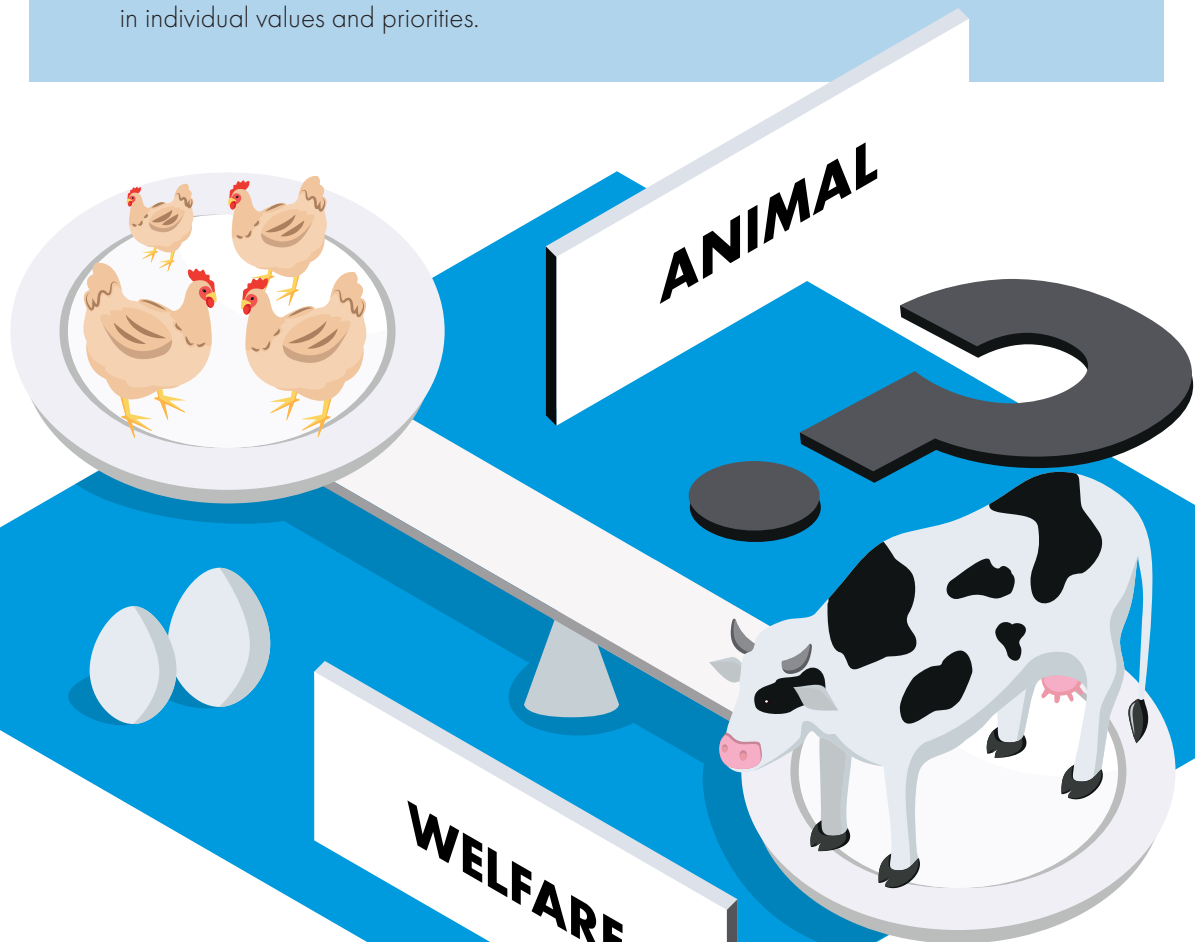
- Ethically-motivated consumers keen to reduce animal suffering by adopting organic or free-range produce may inadvertently worsen their environmental impact, and
- Environmentally-motivated consumers who switch between meat products may inadvertently contribute to greater suffering.

Why is this?

First, the most intensive farming methods (e.g. battery farming) are often the most ethically questionable, but can be relatively efficient in their resource use, per kilogram of produce. They are therefore more sustainable, on some key metrics like land use, than organic or free-range methods. This causes major problems if large numbers of consumers were to switch from intensively farmed to organic and free-range meat: there simply isn't enough land to meet demand through these production methods. Promotion of 'better' meat is therefore not a scalable solution, unless paired with a significant reduction in the volumes consumed (see FAQ in the Appendix for more on this). A common suggestion, 'better and less' is therefore sound advice.

Second, the utilitarian perspective highlights that a switch from beef to chicken, though on average environmentally beneficial, means the suffering of one cow must be replaced by the suffering of many chickens. Science cannot yet convincingly tell us whether the suffering of these two species is comparable, but it's an important consideration.

Clearly, eating altogether less is positive on both counts and avoids the unintended consequences. Otherwise, these trade-offs are genuinely complex and, in large part, rooted in individual values and priorities.



### 1.3 Current trends – a growing problem, but a moment to embrace

**Are consumers headed in the right direction? Or are we facing an uphill struggle? In this section we outline the current state of diet choice around the world, and examine the latest trends.**

#### The good...

Several studies between 2017 and 2019 point towards an emergent rise in veganism/vegetarianism as well as 'flexitarian' (sometimes vegetarian) or 'reducitarian' (reduced meat) diets, at least among certain demographics in wealthier countries. For example in March 2017, 28% of Brits claimed to have already reduced or limited their meat consumption in the six months previous,<sup>56</sup> and looking forward in the same year, 44% claimed to be willing or already committed to reducing or cutting out meat.<sup>57</sup> Since 2017, awareness of livestock's environmental impact has significantly increased, by 23% as of 2019.<sup>58</sup> Similar findings are emerging within other industrialised nations, with Germany being the top of the pile: 52% of the population claim to be cutting back on meat, despite already world-leading rates of vegetarianism (behind only India and Israel).<sup>59</sup>

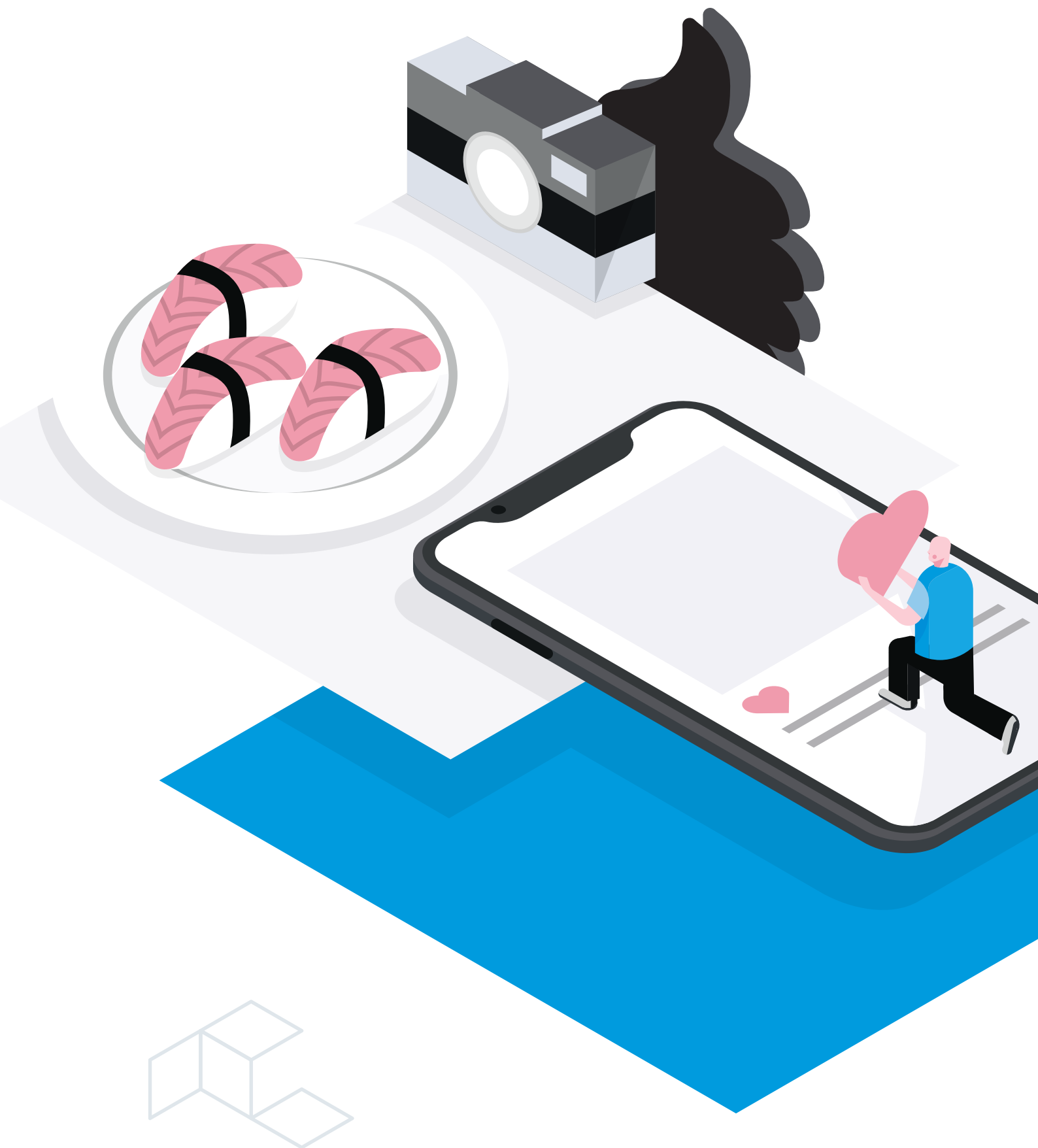
Consumers' reasons for these changes are varied: health and weight management are common motivators, with animal welfare tending to be secondary, but still above concern for the environment.<sup>60</sup> This is true even in 2019, with record levels of environmental awareness and concern.<sup>61</sup> Also important are social media influencers on Twitter and Instagram, both of which have been part of a 'food porn' movement through which users share recipes and images of mouth-watering dishes. Often these have a focus on health, freshness and global cuisine, and thus tend to be more plant-based than the traditional cuisines of northern Europe.<sup>62</sup>

Among the most recent data available are sales figures from supermarkets, with many claiming a new and dramatic trend towards meat-free produce. Among many recent examples, UK supermarket Waitrose claim sales of vegan and vegetarian products increased 85% in the 12 months to October 2018.<sup>63</sup> Wider industry research suggests the number of products labelled as 'vegan' have increased by 257%,<sup>64</sup> though it is not clear how much of this is a result of increasing variety of products, versus changed labelling practices, versus truly increased market share. Regardless, it is a positive sign that retailers perceive a strong business opportunity in plant-based foods.

This is encouraging because it highlights how quickly change can emerge. A small cohort of early-adopters can be enough to encourage suppliers to create and promote new products, which in turn brings these products to mainstream audiences with increased availability, salience, affordability, and perceived normality. This can trigger a virtuous cycle of change among consumers and suppliers. Time will tell whether we are currently on the cusp of such a shift.







**“...A small cohort of early adopters can be enough to encourage suppliers to create and promote new products, which can trigger a virtuous cycle of change among consumers and suppliers...”**



### The bad...

This encouraging evidence, from a small segment of the global population, must be put into perspective. Global demand for meat has increased fivefold in the last 50 years,<sup>65</sup> and shows little sign of abating. Currently, the US and Canada, most of South America, Europe, Australia and New Zealand, eat between 80 kg and 120 kg per person per year.<sup>66</sup> Over the last 35 years, per-capita consumption in much of the developing world has increased, heading towards these industrialised levels. Per-capita consumption in China, for example, has increased from 40 kg per year to 60 kg per year. This has occurred in tandem with a global population growth from around 4.5 bn to 7 bn over the same timeframe

As the population continues to grow and global consumption edges closer to Western levels, the UN estimates we are heading for a 74% increase in global demand for meat, from 270 to 470 million tonnes, and a 58% increase in dairy, both contributing to an 80% increase in agricultural emissions.<sup>67 68</sup> This would be catastrophic in itself, but is seemingly to be achieved while competition for land is increasing due to simultaneous increases in cereal production and other crops, as well as demand for living space, material and resource extraction for infrastructure and consumer goods, and greater competition for water: the regions experiencing greatest population growth and per-capita consumption growth are also among the driest, and due to climate change, set to get drier.

Moreover, many of the more optimistic statistics on increased plant-based food consumption come from self-reported data. These can be unreliable, and may be *increasingly* unreliable (creating false trends) due to shifts towards out-of-home and convenience eating, and increasing social desirability of reporting oneself as eating less meat. More reliable data comes in the form of OECD statistics on livestock production, imports and exports. These show flat trends in the US and EU, though only extend to 2017.<sup>69</sup> It is therefore too early to tell whether the recent claims that consumers are going vegetarian are enough to put a dent in actual production volumes of meat and dairy.

In summary, there is good news and bad news. Global demand for meat is undoubtedly still increasing, and more rapidly than demand for food generally. A recent increase in public interest in the environment generally, and in reduced-meat diets, is encouraging, but it is too early to celebrate a meaningful shift in global consumption trends.

However, it is clearly a timely moment to harness. It will be much easier to encourage behaviour change if changes in public attitudes are already taking place, and similarly much more feasible to implement ambitious policy measures. This is the landscape in which we must think about implementing the strategies presented in this report.

## 1.4 Diets in flux

**In this section, we demonstrate that widespread diet change is not new: national diets are constantly in flux, and often deliberately altered by governments, industry, and NGOs. Our conclusion is that we should not be so timid about doing it again, and for far worthier reasons than many past efforts.**

National and global diets have always been in flux, and often deliberately influenced. Governments have often sought to intervene on the basis of improving public health, with common strategies including 'traffic light' calorie labels (green = good, red = bad);<sup>70</sup> bans on advertising or selling certain products near schools;<sup>71</sup> and tax incentives including sugar taxes or higher rates of sales tax on unhealthy luxuries.

Technological developments through history have also driven dramatic shifts in diet, including the invention of the plough, the Haber-Bosch process for fixing nitrogen, and the rise of convenience foods.<sup>72</sup> In the last few years we've witnessed a further innovation, in the form of hyper-realistic plant-based meat alternatives, and cultured (lab grown) meat. Further innovation in meat-substitutes is surely on the horizon.

Meanwhile, ongoing demographic and economic shifts, including migration (both internationally, and from rural to urban areas), along with rising incomes and the liberalisation of global trade, drive enormous shifts in global diets. We now enjoy more variety than was conceivable just a generation or two ago, as global diets are becoming increasingly similar (i.e. we all eat everything from everywhere). The changes have been particularly profound for countries with traditionally single-staple diets, such as rice across much of Asia and maize across much of Latin America.

The timeline below highlights just a few of these historic changes. These have often enriched our diets but also brought public health (and of course environmental) problems of their own. Our conclusion from these case studies is that although we often view our own nation's cuisine as precious and steeped in tradition, our memories are clearly short. We should not underestimate the extent to which diet change is possible, and indeed likely, over the next few decades.

Exceptions exist, of course; for instance, South Korea's healthy traditional diet has been remarkably well preserved for a country that saw a 17-fold increase in GNP and mass liberalisation in just 34 years. But this is the exception that proves the rule: it took concerted government effort, training thousands of workers in traditional Korean cookery, and mass media campaigns to stem the natural flow of change.<sup>73</sup> But for most of us, over time, shifts in diet seem wholly inevitable.



**16th century****Introduction of the potato to Europe**

Initially met with great resistance due to suspicions that it was poisonous (nicknamed 'the devil's apple'), it soon became a staple, partly as a result of deliberate government efforts to promote it.<sup>74</sup> It would now be hard to imagine a traditional European cuisine without it.

**Late 19th century****Lobster becomes posh**

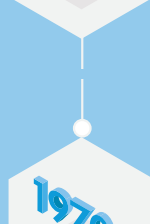
Lobster and oysters were historically so prolific to coastal communities in the US and UK that they were the food of the poor and of prisoners, and used as fertiliser or fish bait. Only with the invention of canning (allowing lobster to be enjoyed beyond coastal communities), and train travel (bringing visitors to the coast), did it start to become a delicacy.

**1947****Ramen noodle soup**

Before 1900 the Japanese did not tend to eat meat, wheat or spices, and yet now, ramen noodle soup (spicy broth with meat and wheat noodles) is considered a national dish. Its true provenance goes back to 1947 when the occupying American military introduced a school lunch programme to alleviate malnutrition among children, consisting of a (wheat) bread roll in a broth of left-over canned military luncheon meat flavoured with curry powder.<sup>78</sup>

**1960s****Pasta is still posh**

In the UK in 1957 pasta was so exotic that the nation fell for a BBC prank showing spaghetti growing on trees<sup>80</sup>, yet today we Brits consume 6000 tonnes of it every week.<sup>81</sup>

**19th century****The invention of canning**

Invented in 1809, adopted at scale some time later, the tin can ultimately revolutionised the food we eat, allowing seasonal and perishable food to be eaten year-round and worldwide.

**Early 20th century****Maize in southern Africa**

The southern African staple of a porridge made from ground maize is considered central to any meal and almost sacred, 'the basis of life ... as far back in history as people can remember'.<sup>75</sup> However, maize came to dominate these regions less than 100 years ago, ousting local crops due to competitive ecological advantage: it's quicker to mature, less vulnerable to birds, and less labour-intensive to farm, which suited shifting demographics when men started taking up industrial jobs away from home.<sup>76</sup> Whether or not maize will remain the dominant crop in these regions is yet to be seen, as it is proving sensitive to climate change.<sup>77</sup>

**Mid 20th Century****Sushi becomes posh**

In Japan, sushi was originally a cheap way of preserving fish (wrapped in fermenting rice, itself not eaten). Only after World War II did it become seen as a quality product.<sup>79</sup>

**1970s****Breakfast cereals emerge**

Between the 1970s and 1990s, the number of cereals on offer to American consumers doubled, from 160 to 340. It's now around 5000.<sup>82</sup> The proliferation is thanks to the invention of extrusion technologies.<sup>83 84</sup>

2000s

## Quinoa is becoming common

A niche product produced only in South America in the year 2000, it is now produced in 100 countries, including the UK.<sup>85</sup>

2000s

## The hipsters take over

'Craft beers', marketed as anti-corporate, local, and authentic, are booming. In just several years, the industry has grown from near non-existence to a quarter of the global beer market,<sup>90 91</sup> much of which is now owned by big-brand breweries consumers think they are avoiding.

2011

## Boozing brits

Between 2011 and 2013 the UK government pushed producers to remove 1.9 billion units of alcohol from the nation's diet, in part by introducing a 50% reduction in duty on beers below 2.8% alcohol, and 25% increase on those above 7.5%.<sup>92 93</sup> This drove product innovation, with some brands creating alternatives (marketing new fruit-flavoured low-alcohol beers as 'refreshing') and others reducing the alcohol content of all their beers from 5% to 4.8% - an imperceptible difference to consumers.



2016

## Achieving the impossible

In the last few years we've witnessed a proliferation of plant-based meat alternatives, such as the Impossible Burger,<sup>97</sup> among others.

2000s

2008

2000s

2011

2010s

2015

2016

2018

2008

## Free-range eggs

The UK has seen a dramatic rise in the market share of free-range eggs over the last 10 years.<sup>86</sup> This was in part driven by EU regulations, but also by a 2008 TV campaign against caged hens. In one week, sales of free-range chicken increased by a third.<sup>87 88</sup> Similar shifts emerged in New Zealand where all major supermarkets have now announced plans to phase out cage-farmed eggs from 2024.<sup>89</sup>



2010s

## Save the sharks

In China, a series of campaigns led by wildlife NGOs saw the consumption of shark-fin soup drop significantly, according to some estimates by 80%, in just several years.<sup>94</sup>

2015

## Pulled pork

In response to a downward trend in the consumption of pork, The UK's Agricultural and Horticultural Development Board ran a series of media campaigns that ultimately led to a 21,900% increase in consumption over a six year period.<sup>95 96</sup>



2018

## UK sugar tax

The recent introduction of a sugar tax in the UK has led to dramatic reductions in the calorie content of carbonated drinks by incentivising reformulation among producers.<sup>98</sup>

## 1.5 A behavioural approach to building public consent

**So far, we've presented the need for more sustainable diets, and demonstrated that diets are constantly changing, often through the deliberate influence of governments, industry and others. However, this doesn't address all possible objections. In this section we consider issues of public consent, and what it means to have 'free choice', through the lens of behavioural science.**

Debate on sustainable diets is becoming increasingly mainstream, with high profile voices such as the UN calling for radical change.<sup>99</sup> In response, a few national governments are starting to act, but these are still the exception rather than the rule.<sup>100</sup> Broadly, there is still an absence of strong policy around the world, and this reflects (and reinforces) the continued contentiousness of the issue. There seem to be two primary reasons for this sensitivity.

First, there is an assumption that the agricultural sector, and the meat industry in particular, has powerful lobbying clout, and presents a barrier to progress. There is some truth in this (see Section 2.3), but it is far from inevitable. For example, the Danish Government's recent proposal to include environmental labelling on food was met with broad support from the Agriculture and Food Council, representing industry interests.<sup>101</sup> Meanwhile, savvy food tech firms are recognising consumer trends, and taking it upon themselves to disrupt conventional production techniques, developing plant-based or lab-grown meat. This isn't restricted to Silicon Valley start-ups: the CEO of Tyson Foods, which provide 20% of Americans' meat (annually, \$15 bn of beef, \$11 bn of chicken, and \$5 bn of pork), has recently signalled moves towards plant-based and sustainable proteins, recognising the business case for doing so.<sup>102</sup> Clearly, views within the sector are varied, and our farmers and food technologists are developing many of the most compelling solutions.

Second, there is a prevailing sentiment that what we eat is a matter of deeply personal choice, and that government intervention will be unpopular.<sup>103 104</sup> However, survey evidence from across 12 countries shows the public expect government to lead on action for the global good,<sup>105</sup> and we think there is in fact a strong case for proportionate intervention on public diets. Though issues of personal choice and liberty are complex, the behavioural sciences offer some insight. Below we identify four key insights, and provide six recommendations to policy-makers.

### 1. We're constantly being influenced, and our choices are far from sovereign

It is tempting to assume that our food choices reflect an indelible, immutable, and sovereign set of tastes that are our 'own'. Any attempt to influence those choices is therefore meddling. But behavioural science reveals this simply isn't the case. As detailed throughout Section 2 below, our tastes are manifest within, and continually shaped by, incumbent economic, material and socio-cultural forces of influence. We enjoy eating meat and dairy in part because they are cheap (relative to their true cost to us and to society); their consumption is normalised in our culture (but hasn't always been so<sup>106</sup>); they are heavily marketed; and nudged upon us (deliberately or otherwise) through myriad aspects of the choice environment in supermarkets and restaurants. It's an illusion to think our food choices originated wholly from within, and it therefore makes little sense to object to influence, per se. A more pertinent question is what type of influence, by whom, and in which direction, is most acceptable?



**Recommendation 1a: Find the sweet spot of impact and acceptability**

We must operate within the realm of public acceptability, and also mustn't let the perfect be the enemy of the good. Pragmatism rules: we can achieve positive impact without purist notions of sustainability, and small steps that achieve public support will be more effective than bigger initiatives that don't. We think targeting interventions towards reduced (but not forgone) red meat consumption has the most potential to offer big positive impacts through relatively modest (and acceptable) changes in consumption, but other 'sweet spots' might also exist. Moreover, targeting producers (e.g. incentivising reformulation) may be more politically feasible than targeting consumers, and this approach can be reflected in tax design (for example, see strategy 1 in Section 3).

**Recommendation 1b: In many ways, this is the perfect issue for nudging**

By definition, nudges aim to be liberty-preserving, exerting soft influence to encourage sustainable choices, without precluding freedom of choice. Nudges alone won't be enough to save the planet, and shouldn't be allowed to crowd out appetite for a stronger policy response, but they may be a more acceptable entry-point. Most (but not all) of the strategies in Section 3 qualify as nudges.

**2. We don't always know, or do, what we want**

Perhaps the most acceptable policy or intervention is one that helps consumers make choices that are better on *their own terms*. This is what a good nudge often seeks to do. But how do we understand what's 'better' for the consumer? That is, how do we define our *true* preferences? If we are constantly susceptible to influence, our *revealed* preferences (what we do) are a poor proxy. Moreover, we have long-term desires that conflict with short-term desires, and our 'present bias' tends to favour the latter at the expense of the former, often against our better judgement. It is therefore rarely obvious what a government, aiming to maximise welfare and liberty, should do.

Take the example of someone who has the urge to gamble when they walk past a betting shop but who also wants to quit gambling. Restrictions on gambling adverts are welfare-diminishing to the former, but welfare-enhancing to the latter. And what about liberty? Scaling back government regulation may minimise the state's influence on our behaviour but frees up betting shops to maximise theirs, perhaps with less savoury motives.

These arguments are directly applicable to sustainable diets. According to a survey of over 6,000 consumers across the US, China, Brazil, Germany and the UK, two-thirds want to consume less, and consume more sustainably, and yet most fail to act on this expressed preference.<sup>107</sup> A nudge towards this aspiration might therefore be embraced, increasing welfare, and can be done in a manner that doesn't restrict liberty or choice.

### Recommendation 2: Help people help themselves

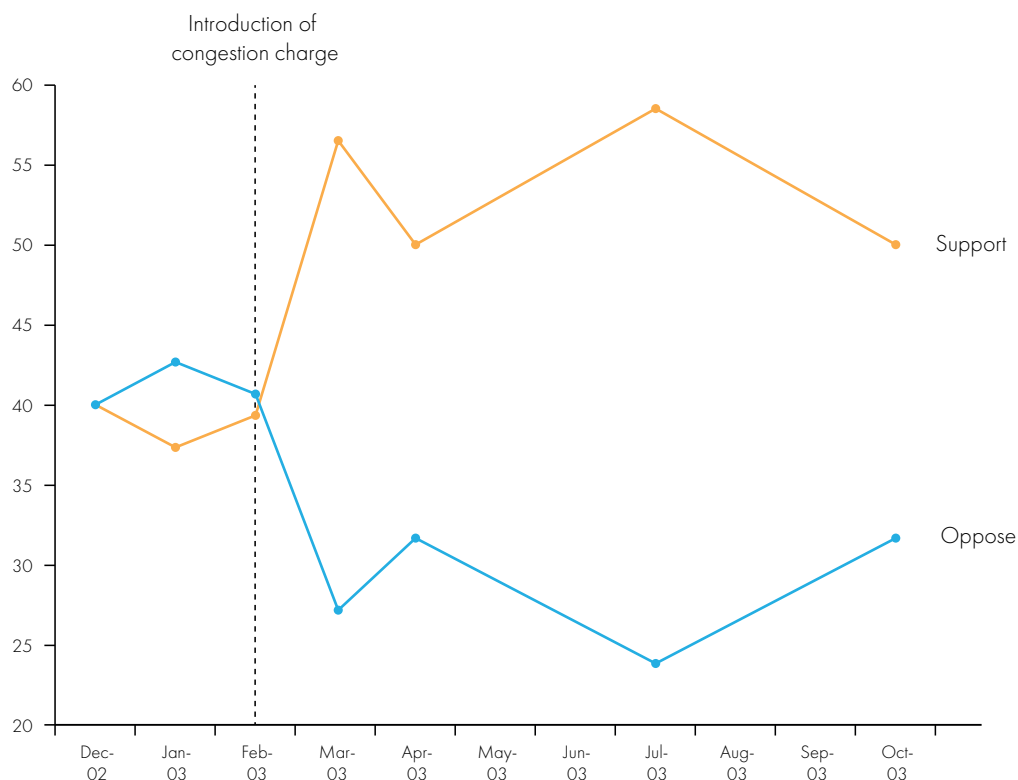
The evidence shows most of us want to be more sustainable and healthier. Policy, therefore, can start by seeking to support and enable this desire, rather than push or nag. Removing barriers to eating more sustainably is not the same as proactively pushing people to eat more sustainably, and will likely be a more acceptable starting point (though there may be a case for doing both). This approach may also be pertinent among retailers and producers, who will want to maintain a positive customer relationship. Many of the ideas in Section 3 are about supporting and enabling, rather than pushing, with 'making it easy' one of our central themes.

## 3. We rarely like change (until it's happened)

Policy is often unpopular before it has been implemented, but public sentiment can take a positive turn in hindsight. The best studied examples include smoking bans, plastic bag levies, and congestion charges introduced in many locations around the world.<sup>108 109</sup> The figure below shows sentiment towards a London congestion charge before and after introduction.

This is human nature: we are loss-averse,<sup>110</sup> meaning that before policy roll-out we focus more on that which we will lose (such as freedom to smoke in bars), and pay less attention to that which we will gain (such as not smelling of smoke at the end of an evening). Often these benefits are impossible to appreciate until after they have been experienced, whereas we are well aware of the privileges we will soon be losing. We are similarly averse to uncertainty and risk, and so are biased strongly towards the status quo and the known but quickly adapt to the new norm.

**Figure 3:** Public support for the London congestion charge shot up immediately after implementation.



Source: Impacts Monitoring: Second Annual Report, TFL (2004)



**Recommendation 3a: Highlight the benefits, and the effectiveness of the policy**

One obvious solution to our natural aversion to change is to help people recognise the benefits of a policy. Another approach is to highlight its effectiveness. A study conducted with consumers across the US and the Netherlands found that support for a climate change mitigation policy aimed at reducing meat consumption increased with its perceived effectiveness.<sup>111</sup> This echoes evidence from other behavioural interventions, in areas from obesity to tobacco, showing that public acceptance of policy rises with perceived effectiveness of that policy,<sup>112</sup> highlighting the importance of communicating success. Further studies have shown that the public are more supportive if they are aware of the extent to which their diets are being influenced by factors outside of their control,<sup>113</sup> presumably because this reinforces the 'protection' element of the policy, as opposed to being about additional infringement on freedoms.

**Recommendation 3b: Create public policy *with* the public**

There are various good practices that governments can adopt to help build public understanding and support for policy. For instance, the use of deliberative forums and citizen juries can create a stronger mandate for action, build public understanding, give a sense of agency and public ownership over the changes (being made with them, not to them), and lead to more innovative policy due to the wider range of views captured.<sup>114</sup>

**4. It's not necessarily paternalistic... though if it were, that might not be a problem**

Paternalism is defined as an infringement on our free choice for our own benefit<sup>115</sup> — protecting us from our own bad decisions. Examples include seatbelt mandates, age restrictions on gambling, and sugar taxes. Though usually benevolent, to critics this can be diminishing of our liberty, and infantilising, built on the premise that we don't know what's good for us.<sup>116</sup> But governments also legitimately intervene to protect us from harm caused by others (and to protect others from harm we might cause them). This is the case with laws against libel, theft, drink-driving, or taxes on carbon emissions. Writ large, suicide prevention is paternalistic, homicide prevention is not.

It's an important distinction because it's often conflated in public debate, leading to objections against paternalism when the policy is not paternalistic. For example, smoking bans in public places find objection on paternalistic grounds ("It's my body!"), yet the policy need not be paternalistic ("Do as you wish to your own lungs, but second-hand smoke harms other people"). It is relatively easy to argue against paternalism but more difficult to argue that we have a right to harm others, or that others have a right to harm us.

Policies to reduce the consumption of red meat and other unsustainable food products can be justified on either grounds. Health arguments are at least partly paternalistic (protecting us from our own harmful consumption), while environmental arguments are not (they aim to mitigate externalised harm to society). In this report we've highlighted the environmental argument, sidestepping the criticism of paternalism. But does this make the case more compelling?

<sup>1</sup> Behavioural science, which reveals our tendency to act against our best interests, even on our own terms, does make a strong case for a proportionate degree of paternalism in policy to protect us from our own psychological failings (e.g. our lack of willpower, short-termism, or inertia/laziness), but that's another argument for another time. E.g. see Allcott & Sunstein (2015).

Recent evidence suggests not. The health argument, though paternalistic, is found to be more publicly acceptable than the environmental argument for government intervention on red meat consumption.<sup>117</sup>

<sup>118 119</sup> Why might this be? A clue comes from other evidence that shows that nudges that are pro-self (in our own interests, thus inherently paternalistic) tend to be more acceptable than those that are pro-social (benefitting others or society at large, thus not paternalistic).<sup>120</sup> This implies self-interest is the important factor, accepting government intervention that benefits us. As for policies that seek to mitigate harm to others, we expect governments to penalise fly-tippers and dangerous drivers because most of us do not fly-tip or drive dangerously, so we envisage ourselves on the victim side of these acts, and thus benefit from government intervention. Here, intervention benefits us. In contrast, most of us enjoy eating beef, and are therefore on the perpetrator side. From this perspective, government intervention on diets feels less like harm prevention, and more like the loss of our own privilege to cause harm.

And so it may be hard to build support for government intervention on a purely environmental case, not because it is paternalistic (it's not), but because it goes against the self-interest of all of us who consume or produce unsustainably.

#### **Recommendation 4: Co-opt the health agenda**

Strongly wedding this issue to the public health agenda, promoting reduced red meat consumption for consumers' own health benefits (rather than *solely* to protect the planet) is likely to be more publicly acceptable. It aligns with our self-interest as individuals, rather than infringing on our liberty for the betterment of society.

## **To conclude**

None of the above points constitute an argument for governments to adopt heavily interventionist policy to influence public diets. That is ultimately a debate for elected officials and the public. However, we are proponents of using good science to frame and interpret such a debate, and the above points address some common misconceptions that might be dampening politicians' appetite to act boldly on this issue.





# Main Course

In this section we take a deep dive into the behavioural science, describing the key factors that influence our food choices. We do this within an 'ISM' model, identifying i) characteristics and psychological traits at the level of the **Individual** consumer, ii) factors of influence within our **Social** environment, and iii) features of the wider **Material** context. This analysis lays the foundation for the 12 strategies described in Section 3.

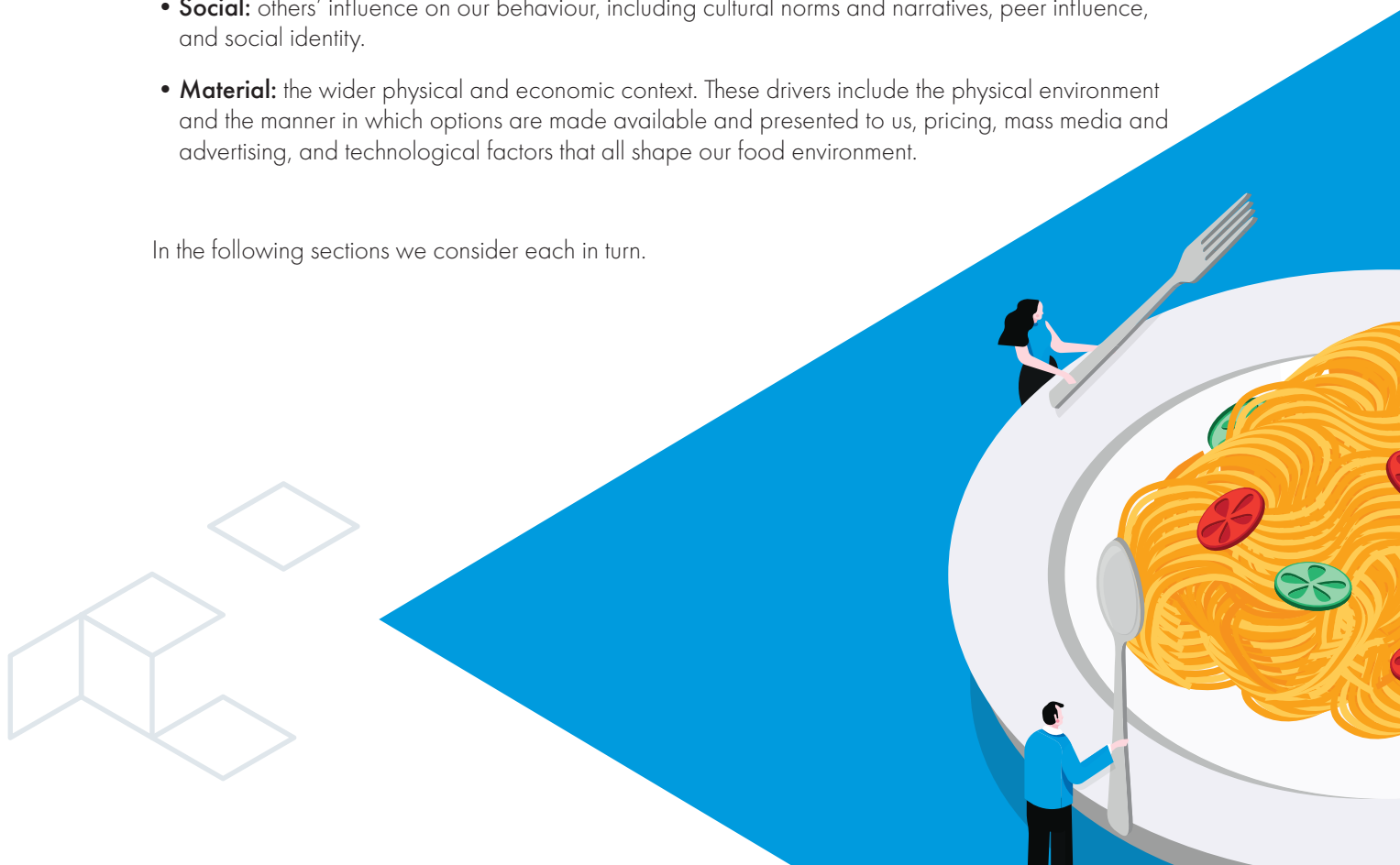
## 2. Drivers of food choice: Individual, Social and Material

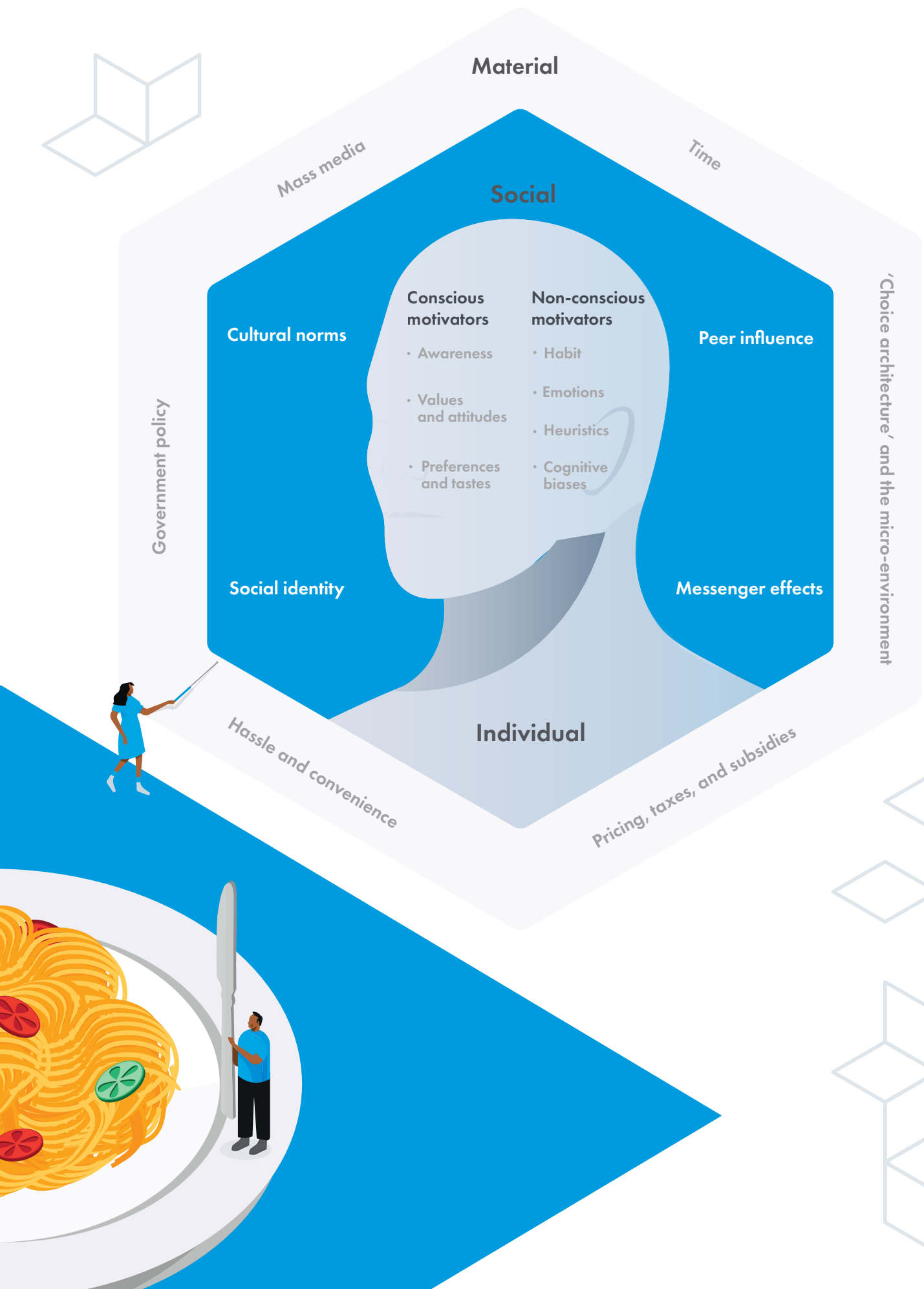
In one sense we can say that global dietary trends are a product of consumer choice, rooted in collective tastes, preferences and habits. However, these choices cannot be separated from the world in which they are made. The social, cultural, physical, and economic setting profoundly influences the preferences we have and the choices we make, both consciously and non-consciously. This interaction between the individual, and the context they are in, is an important theme of this chapter.

Different academic approaches, from social and cognitive psychology to behavioural economics and social practice theory, put more or less emphasis on the personal versus contextual factors that shape our behaviours. Both perspectives are correct: society is a product of billions of individuals' actions, but those individuals are equally a product of their society. To put some structure to this interaction, the figure below presents a simple 'ISM' model, in which we identify the dominant factors shaping our diets at three levels:

- **Individual:** 'inner' psychological drivers of our behaviour, both conscious and non-conscious. This includes our tastes and preferences, values and beliefs, but also ingrained habit, emotion, heuristics (mental shortcuts) and cognitive bias.
- **Social:** others' influence on our behaviour, including cultural norms and narratives, peer influence, and social identity.
- **Material:** the wider physical and economic context. These drivers include the physical environment and the manner in which options are made available and presented to us, pricing, mass media and advertising, and technological factors that all shape our food environment.

In the following sections we consider each in turn.





## 2.1 Individual drivers of diet

### Individual drivers of diet – key takeaways for this section

- Customers tend to prioritise taste/enjoyment, cost, variety, convenience and health, roughly in that order. Environmental concern is rarely mentioned as a factor in our food choices, though this may change as awareness is rapidly increasing.
- At the moment, awareness of the environmental impact of food is still low compared to environmental awareness more broadly. Raising awareness may therefore be worthwhile to build policy support, though the wider behavioural literature suggests awareness-raising on its own is likely to have very limited impacts on individual behaviour. Instead interventions are needed that leverage other motivations, or other drivers of our behaviour.
- A host of non-conscious cognitive processes, including habit, heuristic-based decision making, emotion and cognitive bias, also influence our choices. A broad category of interventions exists that aim to harness or overcome these aspects of our psychology.

### Consumer preferences, awareness and values

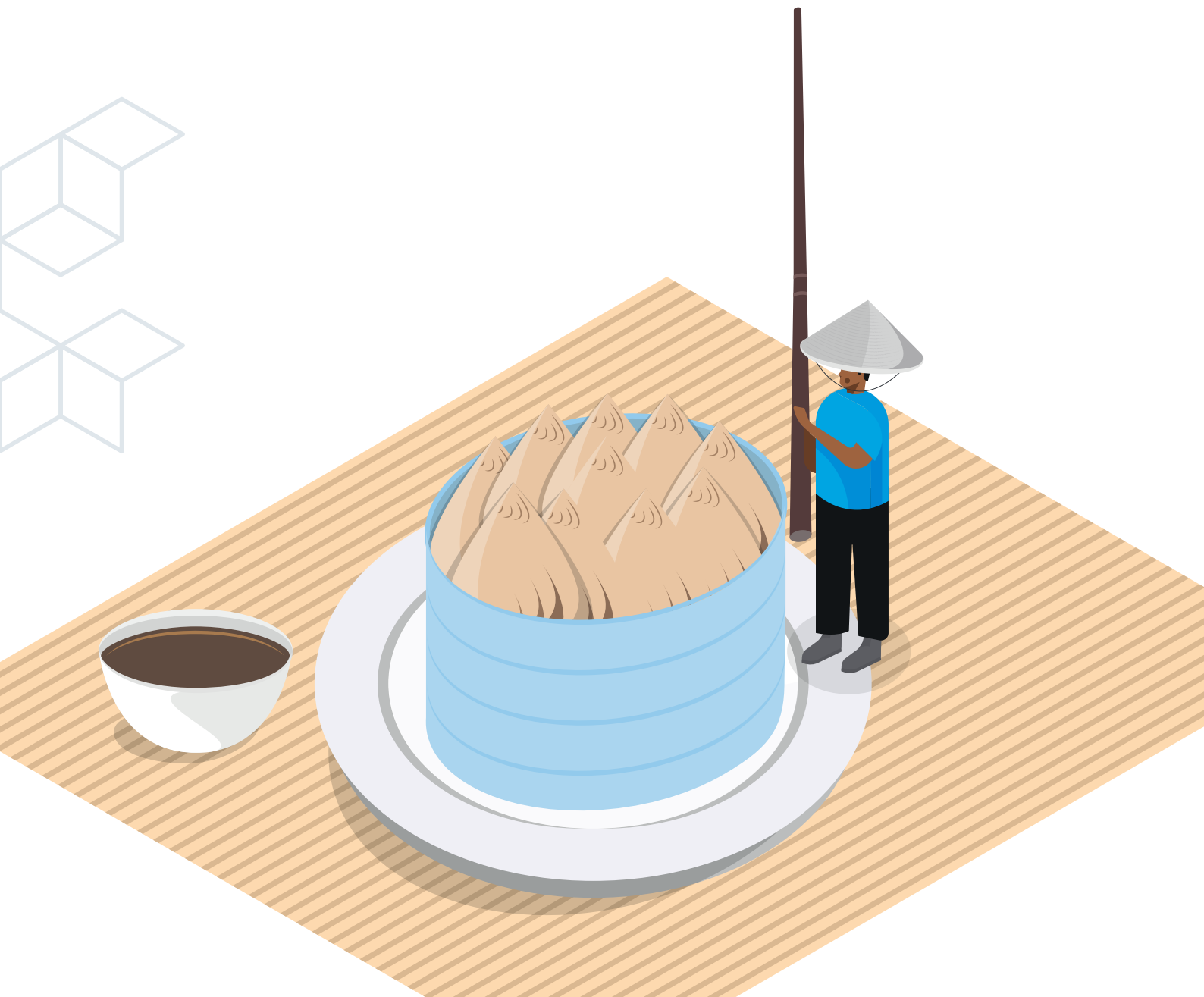
A large proportion of the public claim to care about the environment.<sup>121</sup> However, at present, this concern does not seem to be reflected in our food choices. There are several possible reasons for this.

First, awareness of the environmental impacts of food are still quite low. A survey across 12 countries in 2017 concludes that ‘people have generally not read or heard about the connection [between meat consumption and climate change]’; despite quite high awareness of climate issues more generally.<sup>122</sup> Even those motivated to eat more sustainably are more likely to consider food miles and packaging (which are generally less important than the choice of ingredients).<sup>123 124</sup> A 2018 survey representative of UK consumers found just 17% believe meat is associated with climate change and 9% with water pollution, lower than the belief that meat is associated with negative health effects (28% for bowel cancer and 25% for heart disease) but lower still than the 44% who believe meat is a critical source of protein and thus serves a *protective* health benefit.<sup>125</sup> This echoes other research that shows health concerns to be a driver towards plant-based foods only among the highly health-literate but also a barrier among a large proportion of consumers who see meat as ‘essential for maintaining health... [because] vegetarian diets are inadequate.’<sup>126</sup> This is one of the most common self-reported reasons for not eating less meat, along with simple enjoyment, a preference for familiar foods, and a lack of knowledge and skill in preparing vegetarian food.<sup>127 128 129 130</sup>

The natural conclusion from all of these studies is that we should raise awareness. But will this help? The evidence on food behaviours (principally from public health research) suggests awareness-raising can *sometimes* be effective in shifting behaviour, if designed well (principally, delivered at the point of purchase, on product labels).<sup>131</sup> We discuss the merits of raising awareness in Section 3 (strategy 5), the main benefit being to boost public support for policy. However, we should also be deeply sceptical of information provision as a sufficient strategy to directly change behaviour. One recent review of information and educational interventions to reduce meat consumption concludes that while these interventions can shift self-reported intentions to act, there is currently no evidence to show they impact our actual behaviour.<sup>132</sup> This finding echoes research on public health dietary interventions.<sup>133</sup>

A second possible explanation, therefore, is that with or without awareness of the issue, motivation to eat sustainably may be low compared to other motivations. Data show the dominant motivations across Europe and the US to be for 'tasty, inexpensive, varied, convenient, and healthy foods, roughly in that order of importance.'<sup>134 135 136</sup> Similar findings emerge throughout multiple studies, which occasionally highlight other factors such as parental influence (including culture), body image, and the media.<sup>137 138</sup> Even vegetarians more commonly cite other reasons, including disgust at eating meat, animal welfare concerns, cost, or health and perceived safety.<sup>139 140 141</sup> Among those that do claim environmental concerns, evidence suggests these attitudes may be retrospectively embraced, with vegetarianism first adopted for other reasons and *subsequently* moralised.<sup>142</sup> Though these findings should be caveated by the fact that they can be rapidly out of date in a world where diets are starting to shift, an important point is likely to remain valid: expecting consumers to care about the environment *enough to compromise enjoyment, cost, or convenience* is a big ask. This is why we focus heavily on making sustainable food more appealing in our proposed strategies in Section 3.

A third contributing factor is that even with awareness, and even with strong pro-environmental values and intentions, other barriers still stop us from taking action.<sup>143 144 145</sup> This disparity between our values and our actions (the 'value-action gap' or, somewhat synonymously, 'intention-behaviour gap') further explains why campaigns designed to elevate pro-environmental values may indeed influence our values or our intentions but tend to have a limited impact on behaviour.<sup>146 147</sup> The box below provides further explanation.



### The value-action gap in sustainable consumption

*“Man is not a rational animal; he is a rationalising animal.” - Robert A. Heinlein*

Our actions commonly diverge from our stated values, attitudes, or intentions, and this ‘value-action gap’ is prevalent across most pro-environmental behaviours.<sup>148</sup> In fact, our attitudes can be so disconnected from our behaviour that greater concern for the planet can be predictive of a *higher* ecological footprint (since pro-environmental attitudes tend to correlate with education and income, and thus material consumption).<sup>149</sup>

In part, this reveals the slightly cynical relationship we have with our values. Our concern for the planet may be sincere, and even an important part of our identity, but we often benefit from acting against those values: it’s more convenient to fly, cheaper to replace a broken appliance than fix it, and enjoyable to eat steak. We therefore tend to do just enough to buttress our positive self-image and assuage the guilt (by recycling, for instance), while justifying, downplaying or conveniently ignoring our bigger hypocrisies.<sup>150 151</sup> We adopt various psychological tricks to achieve these double-standards, including *motivated inattention*<sup>152</sup> (not thinking about the issue at the point of purchase); *moral licencing*<sup>153 154</sup> (using good acts, like that time we took the train instead of driving, to excuse the bad); *motivated reasoning*<sup>156</sup> (reasoning towards the convenient or self-serving conclusion); and *delegation* (pushing responsibility onto government, industry etc.)<sup>157</sup> There is a rich body of evidence on the role that these psychological defences play in the consumption of animal products, as we wilfully evade the ethical implications of our food.<sup>158 159</sup>

The value-action gap is further widened because even the most sincere of intentions to eat more sustainably can be thwarted by psychological and practical barriers. These include a lack of willpower, forgetfulness, limited know-how, low self-efficacy, ingrained habit, laziness, poor availability of options, cost barriers, or hassle and inconvenience. Finding ways to overcome these barriers, thus ‘closing the gap’ between our intentions and our actions, is a good strategy for change. Many of the strategies in Section 3 take this approach, particularly those under the theme of ‘making it easy’.

An important consequence of the value-action gap is that we tend to act consistently with our concern for the planet when it is easy to do so (cheap, convenient, enjoyable) but not when it requires greater sacrifice. This is known as the ‘low cost hypothesis’,<sup>160</sup> and raises an intriguing possibility: might eating a more sustainable diet be a ‘low cost’ action we could all easily adopt, satisfying the wish to be more sustainable, without incurring too much personal sacrifice? Or, would it fall into the pile of difficult or unappealing actions we fail to adopt despite knowing we ought to? There is currently insufficient evidence to say, but there is reason for optimism: unlike giving up flying, or buying an electric car, there are no great practical or financial barriers stopping us all from changing our diets tomorrow, and so dietary norms could shift quickly. However, there are other costs to overcome: perceptions of diminished enjoyment, a need to crack old habits, try something new, and learn new recipes. We must therefore move beyond mere awareness raising, and help people overcome these barriers, even if they’re already motivated to eat more sustainably.



## Non-conscious decision-making

Our choices and actions are not borne solely from our conscious beliefs, attitudes and intentions. Equally important are a host of motivations and cognitive processes that sit beneath the surface of awareness. Nobel Laureate Daniel Kahneman describes these as two parallel systems of mental activity. One is slow, reflective, cognisant and intentional, while the second is rapid, largely automatic, driven by intuitive processes and susceptible to cognitive bias (a tendency to predictably err towards certain outcomes, counter to rational logic).<sup>161</sup> This intuitive system dominates or influences much of our behaviour, despite our relative unawareness of it. There is a large body of evidence to show that this is the case generally<sup>162</sup> but also that our food consumption in particular is largely automatic, habitual, and reliant on heuristics (mental shortcuts, or rules of thumb).<sup>164 165 166 167 168</sup>

For instance, these might include ‘eat what everyone else is eating’, ‘pick the middle option’, ‘stick with the familiar’ or ‘buy the brand I’ve heard of’. These are low-effort strategies for making mostly good choices, but they also leave us susceptible to influence and to cognitive bias. Successful behaviour-change strategies of various types can be designed to harness common biases and ‘go with the flow’ of our non-conscious decision-making. Many of the strategies in Section 3 do exactly this.

## 2.2 Social drivers of diet

### Social drivers of diet – key takeaways for this section

- We need to fully embrace the social dimensions of our behaviour if we are to succeed in promoting widespread adoption of more sustainable diets. There are two broad approaches to this.
- First, this is about recognising our innate tendencies for cooperation and conformity, which can be harnessed by leveraging the influence of peer groups and social norms.
- Second, this is also about recognising, and addressing, the baggage of stereotypes and associations that come with certain social identities – such as vegetarianism being feminine or weak. What’s perceived as ‘normal’ is very much socially constructed, and so we must understand food’s social and cultural dimensions to shift these norms.

By zooming out from the individual consumer, and looking instead at their surrounding context, we re-frame the debate. Rather than ask the question, “Why is this person eating red meat, and what would it take to change their food choices?” we might ask, “Why has the practice of red meat consumption become so commonplace in society, and what would it take to re-gear our shared norms towards more sustainable practices?” Through this lens, answers are found in the social and cultural forces described in this section, as well as the material world around us, covered in Section 2.3.<sup>169</sup>



## Social influence

**Companion**, (noun).

*Someone with (com) whom we share bread (pan).*

Humans are fundamentally social creatures. We have evolved a strong tendency to cooperate, to identify with social groups, and to conform to norms. These social influences can often be directly harnessed to promote more sustainable behaviour. For example, simply telling people that most other people have adopted a sustainable behaviour (such as using less energy, or re-using their towels in a hotel) effectively promotes these behaviours.<sup>170</sup> Indeed, many vegetarians claim that they gave up meat due to a friend or family member, revealing that the normative beliefs of our peers are a strong driver of our own behaviours.<sup>171</sup> While plant-based food is not yet the majority norm, research has shown that 'dynamic norm' messages (communicating that people are increasingly adopting low-meat diets) can also be effective at promoting plant-based food choices.<sup>172</sup>

We also have a finely tuned sense of social etiquette, trust, fairness, and status, and more broadly our tendency to act for the good of others is socially regulated. Feelings of guilt, empathy and peer pressure are the proximate motivations that encourage us to adhere to norms of fairness and cooperation. Conversely, anger and indignation drive us to ensure others also play by the rules. This is highly relevant to all manner of pro-environmental behaviours, since we are more inclined to 'do our bit' if a) we know that others are also doing their bit, and b) our behaviour is accountable, or observable, to others.<sup>173</sup>

<sup>174</sup> Again, these facts can be used to design interventions and campaigns that use peer-comparisons, feedback, or rankings.



## Identity and culture

Our lives are set against a backdrop of culture, shared narratives, meaning, and social identities. These come packaged with stereotypes and associations, and we therefore eat foods that reflect our culture and that we identify with. These social identities are cast along boundaries of gender, family role, nationality, religion and so on. Whether or not we recognise it as such, the choice to eat sustainably, healthily, or ethically is in part an expression of belonging to these social groups.<sup>175</sup>

This can be a positive force for some consumers who identify with certain social categories, but a major hurdle for others.<sup>176</sup> For instance, eating meat is associated with masculinity,<sup>177</sup> and vegetarianism with femininity and weakness.<sup>178</sup> This view seems to be shared by men and women alike, and broader concern for the environment is also considered feminine.<sup>179</sup> These are not false preconceptions: gender is in fact the strongest demographic predictor of meat consumption.<sup>180</sup> Women do also on average express more concern about the environment, are more emotionally engaged with concerns about animal welfare, and report being more willing to change their diets.<sup>181</sup> Whether these associations reflect anything deeper than a mere manifestation of stereotypes and culture is not clear. However we do know that the advertising industry has played a role in promoting this connection between meat and manliness, as well as the corresponding one that vegetarianism is effeminate.<sup>9</sup>

Other associations with vegetarianism that need to be tackled are perceived seriousness, upper socio-economic status, arrogance, virtue, and particular political leanings.<sup>182</sup> At least in the industrialised West, these reflect a coherent and distinct social identity of vegetarianism against a backdrop of 'normal' meat consumption, which itself is not associated with any particular social groups. Breaking these stereotypes can be difficult, though easier when others sharing one's identity do: studies have found that among men, the number of vegetarian friends they have is the strongest predictor of their own meat consumption.<sup>183</sup> Other research reveals that men are more likely to buy sustainable options (cars, for instance) when their masculinity was affirmed beforehand, or when advertising for the product is overtly masculine.<sup>184</sup>

The social stereotypes and associations that are attached to different diets will of course vary between cultures. In many parts of the world meat consumption is a sign of affluence and thus associated with status, conspicuous consumption and egoism.<sup>185</sup> The norms associated with 'traditional' cuisines<sup>h</sup> can also limit our imaginations and our comfort zones. For instance in many cultures, including Anglo-cultures and other parts of Northern Europe, meat is a central component of most meals, and the same dish is perceived as incomplete without it. This suggests we either need to re-invent what traditional and 'normal' Northern-European and American food looks like (such changes have happened before – see Section 1.4), or we might focus on amplifying influences from other cultures, since many (such as Indian) happen to be low in ruminant meat but are not perceived as 'incomplete' as a result. The globalisation of cuisine, and influences from Asia, the Middle East and elsewhere into European and American cuisines, is surely one of the main reasons why vegetarian options are more varied and appealing than just a decade or two ago.

The broad point here that must be addressed is that meat eaters commonly perceive plant-based food as narrowly attached to a vegetarian identity they are not a part of.<sup>186 187</sup> In short, plant-based food is weird.

<sup>9</sup> One example: Hummer, makers of the infamously low mileage-per-gallon truck, advertised it as a way to 'rebalance' the masculinity of a tofu-buying vegetarian. <https://www.youtube.com/watch?v=IL4ZkyPLN38>. Wider and more subtle implications, from BBQ culture to gendered stereotypes in film and television, still pervade our modern culture.

<sup>h</sup> Noting that traditions change more frequently than we tend to recognise – see Section 1.4.

### Plant-based food is weird

All of us eat plants, so it is arguably omnivores who deserve the label of distinction. Nonetheless, the weight of normality currently sits with meat-eaters. A brief thought-experiment can help illuminate how influential this framing is (and how big a barrier it presents in countries with meat-centric diets).

Picture a parallel universe in which vegan food is the default, menus have an 'A' to inform customers that some dishes contain animal flesh (with the weight of assumption being that they otherwise do not); consumers wanting meat have to pre-order their meal when booking a flight, attending a wedding or a Christmas party (as vegans often do now); and shoppers have to go to niche shops or find the special 'contains meat' aisle in supermarkets, along with the anti-allergen and other 'alternative lifestyle' produce.

If this parallel universe feels radical, this is only because the current norm is symmetrically radical in favour of profligate meat consumption. This is not a value statement: regardless of where any of us believe the true, objective norm *should* be (if such a thing could exist), the behavioural science clearly demonstrates that pervasive norms go unquestioned but have enormous influence over our perceptions and our actions. This includes norms of food labelling systems, supermarket layouts, cultural and identity labels, and the relative prevalence and availability of different options. In all cases, we often elevate plant-based food as 'special' against a backdrop of 'normal' meat consumption, and this in turn reinforces our preferences, tastes and choices. We would therefore be mistaken in believing our tastes are 'our own', unfettered by outside influence. Shifting the perceptions of what's normal is an important strategy, and forms one of three themes in Section 3.

g One example: Hummer, makers of the infamously low mileage-per-gallon truck, advertised it as a way to 'rebalance' the masculinity of a tofu-buying vegetarian. <https://www.youtube.com/watch?v=IL4ZkYPLN38>. Wider and more subtle implications, from BBQ culture to gendered stereotypes in film and television, still pervade our modern culture.

h Noting that traditions change more frequently than we tend to recognise – see Section 1.4.

## 2.3 Material drivers of diet

### Material drivers of diet – key takeaways for this section

- We are highly sensitive to contextual factors, which shape and constrain our behaviour in ways we're rarely fully aware of. This includes 'large' influencing factors such as regulatory landscapes, technological developments and economic factors, as well as 'small' factors, including the details of our immediate 'micro-environment'.
- Government financial support to meat production (direct and indirect subsidies) is likely to pose a major barrier to reduced ruminant meat consumption.
- There are many ways we can manipulate the choice architecture – the immediate setting and framing of options – to promote certain choices. Though these techniques alone won't be enough to save the planet, they can be low-cost, highly feasible, and can add up to significant impacts. This includes re-ordering or repositioning options in supermarkets, canteens and menus; increasing the availability of sustainable options; changing portion sizes; setting more sustainable defaults; and making sustainable options easier to select.

### Pricing and subsidies

We cannot ignore the influence of industry lobbying and government subsidy, which both profoundly shape the food sector and generally inhibit change.<sup>188 189</sup> In the US alone, the sales of meat are estimated to be worth \$125-\$200 bn per year, dominated by a handful of corporations, with the economic ripple effects estimated to be worth \$864 bn, 6% of GDP.<sup>190 191</sup> In addition to the significant environmental and health costs the meat industry puts on society,<sup>192</sup> the sector is also directly subsidised across the US, Europe and elsewhere. Animal feed and other animal products alone are subsidised to the value of \$52 bn in OECD countries,<sup>193</sup> while the total value of agricultural subsidies exceeds \$600 bn per year.<sup>194</sup>

We know such subsidies influence our diets, and not always to consumers' benefit. One example is that of maize subsidies providing cheap corn syrup and ultimately playing a major role in widespread obesity, particularly in the US.<sup>195</sup> Meat consumption is also known to be price-sensitive,<sup>196 197 198</sup> and so low prices are a major barrier to reduction. Indeed, a review of 160 studies on food price effects found meat to be among the most price-elastic of products, suggesting an increase in price would effectively reduce the volume we eat, providing a strong case for reducing subsidies to these products if we want to decrease consumption, or going further and taxing them.<sup>199</sup> However, in many countries, meat is not only subsidised in its production, and forgiven its significant externalised costs but also subject to a reduced level of VAT.<sup>200</sup>

### Traditional and online media

Traditional and social media are powerful forces of influence because they draw such large audiences and capture so much of our attention. In the UK, the average adult spends five hours a week looking at food related content on social media, and more than an hour and a half watching food related TV, with approximately half saying they have tried to make something they saw on TV.<sup>201</sup> Among younger audiences, 47% in the UK consider themselves a 'foodie', and 63% aged 13-32 post pictures of food on social media. 160 bn Instagram posts are tagged 'food porn', and in 2015 there were 23 bn views of online food videos, a figure that has been steeply rising.<sup>202</sup>

## Choice architecture

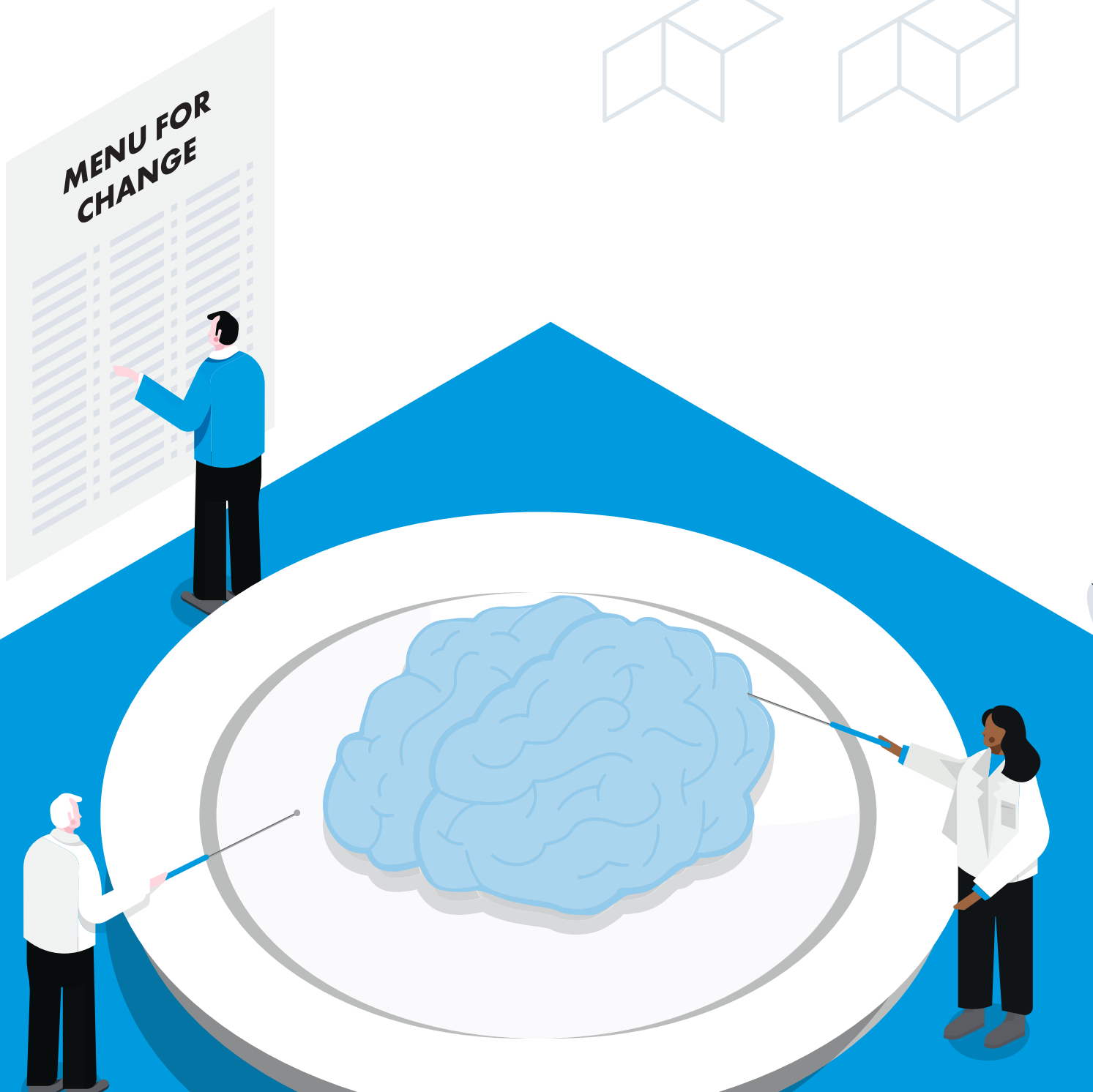
The smallest of details in our material environment also matter a great deal. The heuristics we use to make decisions (introduced in Section 2.1) are often automatic responses to cues in our environment, meaning the design of our 'micro environment', or the 'choice architecture' can have profound effects. Examples include the layout of a menu, canteen or supermarket. Six factors in particular emerge as well-evidenced in this context.

- We tend to stick with the default option. This is the easiest 'do nothing' option, and is also often perceived as an implicit recommendation, norm, or safe choice. The power of defaulting people into certain options (free to opt out if they wish) has been demonstrated in many contexts, including dramatically increasing the number of people saving for retirement and the number of customers on green energy tariffs.<sup>203</sup> Many food environments, such as catered events and flights, have a default choice, which is often not the most sustainable.
- We tend to gravitate towards the first option in canteens<sup>204</sup>, and the first and last options on menus.<sup>205 206</sup>
- Making plant-based or other sustainable options more available (by increasing their prevalence relative to meat options) has been shown to be effective in canteens, with surprisingly large impacts.<sup>207</sup> This strategy works by making them more noticeable, seemingly more normal or common, and by simply increasing the odds that one of the sustainable options will appeal to our tastes.
- Not all supermarket positions are equal, with evidence showing we bias towards produce at the end of aisles, at eye-height, and by the checkout.<sup>208</sup>
- Research suggests products that are more eye-catching sell more,<sup>209 210</sup> since in a supermarket or menu filled with choice, the first priority is to capture the consumers' attention, particularly if a meat-eater wasn't actively looking for the plant-based option.
- Modest reductions in meat portion size have been shown to be potentially effective *without* diminishing consumer satisfaction.<sup>211</sup>

Meta-analyses show that these kinds of techniques have merit, with diet interventions that seek to alter the 'external' setting, or *choice environment*, tending to be more effective than those that target our 'internal' motivations.<sup>212 213</sup> One academic review describes this as favouring interventions that target eating behaviour more 'directly', e.g. through plate size or default options, over those which target psychological processes hypothesised to precede behaviours (such as knowledge, awareness, or values).<sup>214</sup>



**“... diet interventions that seek to alter the ‘external’ setting, or *choice environment*, tend to be more effective than those that target our ‘internal’ motivations ...”**







## 3. Twelve strategies for promoting sustainable diets



Having described the various challenges we face, we now turn to solutions. As throughout the report, we've naturally focussed on red-meat consumption, but the twelve strategies here are applicable to other product substitutions too.

Although our behaviour is constantly being influenced, and dietary norms are constantly in flux, deliberately manufacturing such changes is not straightforward. Human behaviour can be stubborn and 'sticky', and predictably unpredictable. In the following sections we distil what we know about behaviour-change, to offer 12 concrete strategies, each containing multiple actionable ideas.

Some of the strongest possible interventions (such as redirecting agricultural subsidies) are excluded. This is not because they would be ineffective, but because we have focussed on less conventional solutions informed by the behavioural sciences. However, a word of warning: focussing on nudges and 'softer' interventions, as though they offer an easier solution, can be counterproductive if it diminishes political appetite for stronger policy.<sup>215</sup> Instead, the ideas below have an important contribution to make because they are often more feasible than radical policy-change, implementable by a wider range of stakeholders, and can still amount to significant impacts.

There are three common themes throughout the 12 strategies, reflecting three critical pillars of dietary change:

### 1. Make sustainable food more **APPEALING**.

Ultimately, there is only so much compromise consumers are willing to accept. Various motivations can be harnessed to make sustainable food more appealing (e.g. cost or convenience), but the most important is enjoyment – sustainable food needs to be delicious.

### 2. Make sustainable food **NORMAL**.

Though we tend to think of our food choices as deeply personal, in reality they are shaped profoundly by our culture and our social environment. We must therefore create new norms, promote plant-based dishes as mainstream, and address the perceptions of 'otherness' of plant-based food.

### 3. Make sustainable food **EASY**.

When changing our habits, there is a direct relationship between how motivated we are, and how easy it is to do. The motivation to eat sustainably won't be sufficient among most consumers, unless we also make it really easy. All barriers (both psychological and practical) must therefore be removed.

Our 12 strategies are targeted broadly at three audiences:



► **Government** (policy-makers, regulators, public procurement)













► **Industry** (retailers, producers, canteen staff, restaurant managers, marketers)



► **Civil society** (campaigners, educators, members of the public)

Who?	What?	Expected Impact?
<b>Make it APPEALING</b>		
	<b>1. Drive product reformulation and innovation with a carbon tax targeting producers.</b>  <b>1a.</b> Modelling past efforts to reduce sugar consumption and alcohol consumption in the UK, a well-designed tax on emissions per portion of high-impact foods, could drive product innovation and reformulation without unduly penalising consumers who enjoy eating red meat.	High
	<b>2. Market plant-based food as aspirational, delicious, and indulgent.</b>  <b>2a.</b> This requires a shift in language, moving away from perceptions that plant-based food is healthy, light, abstemious or 'incomplete'. E.g. Don't use 'meat-free'.  <b>2b.</b> Imagery and design should do the same, emphasising enjoyment rather than health or lightness.	Medium
	<b>3. Use novel in-store/in-app promotions, incentives and games.</b>  <b>3a.</b> In-store promotions such as meal deals can boost sales, raise awareness, encourage meat-eaters to try new options, and send a positive signal.  <b>3b.</b> Novel 'gamification' techniques and other behaviourally-informed incentives can be built into loyalty schemes and grocery shopping apps.	Modest
	<b>4. Campaign with pride, positivity, and pragmatism.</b>  <b>4a.</b> Avoid blame, guilt, negativity and perceptions of righteousness, and instead build campaigns around pride and positivity.  <b>4b.</b> Promote practical substitutions that remain appealing (such as beef for chicken, or small reductions), rather than purist notions of plant-based diets that don't appeal to the mainstream.	Modest
  	<b>5. Raise awareness, and build a mandate for strong policy.</b>  <b>5a.</b> Harness influential messengers who have broad appeal, relevance and credibility, for instance TV chefs, athletes, GPs, and cultural influencers, to raise awareness of, and appetite for, sustainable food.  <b>5b.</b> Increase knowledge and know-how through education, in particular through school curricula (before tastes and eating habits are settled), as well as in professional chef training.	High

Who?	What?	Expected Impact?
<b>Make it NORMAL</b>		
 	<p><b>6. Publicise the desirable norm, and lead by example.</b></p> <p><b>6a.</b> Communicate the desirable prevailing norm, or the shifting trend, in low-meat diets (e.g. 'more and more people are cutting back on meat'), or use peer comparisons among consumers or producers.</p> <p><b>6b.</b> Lead by example in government procurement, by offering more plant-based options and less red meat in hospitals, schools, and government canteens.</p>	Medium
 	<p><b>7. 'Re-brand' plant-based food towards a mainstream identity, and promote more mainstream dishes.</b></p> <p><b>7a.</b> Market plant-based food with a 'masculinity makeover' to address negative and narrow associations of weakness or femininity.</p> <p><b>7b.</b> Promote traditional cuisines where they are sustainable.</p> <p><b>7c.</b> Push for new plant-based 'power dishes' that have disproportionate sales across the market.</p>	Medium
	<p><b>8. Integrate (don't segregate) the plant-based produce.</b></p> <p><b>8a.</b> Don't put vegetarian options in separate aisles or in boxes on menus, but integrate them with the meat options.</p>	Medium
<b>Make it EASY</b>		
	<p><b>9. Eco-labels and supermarket ratings.</b></p> <p><b>9a.</b> Develop (and test) eco-labels on food.</p> <p><b>9b.</b> Introduce sector-wide supermarket 'environmental performance ratings' to nudge consumers, towards 'better' retailers, and create market competition on environment standards.</p>	a) Modest b) High
  	<p><b>10. Ease the change with 'rules of thumb', tips and recipes.</b></p> <p><b>10a.</b> Widely promote simple heuristics (rules of thumb) like 'red meat once a week' or 'red meat's a treat'.</p> <p><b>10b.</b> Help people plan and prepare new recipes, with in-store recipe cards and meal kits that make it easy to venture beyond our narrow repertoire of familiar dishes.</p> <p><b>10c.</b> Help shoppers make consciously sustainable choices, for example with selectable 'sustainability filters', or opt-in tips and substitutions, on takeaway apps and online grocery stores.</p>	Medium
 	<p><b>11. Prompt sustainable choices at timely moments.</b></p> <p><b>11a.</b> Prompt one-click substitutions at the point of sale on online grocery sales.</p> <p><b>11b.</b> Provide timely feedback on the environmental impacts of our shopping, e.g. on receipts, to reinforce sustainable purchases, motivate improvement, and cement habits.</p> <p><b>11c.</b> Identify and target support during timely life moments, such as when starting university, when eating and purchasing habits are not yet settled.</p>	Medium
	<p><b>12. Edit the choice architecture, to make sustainable options more prevalent, more prominent, and the default choice.</b></p> <p><b>12a.</b> Make sustainable options more <i>prevalent</i>, by increasing the relative availability of options, and reducing portion size of less sustainable products.</p> <p><b>12b.</b> Make sustainable options more <i>prominent</i>, by putting them first in canteens and on menus, and in more salient locations in store.</p> <p><b>12c.</b> Make sustainable options the <i>default</i> choice, e.g. on flights or at catered events.</p>	a) High b) Modest c) Medium

## 3.1 Make it APPEALING

### 1. Drive product reformulation and innovation with a carbon tax targeting producers

#### Putting it into action:

**1a. Implement a producer-facing carbon tax (on an emissions per portion basis) to incentivise product reformulation and innovation.** To function well, the tax should be avoidable through realistic reductions in the carbon footprint of the products, such that the tax drives changes to producers' offerings without penalising consumers (the ultimate sign of success is that no revenue is collected, but products improve). By shifting the tax thresholds in time, further innovation can be incentivised.

Such a tax can promote various ends: producers may change the ingredients of processed foods (for instance blending mushroom into beef burgers); they may transition to more sustainable suppliers or farming techniques; or they may diversify towards substitutable but more sustainable products to maintain market share. In all cases an effective tax can tip market equilibria in favour of innovation.

#### Why would it work?

Existing products that dominate the vegetarian market are designed largely to cater to this niche market, with mainstream consumers expressing perceptions of poor value, low quality, unappealing tastes and textures.<sup>216 217</sup> We therefore need more high quality, varied, affordable and readily available products that are appealing to mainstream meat-eaters.

One way to achieve this is through reformulation of processed ruminant products to contain less meat or dairy, so that they remain familiar and delicious but achieve incremental improvements in environmental impact. The sugar tax and alcohol case studies below demonstrate how this can be achieved without unduly punishing the consumer who still wants to eat meat products.

Some experts suggest the widespread adoption of a meat tax is inevitable, pointing out that red meat has now reached scientific consensus and WHO-recognition of its detriments to health and the environment. A similar route led to the widespread adoption of tobacco and sugar taxes.<sup>218 219</sup>

#### Case studies

**Blended burgers are still burgers.** Several products have recently entered the market that reformulate conventional meat products to contain more vegetables, such as the 'blended burger' (70% beef, 30% mushroom). Ten billion burgers are eaten in the US each year, and if all contained 30% mushroom, the saved GHG emissions would equate to removing 2.3 million cars from the road.<sup>220</sup> These developments are being pushed by ethically-motivated start-ups, and modest demand from consumers, but similar innovations can be incentivised far more widely in the market.

**A sweet tax design doesn't have to punish the consumer, but can really drive innovation.** In the UK, a modest tax was recently introduced on sugary drinks. Though only a fraction of consumers was likely to switch brands in response to increased prices, by carefully setting the threshold of the tax, producers have been incentivised to reformulate their products to avoid the levy. This resulted in the removal of 45 million kg of sugar from the national diet every year.<sup>221</sup> As a consequence, *all* consumers of these products (regardless of whether they would have shifted products in response to the levy) now consume less sugar. Evidently, it's sometimes more effective to design policy around 'inert' behaviour, than trying to change millions of consumers' decisions. Similar success was had in reducing alcohol consumption in 2011, described in section 1.4.<sup>222</sup>



## 2. Market plant-based food as aspirational, delicious, and indulgent

### Putting it into action:

#### 2a. Avoid overtly environmental or vegetarian labelling such as 'meat free'

Indulgent, providential or taste-based phrasing is more appealing to mainstream consumers.

#### 2b. Use imagery and design which emphasises enjoyment rather than healthiness or lightness, to broaden the appeal of plant-based options to a wider market.

### Why would it work?

The language and imagery used on menus, packaging and advertisements are important. Unless intentionally targeting niche consumers (as with health foods, for instance), we should avoid overtly environmental or 'vegetarian' language. This isn't about tricking consumers into failing to recognise that a dish on a menu is vegetarian, but about avoiding the negative associations that come with these labels.

We know meat-eaters often perceive vegetarian food as incomplete, abstemious, light, and unsatisfying. Yet the term 'meat-free' reinforces this perception, and 'vegetarian' evokes a perception of 'not for me'. Plant-based food is also sometimes framed as a healthy choice and this can result in it being perceived to be less tasty or less filling – our intuition is that unhealthy food is more enjoyable.

223 224

### Case studies

**Would you prefer a 'field grown breakfast' or a 'meat-free breakfast'?** We worked with The World Resource Institute (WRI) to test the impact of different language on meat-eaters' tendency to order a vegetarian dish. Across many dish types, experiential and indulgent language ('mild and sweet', 'comforting' etc.) and terms highlighting providence ('field grown', 'garden') boosted sales. In contrast, 'meat-free' was consistently unpopular.<sup>225</sup> WRI have since replicated these findings in field experiments within UK and US cafes, witnessing sales of vegetarian options increase by up to 70%.

**Twisted carrots and dynamite beets.** Health food marketed as delicious tends to outsell the same food marketed as healthy. One study found the decadent phrasing of 'twisted citrus-glazed carrots' and 'dynamite chilli and tangy lime-seasoned beets' significantly out-sold the same produce labelled with the health phrasing 'carrots with sugar-free citrus dressing' and 'lighter-choice beets with no added sugar'.<sup>226</sup>

**Fancy a meat-free 'disc' or 'tube'?** Recent EU proposals have sparked a debate about the naming of meat-free burgers and sausages, with these conventional terms potentially being reserved for meat products to 'avoid consumer confusion'. The unappealing-sounding terms 'discs' and 'tubes' have been proposed as alternatives,<sup>227</sup> and though these may be the most media-grabbing options (rather than the most likely to be used), such proposals do highlight the importance of language.



### 3. Behaviourally-informed in-store promotions, incentives and games

#### Putting it into action:

**3a. Highlight sustainable options through in-store promotions.** For example, 'meal deals' are common in the UK. Lunch meal deals might include an extra item if the sandwich is vegetarian, and dinner meal deals might include a choice from a more expensive wine selection if the main dish is vegetarian. Such efforts not only boost sales of plant-based food, but send a strong signal, encourage meat-eaters to try new options, and raise awareness.

**3b. Use supermarket loyalty schemes and clubcard data to harness personalised nudges and 'gamification'.** For example, interested customers using an accompanying app could set themselves challenges and goals, receive feedback on progress, have tailored suggestions for product substitutions and recipes, and offer small rewards or prize draws in return for sustainable outcomes.

#### Why would it work?

Conventional taxes or discounts are not the only way to incentivise changes in consumer behaviour. Small monetary incentives can leverage behavioural factors and therefore punch above their weight. The recent success of plastic bag levies is a good example: though the small levy (e.g. £0.05 in the UK) is economically quite weak, they are effective because they create a new default of not using a bag, impose a small social cost to asking for one (breaking the norm), and act as a reminder that we can manage without, and should 'do the right thing'. The success of products such as the Fitbit also shows the allure of games, competitions, goals and targets, particularly where there is a social element through which we are compared to our peers.

Well designed in-store incentives, though having the potential to be very modest in economic terms (and thus very cheap to implement), can perform well if they are similarly designed to leverage other psychological mechanisms.

#### Case studies

##### Would you prefer \$0.10 off your metro ticket, or a chance to win \$100?

In an effort to shift commuters' travel times away from peak hours, the Singapore metro system awarded points for travelling off-peak. These could be converted to a nominal discount on the next ticket, or 'spent' through an online gaming platform with the chance to win much larger sums. Despite the expected return on the games being less than unity (the house always wins on average), 88% of people chose to play rather than cash-in their credits (highlighting our tendency to overweight small probabilities but also the value we get from fun, competitive, and chance-based incentives). Moreover, the introduction of the incentive led to a 7.5% shift from peak to non-peak travel – a huge impact given the inflexibility of most people's commuting patterns.<sup>228</sup>



## 4. Campaign with pride, positivity, and pragmatism

### Putting it into action:

**4a. Avoid blame, guilt, and negativity, and instead build campaigns around pride and positivity.** In short, the vegetarian/vegan movement desperately needs a re-brand to regain broad public appeal, and address perceptions of righteousness.

**4b. Promote practical, easy changes, rather than purist notions of plant-based diets.**

After all, two people halving their meat consumption is as good as one person cutting it out altogether, but is much more likely to be achieved at scale.

### Why would it work?

Environmental campaigns often use negative emotions (guilt, anxiety, admonishment), and veganism in particular has connotations of abstemiousness and righteousness. This is not always a terrible strategy: guilt can be a powerful motivator when taking action is easy. However research shows it can often backfire when taking action is hard or unappealing. Instead of changing our behaviour, we resolve the guilt by doubling-down, rationalising our actions, rejecting the message, and the messenger. Put simply, we're unlikely to accept an argument that is built on the premise that we are acting immorally, nor grow fond of the person or organisation presenting that argument to us. Taking a more positive approach, for instance leveraging pride, or promoting a positive identity association with the behaviour, has been found to be more effective in such situations.<sup>229 230</sup>

### Case studies

**Imagine how proud you would be for not eating that chocolate cake!** A study on emotions and self-control presented participants with chocolate cake under one of three conditions: one group were told to imagine how proud they would feel for not eating it. A second group were told how guilty they would feel if they did eat it. A third control group received no such priming. It was the pride group who best resisted – a full 40% didn't touch it, compared to just 10% in the guilt group, which was even worse than the control group.<sup>231</sup>

**Make your own success.** The 'Strength of Chi' campaign in Vietnam sought to reduce rhino horn consumption among businessmen. The campaign promoted a positive identity of professional success and 'making your own good fortune' rather than using horn products. Evaluations, though imperfect, suggest a reduction in self-reported rhino horn use from 27.5% in 2014 to 7% in 2017.<sup>232</sup>



## 5. Raise awareness, and build a mandate for strong policy

### Putting it into action:

**5a. Harness influential messengers** who have broad appeal, relevance and credibility, for instance TV chefs, athletes, GPs, and cultural influencers, to raise awareness of, and appetite for, sustainable food.

**5b. Increase knowledge and know-how through education**, in particular through school curricula (before tastes and eating habits are settled), as well as in professional chef training.

### Why would it work?

Awareness-raising, education and celebrity endorsements are well-trodden strategies. Ordinarily we might steer away from these simple approaches because (as discussed in Section 2.1.1), knowledge and attitudes often do not translate to behaviour change. However, in this instance there are several good reasons to make a concerted effort to raise awareness:

- There is a large and increasing voice of environmental concern in the population, yet the impacts of food are still less well-known than other issues<sup>233 234</sup> (although knowledge is growing<sup>235</sup>). It is therefore possible that raised awareness will be enough to shift behaviour, among some consumers who already care greatly about the environment. Even if these impacts are modest, they may help contribute to the wider debate and to a slowly shifting norm.
- Consumers who are currently trying to eat sustainably often misdirect their efforts, prioritising low food miles and packaging over product choice.<sup>236</sup> Increasing understanding may therefore be beneficial among already-motivated consumers.
- Greater awareness can catalyse other nudges, such as prompts or product labels, which tend to be most effective when the consumer understands their purpose and supports their underlying aim. This is also true for some incentives, such as levies on plastic bags, which work partly as a salient reminder to 'do the right thing' and thus depend on consumer knowledge.
- Perhaps most importantly, raised public awareness is a step toward public support for big-ticket policy initiatives like carbon taxes, which in turn have a big impact on suppliers' and consumers' behaviour.<sup>237 238</sup> As one review on sustainable diet interventions concludes '*while increasing education may not directly alter behavior, it may increase attitudes and knowledge and lead to increased support for economic, organizational, and policy interventions that might be more effective in driving change.*'<sup>239</sup>

Alongside awareness, is know-how. A common barrier associated with diet change is a lack of knowledge of recipes and cooking techniques.<sup>240 241 242</sup> Most of us have a repertoire of just a handful of recipes, and rarely bother to seek out different ingredients. This extends to professional chefs who may lack the expertise, time or inclination to learn new ways of cooking. Providing this know-how, to children, lay-people and professionals alike, is therefore important, and something that can be achieved by parents, educators, technical colleges, and policy-makers.



“... while increasing education may not directly alter behaviour, it may increase attitudes and knowledge and lead to increased support for economic, organizational, and policy interventions that might be more effective in driving change...”<sup>243</sup>

#### Case studies

**Celebrity endorsements – cliché, but sometimes effective.** Though probably the exception rather than the rule, raised awareness can sometimes lead to significant diet changes. For instance in 2008 UK celebrity chefs Hugh Fearnley-Whittingstall and Jamie Oliver launched a TV campaign against caged hens. In one week, sales of free-range chicken increased by a third, despite shoppers needing to pay more.<sup>243 244</sup>

**The David Attenborough Effect – more of an effect on policy makers than the public?** In response to the BBC series Blue Planet II in 2017, many in the sustainability community are talking about the ‘David Attenborough Effect.’<sup>245</sup> The series only very briefly covered the problems of marine plastic pollution, yet had a disproportionate impact on public awareness due in part to the high esteem and credibility of the messenger. There have been some modest changes in behaviour (e.g. reduced use of plastic drinking straws both among consumers and restaurateurs). However the bigger impact is surely the effect the series had on political discourse and policy-making in the UK and around the world. The UK has since announced bans on disposable plastic items, an overhaul of recycling systems, and the introduction of a deposit return scheme for drinks containers. It is these changes, rather than individual behaviour change, that are the biggest wins from raised public awareness.





## 3.2 Make it NORMAL

### 6. Publicise the desirable norm, and lead by example

#### Putting it into action:

**6a. Communicate the desirable prevailing norm, or the shifting trend, in low-meat diets.** Specifically, this means communicating that “*more and more people are cutting back on their meat consumption*”, or providing social comparisons to the poorest performing producers or high consumers. This might include providing carbon footprint comparisons on the back of receipts (comparing my emissions to that of the average shopper, with personalised tips for substitutions I could make next time), or providing similar comparisons to food producers.

**6b. Lead by example through public procurement.** Governments can do their bit to promote new norms by leading by example. For instance, hospital and school canteens and other public eateries can offer more plant-based options and less (or no) red meat. This reinforces the perception that this is normal (helping establish a new norm), signals that the issue is important and legitimate (helping nudge the policy debate forwards), and creates a ‘choice architecture’ more conducive to choosing sustainable food (see idea 12b).

#### Why would it work?

We are profoundly influenced by our perception of what other people do and believe. These social dimensions of food are a major barrier to the widespread adoption of sustainable diets but also give rise to a number of possible interventions based around communicating the desirable norm or using peer comparisons. For example, people’s assessment of how desirable food is increases when exposed to peers’ positive opinions about that food,<sup>246</sup> and research by the OECD found that people were more likely to buy organic chicken if they thought other people were doing so<sup>247</sup> (both examples of ‘social proof’). Where the desirable behaviour is not yet the norm (i.e. we cannot claim that most people have stopped eating red meat) we can instead highlight the dynamic norm (the shifting trend),<sup>248</sup> or begin to set positive examples in locations we have control over – such as government canteens.

#### Case studies

**Would you use less energy if your neighbours were?** Opower provide utility bills that compare customers’ energy consumption to that of their more efficient neighbours, leading to a sustained 3% reduction.<sup>249</sup> Similarly, telling hotel guests that ‘most other guests re-use their towels’ has been shown to be significantly more effective at promoting towel re-use than messages about the environment.<sup>250</sup>

**Shifting trends in meat consumption.** One recent study has shown that communicating the ‘dynamic norm’ of increasing popularity of plant-based diets (i.e. along the lines of ‘*more and more people are choosing to eat plant-based food*’) successfully nudged canteen customers towards more veggie food.<sup>251</sup>

**Even solar panels are contagious!** Leading by example is important, because the more we observe a behaviour, the more we perceive it as normal. One study showed that one of the strongest predictors of a household installing rooftop solar panels is the number of households nearby that already had them – and it matters that those households have them installed visibly, i.e. on the front, not the back of the building.<sup>252</sup> <sup>253</sup> But making behaviours more observable is also good for another reason: we’re more likely to feel the social pressure of ‘doing the right thing’ when we are being observed. For example, donations to environmental causes have been found to be higher when the giving is public, and thus influences one’s reputation.<sup>254 255 256</sup>



## 7. 'Re-brand' plant-based food towards a mainstream identity, and promote more mainstream dishes

### Putting it into action:

**7a. Promote a 'masculinity makeover'** of plant-based food, to redress negative or narrow stereotypes of abstemiousness, weakness or femininity. Reaffirming the male identities of those who reduce their meat consumption requires concerted marketing efforts, and harnessing influential role models who counter the prevailing stereotypes.

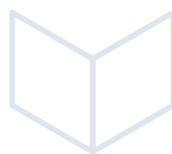
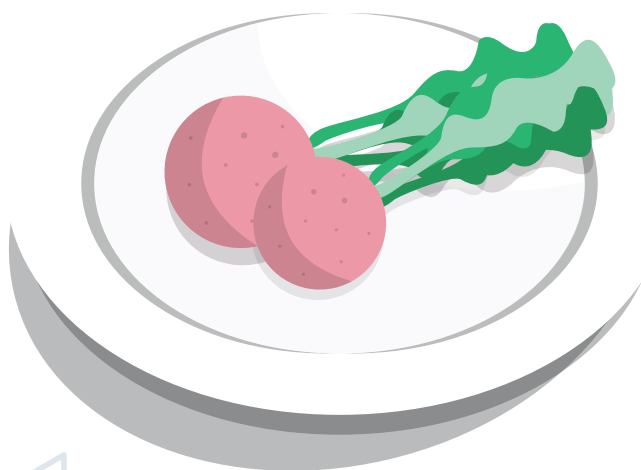
**7b. Harness national or traditional identities** in regions where diets are becoming less sustainable but where traditional cuisines are healthy and low-impact. Influences from these low-meat cuisines (e.g. Indian, Israeli) can also be promoted among Anglo and European consumers, without suffering the negative connotations that vegetarian food is in some way lacking.

**7c. Focus marketing efforts towards a single 'power dish'.** The vast majority of food consumed in the US spans just 25 'power dishes' – dishes that are familiar to all and account for a disproportionately large fraction of meals consumed. Only one of these 25 dishes is plant-based. Other countries have similar trends, including the UK. A concerted push by producers, retailers and marketers around one or two plant-based dishes could therefore have disproportionate impact. In practical terms, this might equate to a sector-wide reinvention and resurgence of mac 'n' cheese, parmigiana, or shakshuka, for example.

### Why would it work?

We define ourselves along the boundaries of our social groups,<sup>257</sup> and gravitate towards food compatible with our self-concept. For example, a stereotypical meat-eater might self-define as no-nonsense, traditional, male, red-blooded, etc. However, our social identity is not indelible, but is influenced by the norms and values expressed through mainstream media and wider society. Unhelpful identity associations (such as meat = masculine) can therefore be changed over time.

The idea of 'power dishes' was suggested by the World Resource Institute's Better Buying Lab,<sup>258 259 260</sup> and highlights the limited range of dishes most of us tend to eat. This is a limitation but also an opportunity, as promoting just one or two plant-based dishes, with a view to making them ubiquitous classics, would have disproportionate impact. This requires a major industry push underpinned by market research to understand where the biggest opportunities for this lie.



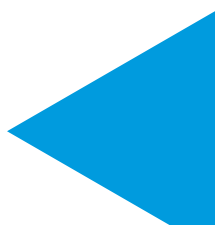
### Case studies

**Don't mess with Texas!** One of the most successful anti-littering campaigns, the slogan 'don't mess with Texas' aimed to harness a positive and proud social identity of no-nonsense, tough Texans. The campaign is credited with reducing littering on highways by up to 72% between 1986 and 1990<sup>261</sup>, and the phrase, now a cultural artefact in its own right and found on countless souvenirs, has become 'an identity statement, a declaration of Texas swagger.'<sup>262</sup>

**Are you veg-curious?** A recent marketing campaign played with the feminine associations of plant-based food, and sought to appeal to men with the slogan 'are you veg-curious?' This stands in contrast to the efforts of many car companies, deodorant and tobacco firms who have used masculinity branding for many years to promote products to men.<sup>263</sup>

**Hunky dads, small pinkies, and turtles.** A number of other campaigns have overtly aimed to make certain behaviours more or less 'masculine'. In Japan a recent 'hunky dads' social media campaign aimed to encourage fathers to take paternity leave by addressing the emasculating associations of parenting or of sacrificing a career.<sup>264</sup> In Australia, speeding offences among young men were tackled by deliberately emasculating the behaviour, with an unimpressed female bystander implying their lack of manhood with a 'small pinkie'. Young driver deaths fell by 50% during the period of this campaign.<sup>265</sup> Overtly sexualised advertising has similarly been used in conservation campaigns to convey the message that 'real men don't eat turtles.'

**Pulling in the crowds.** The food industry is not new to the idea of re-inventing existing products, and dramatically boosting sales through focussed marketing efforts. For example, pulled pork (an American BBQ tradition) has recently boomed in the UK. In response to a downward trend in the consumption of pork, the Agricultural and Horticultural Development Board's Pork Division ran a series of media campaigns which ultimately led to a 21,900% increase in consumption over a six-year period.<sup>266</sup> This represented a return for the industry of £7.50 per £1 spent on marketing.<sup>267</sup> There's no reason the same couldn't be achieved with a plant-based dish.



## 8. Integrate (don't segregate) the plant-based options

### Putting it into action:

**8a. Don't put vegetarian options in separate aisles or in boxes on menus, but integrate them with the meat options.** This means cafes and retailers should integrate meat and non-meat products by product category, putting veggie burgers with the burgers, and soy/oat milk with the cows' milk, etc. Restaurants should discard the separate 'vegetarian' sections of menus.

### Why would it work?

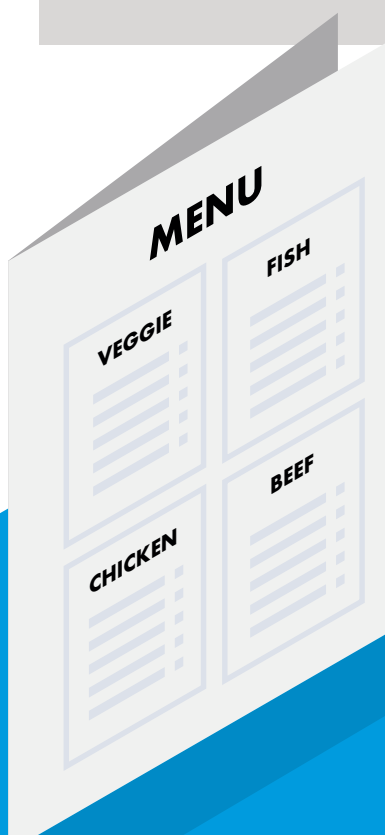
Segregation of vegetarian items on menus and in shops is detrimental for multiple reasons. First, doing so reinforces the perception that they are different, and from a meat-eater's perspective, intended for 'other people'. Second, physical separation in supermarkets increases the hassle, and reduces the salience of plant-based options from the perspective of a meat-eater who may not be averse to eating meat-free food but who would rarely venture into a specialist meat-free aisle. Third, when we are faced with many options, such as on a menu, we tend to adopt rapid and simple choice-elimination strategies. Segregating items into a 'vegetarian' section, to a meat-eater, invites the strategy of ignoring that section to reduce the number of options they are faced with.

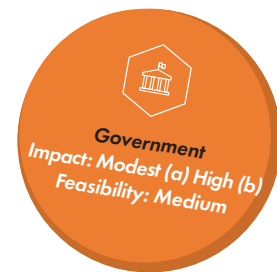
### Case studies

**Segregation in cafés.** Prêt (the global café chain) tried introducing 'veggie only' refrigerators in their sandwich shops, in an attempt to promote vegetarian foods. However, they found it reduced sales compared to integrating the produce across all refrigerators.<sup>268</sup>

**Segregation in restaurants.** Research by the World Resource Institute found that putting vegetarian options in a separate box on a menu reduced ordering rates of veggie options by 56%.<sup>269</sup>

**Segregation in supermarkets.** In one study, putting vegetarian sandwich fillings adjacent to the meat options roughly doubled sales compared to having them in a separate 'vegetarian' section of the shop.<sup>270</sup>





## 3.3 Make it EASY

### 9. Eco-labels and supermarket ratings

#### Putting it into action:

**9a. Develop eco-labelling on food.** There are various forms this could take, including green labels, or a 'true cost' parallel price tag accounting for all environmental (and potentially other) externalities or costs to society (this approach might also motivate reductions in waste as it highlights the true value of food). However, more research is needed on the efficacy of these designs.

**9b. Develop environmental ratings for supermarkets.** This should capture all aspects of the business, from farm to fork, for all products sold and wasted. A simple rating system allows consumers to make one choice (which supermarket to shop in) that consequently leverages retailer competition to drive myriad improvements in the way retailers and their supply chains produce, transport, promote, package and deal with waste for their products.

#### Why would it work?

Choosing more sustainable food is complex. Customers must have a detailed understanding of production, waste, packaging, food miles and multiple other issues. Without this information, environmentally-conscious consumers cannot optimise their choices. There are two potential solutions to this information problem, indicated above.

One option is to label individual products. There are a number of studies on this, for example showing that simple green price tags may be effective.<sup>271</sup> However, much more research is needed to optimise the design, and understand the potential impact, of eco-labels on food. If designed poorly there is a risk they would add to the confusion that already exists around organic, fair-trade, and free-range produce. However, it is clear that environmentally conscious consumers currently cannot, without sophisticated expertise of their own, make informed decisions – a classic market failure. Less concerned consumers would also have their awareness raised from seeing such labels.

In the design of these labels, simplicity is key (the common traffic-light health labels are a good example), but so is 'substitutability' – the consumer must be able to do something with that information. Such labels may therefore be most effective when they make it clear that easily substitutable foods, adjacent to each other in shops, have different environmental footprints: Once we are already at the supermarket shelves, with a recipe or shopping list in mind, we may be unlikely to swap minced (ground) beef for lettuce, but we may switch between two brands, or opt for a blended minced beef which is part mushroom.

However, there may be a more powerful way to promote more sustainable consumption. As consumers, we have limited mental capacity to make decisions, and so making hundreds of sustainable product choices each time we enter a supermarket is onerous. Instead, rating the overall supermarkets' environmental performance provides a simpler heuristic to nudge the consumer to the 'better' retailer. If just a small fraction of consumers switch retailer, this creates an incentive for supermarkets to improve their environmental performance. This creates market competition on environmental performance, and by driving improvements in supply chains and product offerings, helps every consumer (even the most inert or loyal customers) eat more sustainably. This is a good example of a triple-nudge: nudging consumers to nudge retailers to nudge them back. It is also an example of 'regulation by reputation' – a way of tweaking market forces to drive better market outcomes, without resorting to heavy-handed regulation.

### Case studies

**Some optimism for Eco-labels.** Though robust evidence on eco-labels is minimal (there is more evidence on calorie labels), a number of recent studies suggest eco-labelling on food may have an impact on consumer choice. For instance, Swedish burger chain Max introduced carbon labels on all their burgers, and witnessed a 16% increase in the sale of burgers with a lower than average footprint. Another study trialled carbon labelling on soup, and found it to cause a reduction in the purchase of beef soup (the option with the highest carbon footprint). However, the precise design of food eco-labels, and their impact across different products, under 'real world' conditions, needs much more research.

**Reviews and reputation matter to firms.** A study of Washington restaurants' revenue and market share found that reviews and ratings really matter, as does their design. A 1-star increase in rating corresponded to a 5%-9% increase in revenue. Causality was demonstrated by virtue of Yelp's rounded scoring system, allowing the researchers to compare restaurants just above and just below a rounding threshold (where the average score is near identical but looks to be a whole star different to consumers).<sup>272</sup> Creating these thresholds deliberately, and making them increasingly demanding over time, is therefore an effective intervention, as retailers would make great effort to stay just above the threshold.





## 10. Ease the change with 'rules of thumb', tips and recipes

### Putting it into action:

**10a. Widely promote simple heuristics (rules of thumb)** to overcome the complexity of sustainable diets. Just like '5 a day' health guidelines for eating fruit and veg, these might promote reduced consumption (e.g. 'red meat is a treat', 'meat-free Mondays', or 'red meat once a week'). Alternatively they may prompt easy substitutions we can all make, such as 'beef for beans'.

**10b. Help people plan and cook more sustainable recipes**, for instance promoting new dishes through in-store recipe cards, or meal kits that take the hassle out of learning and finding new ingredients and new ideas. As recommended in strategy 2, these shouldn't be promoted on the basis of health or sustainability, but should simply be delicious and happen to be sustainable.

**10c. Help shoppers make consciously sustainable purchases on takeaway apps and online grocery stores.** In addition to the 'choice architecture' strategies outlined in strategy 12, which largely target our *unconscious* decision processes, retailers can also help those who *consciously* want to eat more sustainably, for instance having a user-selected 'sustainability filter' on takeaway apps and online grocery shops, or have users opt-in to personalised tips and recommended substitutions.

### Why would it work?

Our food choices are highly routine, and shifting these ingrained habits is hard. Understanding how to eat more sustainably is also complex. We have limited cognitive bandwidth and mental attention, and particularly struggle making decisions across multiple dimensions, or where there is too much choice. The above ideas therefore all seek to make the process of changing habits, and of navigating the complexity of sustainable eating, much easier. This is important given the evidence that many of us want to eat more sustainably,<sup>273</sup> but fail to do so: this is partly down to lack of willpower, but is also an indication that the change is complex and difficult.

### Case studies

There are many examples of initiatives designed to reduce decision-complexity. These include consumer review sites, and online comparison tools, the best of which tend to reduce multiple dimensions into a single score (such as the UK's 'tariff comparison rate', which puts a single cost metric onto energy tariffs, despite the underlying price including fixed plus variable rates plus one-off discounts and charges). Many websites allow buyers to rank options by multiple metrics (e.g. by price and by popularity), though few include sustainability filters. There is also a wealth of evidence that simplification of key health messages (like '5 day'), though lacking in nuance, are far more effective at spreading understanding by virtue of being easily understood and remembered.





## 11. Prompt sustainable choices at timely moments

### Putting it into action:

**11 a. Promote easy substitutions at the point of sale.** Substitutions should be easy, such as promoting a switch from beef burgers to chicken burgers, and are much more likely if prompted at the point of sale, either in aisle, or during check-out on online grocery stores. These prompts should be frictionless (one-click swap), and can simultaneously leverage other behavioural insights (e.g. social norm messages showing that many other customers have made the switch). They should also be the same price or cheaper, to avoid imposing a trade-off, and to avoid undermining trust in the motivation of the retailer for promoting the switch.

**11 b. Provide feedback on receipts or through supermarket apps.** In addition to a summary of financial savings, which are common on many supermarket receipts, feedback on receipts could convey the environmental footprint. This can be paired with personalised tips and suggested substitutions for next time, or bring to bear other nudges. These might include positive feedback to reinforce behaviours (in response to reduced environmental impact over time), or social norm comparisons (comparing emissions per portion either to the shoppers' own historic norms, or to those of the average customer).

**11 c. Identify timely moments at which diet change is most likely, and target campaigns and support accordingly.**

Possible windows of opportunity include:

- Students starting university, learning to cook and buy groceries for the first time.
- New parents, with shopping and household routines (and personal finances) disrupted.
- Moving house, often with a need to get familiar with a new supermarket, and perhaps enjoying the use of a new kitchen (and similarly, those buying a new kitchen, oven, or other cookware).
- New Year, a landmark birthday, or alongside certain health goals or scares, all of which may motivate a change in diet.

### Why would it work?

This strategy combines two powerful ideas: timely moments, and substitutions.

First, we are much more open to influence and prompts during key timely moments. Specifically, during the 'decision point' (e.g. at the point of sale), or when the issue is most salient (e.g. after a health scare), or when old habits are disrupted or not yet formed (e.g. new students).

Second, rather than expecting consumers to curtail their meat consumption overnight, it is much easier to substitute one behaviour for another, which requires little effort and which satisfies the same tastes and motivations. This is why switching from cigarettes to e-cigarettes is much easier than quitting entirely. Swapping beef burgers for chicken is a similarly pragmatic first step. This is also why product innovation and reformulation (see strategy 1) is so important, to create small steps towards more sustainable food.

### Case studies

**Finding the right moment is important.** In our work to promote sustainable transport behaviours in Portland, US, we found that residents who had just moved home (and who therefore had their commuting routines and other aspects of their lives disrupted) were four times as likely to sign up to a cycling scheme than a matched cohort who already lived in an area where a new bike-docking station had been installed.



## 12. Edit the choice architecture to make sustainable options more prominent, more prevalent, and the default choice

### Putting it into action:

#### 12a. Increase the *prevalence* of sustainable and healthy options by:

- Increasing the relative availability of plant-based options.<sup>274</sup> This applies to restaurant menus, canteens and shops. Government procurement can lead by example and increase the relative availability of plant-based options in hospitals, schools, government canteens and events.
- Modestly reducing meat portion size in 'portioned' products (e.g. sausages), and in restaurants, framing meat as part of the meal but not the 'main event'.

#### 12b. Increase the *prominence* of sustainable and healthy options by:

- Putting them first in canteens, and on menus.<sup>275</sup>
- Putting them in 'prime' shelf locations, including end-of-aisles, at the checkout, and at eye-height, and giving them more shelf space. Conversely, the meat section can be given less shelf space, and moved towards the back of the supermarket so there is less through-traffic.
- Making them more eye-catching through novel packaging design or displays,<sup>276 277</sup> or by having eye-catching images of those options (rather than the less sustainable options) on menus.

#### 12c. Make sustainable food the *default* choice by:

- Requiring customers to opt-out, rather than opt-in, to the plant-based or most sustainable option on flights, or at catered or pre-ordered events such as conferences, workplace lunches, or weddings.
- Café chains may default oat or soy milk unless the customer requests dairy in their tea or coffee.

### Why would it work?

Each of the above examples is well evidenced in the literature, as per the citations included above. Typically these alterations of the 'choice architecture' are effective because they leverage the heuristics and biases with which we make decisions (such as 'choose the first option I see that is good enough', or 'stick with the default unless there is good reason not to'). Among these techniques, the evidence suggests increasing the availability of plant-based options may be the most powerful (e.g. have 2 in 4 options plant-based, rather than 1 in 4).<sup>278</sup> Defaults are also known to be particularly powerful,<sup>279</sup> though there is less evidence in the context of food choices. Re-ordering and re-positioning of items is likely to have a more modest impact, though are evidenced to generally be effective, and are often very cheap and easy to implement.

### Case studies

**When is the last time you switched energy tariff?** Many consumers fail to switch their energy tariff even when it is in their best interest to do so, instead sticking with the default option. Many customers also claim they would prefer to use renewable electricity but don't. One study in Germany found that defaulting customers onto a renewable electricity tariff increased the numbers on that tariff by tenfold.<sup>280</sup>

**Taking firm action:** Some organisations have taken defaults beyond a nudge to the point where freedom of choice is diminished but not totally excluded. For example, WeWork, a \$20 bn global office space company with 6,000 employees, introduced in 2018 a company-wide policy to no longer provide meat products to employees at events, nor to reimburse employees for purchases of meat.<sup>281</sup>

**Give more options.** A study at the University of Cambridge found that doubling the number of veggie options available in cafeterias (from one in four options, to two in four options) increased veggie sales by between 41% and 79% across different canteens. This was more effective than re-ordering the options: putting veggie options first increased sales by 25% but only in cafeterias where there was some distance between the first option and the next (meat) option.<sup>282</sup>

**Size matters.** Some research has shown that selling smaller portions of sausages in supermarkets led to less volume of meat being bought, without leading to compensatory purchase of other products.<sup>283</sup>

**You can't buy what you can't see.** When faced with an overload of choice in the supermarket, simply getting shoppers' attention is the first challenge. Combining eye-tracking lab studies and in-store field trials, researchers found that making the packaging of sustainable coffee more salient and visually appealing led to greater attention (consumers looked at the product for longer) and led to a 22% increase in sales. In contrast, consumers' concern for the environment, and the provision of information about the coffee certification scheme, had no impact on sales.<sup>284</sup>



# Dessert

## 4.1 Final Remarks

Since we started thinking deeply about this issue at the Behavioural Insights Team, some two years ago, it feels as though the topic has become relatively mainstream. Depending on your point of view, either the world is finally waking up to the environmental cost of feeding seven billion people, or this is the latest fad of environmentalists, picking on a new industry to blame. Certainly, there is a risk that the farming sector will become the new coal industry, and all nuance will be lost from this debate. That's not our intention. We all need and enjoy our food.

Our view is that no single sector should be cast as the villain, and that we all have a role to play – industry, government, civil society and consumers. Though each may be tempted to push responsibility for progress onto the others, in fact we each hold different levers of change that must all be pulled if we are really to save our planet. That means regulation, taxes and nudges from governments around the world. From industry; the full power and creativity of marketing, product design and choice architecture which aligns with the public good. Civil society must continue to campaign, set the debate, raise awareness and build a strong mandate for policy. And as consumers we must 'do our bit', vote with our wallets in shops and restaurants, and express support for this issue to our politicians. We can all do this while continuing to treasure our farms, our rural economies and the food we enjoy, both traditional and new. The changes needed from each of us, to achieve this aim, are not that difficult.

In this report we have taken a pragmatic and evidence-based view of the behavioural science, and suggested 12 strategies that span these four groups of stakeholders. Most of these strategies contain several discrete ideas. There is therefore a wealth of information here, but this long list of ideas is just the beginning. They all need further development, and ideally will be tested and rigorously evaluated, to find out what works, and what does not, for whom and in what contexts.

We're keen to do our bit, not only by eating more sustainably ourselves, but also by continuing to research what works, and spreading the best behavioural science on this issue around the world.

If you're a policy-maker, restaurateur, retail manager, producer, or educator, and fancy helping us test these ideas to create a more sustainable future, please get in touch.



## FAQs

### **Q: What is the difference between ruminant meat and red meat?**

A: Most animals, including us, are monogastric with one-chambered stomachs, but ruminants are mammals with four-chambered stomachs. Ruminant meat includes beef, lamb and goat. All mammalian muscle tissue is red meat, and non-ruminant red meat includes pork and rabbit. Ruminants digest grass using microbes and enteric fermentation ("rumination"), which produces methane as a by-product. Not all animals that eat grass are ruminants, but only ruminants produce large quantities methane.

### **Q: Are the emissions estimates contested?**

A: There have been many high-quality academic studies published in the last two years that have helped to update and validate previous estimates. In this report we use data from the most recent and well-respected peer-reviewed articles. That said, accurately measuring the emissions of food is complex. Emissions vary significantly by regional ecosystem and by production method, and also depend on the researchers' judgment on what to include. For instance, the highest estimates include allowances for increased packaging, medical treatment, and even cooking energy, which all vary between food types. In these regards, the data quoted in this report are robust and conservative on some counts. Remember also that greenhouse gas (GHG) emissions are just one of many environmental impacts of agriculture. Vast water consumption, deforestation, species loss, antimicrobial resistance, fertiliser run-off, ocean acidification and health effects all add to the rationale for changing diets.

### **Q: Is grass-fed beef more sustainable?**

A: Not all beef production is equally environmentally costly. For example the data used to produce figure 3 shows beef production to vary between 20 kg and 105 kg of CO<sub>2</sub>e per 100 g of protein, at the 10th and 90th percentiles. However, even 'good' beef is still generally less sustainable than many alternative products.<sup>285</sup>

There are three important arguments among proponents of grass-fed beef. First, emissions produced by the cow are ultimately sequestered by the grass as it grows back, assuming the land is not over-grazed (i.e. the land can support cattle indefinitely without need for fertiliser or supplementary food, which is quite rare). Second, grasslands are a major carbon store, which we should not plough up to grow crops, as this releases more carbon. In other words *"the only practical way to produce human-edible food from grassland without releasing large amounts of carbon to the atmosphere is to graze it with ruminants, and with the increasing global population it would be highly irresponsible to stop producing meat, milk and animal fats from grassland."*<sup>286</sup> Third, some research suggests well-managed grazing can actually help soil sequester more carbon.<sup>287</sup> These points are all debated, with other research showing that grass-fed beef is still a net contributor to emissions and significantly worse for the environment than other food substitutes.<sup>288</sup> Recall that beef production requires many times the land area than crop production, per calorie of food produced, so we don't necessarily need to farm on these grasslands if we reduce global meat consumption.

However, putting this aside, perhaps the more important rebuttals are economic: what matters is not so much the absolute carbon emissions of grass-fed beef, but rather, in the global food system, is the alternative better or worse? Through this lens it is important to recognise that grass-fed beef might be better than industrially farmed beef, and even better than growing crops on certain natural grasslands, but such land does not exist in abundance. It therefore works well on 'ecological leftovers' (grassland unsuitable for forest growth or crop production), but not if demand for grass-fed beef requires us to expand its production to other areas, which would drive deforestation (or prevent reforestation), or take up land perfectly suited for crop production at the cost of far higher carbon emissions (or foregone carbon sequestration).

As such, it is not paradoxical to say that yes, grass-fed beef can be much kinder to the environment when occurring in the right places and with the right farming methods (and this should continue), but, a significant global increase in demand for grazed beef would be highly detrimental (either due to consumers switching from crop-fed/intensively-farmed beef in the belief that it is better for the environment, or due to global increases in demand for beef generally, which is occurring). As one report concludes, regardless of any benefits that grass-fed beef may have over industrial farming in the current market, *'scaling grazing systems up to produce a level of output that could substitute for the outputs of intensive [confined] systems so as to meet the projected demands of a growing population would have very damaging consequences for land use change and associated CO2 release.'*<sup>289</sup>

In summary, in the context of rapidly increasing global demand for beef, reduction in per-capita consumption is unambiguously the most important step. In an ideal world, the optimal system might be one of significantly reduced global beef production, and for grazed cattle on natural grasslands to form the basis of a remaining, smaller industry. As consumers, this means we can have a positive impact if we eat 'better' beef and *much* less of it, so that the world's smaller appetite for beef can be met with the most sustainable production methods on the modest amount of land suited to it. But this clearly doesn't work (indeed it backfires) if we just eat 'better' beef without significantly reducing the amount we eat.

### **Q: What about local meat? Surely this is better than freighted avocados?**

A: Local food does not always equate to less environmentally damaging. 'Buying local' and 'food miles' have a prominent position in public awareness but are arguably given too much weight when making sustainable purchasing decisions. All other production methods being equal, food with fewer food miles will have a lower ecological footprint. However, what you eat is generally more important than where it comes from.

One study estimated that on average food consumed in the US is transported 6,760 km across the supply chain (1,640 km of which is for the final delivery), but despite these long distances transport only makes up 11% of the food sector's carbon footprint.<sup>290</sup> For produce with the highest carbon footprint, such as beef and lamb, the contribution of food miles is often very small: sustainably-farmed lamb from New Zealand, eaten in the UK, could be preferable to less sustainably farmed lamb from the UK, for instance. That said, how food is transported is clearly important: air freighting uses 10 times more energy than shipping.<sup>291</sup> However, consumers generally cannot currently get this information from food labels.

Eating seasonally can also be helpful but is not as big an issue as consumers tend to think. Vegetables from greenhouses (non-seasonal) have emissions approximately twice that of field grown vegetables. This certainly matters, but choosing vegetables over meat is still hugely beneficial even if they're not seasonal.<sup>292</sup>

### **Q: What about organic food?**

A: In some regards organic food can be much kinder to the local environment, with higher on-farm biodiversity and soil integrity, and the food has lower pesticide residues and higher levels of micronutrients. These are major benefits. However, in other regards organic farming is not inherently sustainable.<sup>293</sup> Organic farms tend to be less efficient, requiring more land cultivation, and therefore can cause net higher carbon emissions and biodiversity loss per kilogram of produce, when accounting for demand-for-land.<sup>294 295</sup> As with the question above on grass-fed beef, this really depends on what the land would otherwise be used for. (Reforestation? Production of more crops under different farming techniques, relieving land pressures elsewhere? Biofuels?). A single organic farm in isolation may be extremely sustainable, but would feed far fewer people than an industrial farm. Feeding the planet organically would require widespread deforestation and an additional Earth to farm, so is not a scalable solution. Again, viewed through the lens of a global food system (rather than the hyper-

local ecology), it only works as a solution when it uses the 'ecological leftovers' that can't serve a more resource-efficient purpose. Intensive agriculture therefore remains critical so long as the world's population is eating large quantities of meat, although in a world of greatly reduced meat consumption, widespread adoption of organic practices would be beneficial. By way of example, battery-farmed chicken is extraordinarily efficient, producing 1 kg of chicken from as little as 1.6 kg of grain in five weeks. Organic practices, for all their benefits, cannot achieve such efficiency of production. So once again, it is a reduction in per capita consumption (rather than switching to 'better' produce) that matters – and only this significant reduction will free up the resources to adopt better farming practices more widely.

**Q: If we eat more plants will we get enough protein and micronutrients?**

A: The average daily protein requirement is around 50 g. Most people in the industrialised West, China, the Middle East and Latin America eat significantly more than this (75-90 g). Wealthier countries generally get most of this from animals. We therefore consume more protein than necessary or healthy, and get more of that protein from meat than necessary. We also consume more red meat than is healthy.<sup>296</sup> As such there is ample scope (and many benefits) to reduce our total protein intake, and significantly reduce our red meat intake.

- 1 IPCC, 2018: Summary for Policymakers. V. Masson-Delmotte, P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)
- 2 IPCC (2019) IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse gas fluxes in Terrestrial Ecosystems.
- 3 Stoll-Kleemann, S., & Schmidt, U. J. (2017). Reducing meat consumption in developed and transition countries to counter climate change and biodiversity loss: a review of influence factors. *Regional Environmental Change*, 17(5), 1261-1277.
- 4 Wellesley, L., Happer, C., & Froggatt, A. (2015) *Changing Climate, Changing Diets: Pathways to Lower Meat Consumption*. Chatham House
- 5 Ibid.
- 6 The Guardian report that the prospect of a meat tax is likely to be less unpopular than the UK government thinks. <https://www.theguardian.com/environment/2015/nov/24/meat-tax-far-less-unpalatable-than-government-thinks-research-finds/> Accessed January 2019.
- 7 Committee on Climate Change, 2019. Net Zero – the UK’s contribution to stopping global warming.
- 8 IPCC, 2018: Summary for Policymakers. V. Masson-Delmotte, P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, Maycock, M. Tignor, and T. Waterfield (eds.)
- 9 Lang, T. 2017. ‘Why consumers need help to shift to sustainable diets’. Expert Comment, City University London. Available at: <https://www.city.ac.uk/news/2017/april/consumers-and-sustainable-diets> Accessed January 2019.
- 10 Keats, S. and Wiggins, S. (2014). *Future diets: implications for agriculture and food prices*. London: Overseas Development Institute.
- 11 Garnett, T. (2016). Plating up solutions, *Science*, 353, pp. 1202-1204.
- 12 Ranganathan, J. et al (2016). *Shifting Diets for a Sustainable Food Future*. Washington DC: World Resources Institute.
- 13 Wellesley, L., Happer, C., & Froggatt, A. (2015) *Changing Climate, Changing Diets: Pathways to Lower Meat Consumption*. Chatham House.
- 14 Willett, W., Rockström, J., et al (2019). Our food in the Anthropocene: the EAT-Lancet Commission on healthy diets from sustainable food systems’. *The Lancet* 16 January 2019.
- 15 Ibid.
- 16 Caron, P. et al (2018). Food systems for sustainable development: proposals for a profound four-part transformation. *Agronomy for Sustainable Development*, 38: 41.
- 17 Rockström, J., Steffen, W. L., Noone, K., Persson, Å., Chapin III, F. S., Lambin, E., ... & Nykvist, B. (2009). Planetary Boundaries: Exploring the Safe Operating Space for Humanity. *Ecology and Society*.
- 18 <https://www.overshootday.org/> accessed August 2018.
- 19 Poore, J., & Nemecek, T. (2018). Reducing food’s environmental impacts through producers and consumers. *Science*, 360(6392), 987-992.
- 20 Garnett, T., Smith, P., Nicholson, W., & Finch, J. (2016). *Food systems and greenhouse gas emissions*. Food Climate Research Network, University of Oxford.
- 21 Food and Agriculture Organization of the United Nations, Rome (2006). *Livestock’s Long Shadow – Environmental issues and options*.
- 22 Ibid.
- 23 Clark, M., & Tilman, D. (2017). Comparative analysis of environmental impacts of agricultural production systems, agricultural input efficiency, and food choice. *Environmental Research Letters*, 12.
- 24 Clune, S., Crossin, E., & Verghese, K. (2017). Systematic review of greenhouse gas emissions for different fresh food categories. *Journal of Cleaner Production*, 140, 766–783.
- 25 <https://www.ourworldindata.org/meat-and-seafood-production-consumption/> Accessed August 2018.
- 26 <https://www.nationalgeographic.com/what-the-world-eats/> Accessed August 2018.
- 27 Berners-Lee, M., Hoolohan, C., Cammack, H., & Hewitt, C. N. (2012). The relative greenhouse gas impacts of realistic dietary choices. *Energy Policy*, 43, 184-190.



- 28 Food and Agriculture Organization of the United Nations, Rome (2006). Livestock's Long Shadow – Environmental issues and options.
- 29 Sutton, M. A., Oenema, O., Erisman, J. W., Leip, A., van Grinsven, H., & Winiwarter, W. (2011). Too much of a good thing. *Nature*, 472(7342), 159–161.
- 30 NASA Earth Observatory. Aquatic Dead Zones. Revised 17 July 2010. For a world map, see [https://en.wikipedia.org/wiki/Dead\\_zone\\_\(ecology\)#/media/File:Aquatic\\_Dead\\_Zones.jpg](https://en.wikipedia.org/wiki/Dead_zone_(ecology)#/media/File:Aquatic_Dead_Zones.jpg) Accessed August 2018.
- 31 Food and Agriculture Organization of the United Nations, Rome (2006) Livestock's Long Shadow – Environmental issues and options.
- 32 Maddocks, A. (2015) Ranking the World's Most Water-Stressed Countries in 2040. World Resource Institute.
- 33 UNESCO (2012) Facts and Figures: Managing Water under Uncertainty and Risk, from the United Nations World Water Development Report, 4.
- 34 Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science*, 360(6392), 987-992.
- 35 UN Water. Data taken from website, available at <http://www.unwater.org/topics/water-and-food/en/> Accessed August 2018.
- 36 Data from <http://www.waterfootprint.org>, commensurate with many other sources including the UN, above.
- 37 Food and Agriculture Organization of the United Nations, Rome (2006). Livestock's Long Shadow – Environmental issues and options.
- 38 Poore, J., & Nemecek, T. (2018). Reducing food's environmental impacts through producers and consumers. *Science*, 360(6392), 987-992.
- 39 Ibid.
- 40 Ibid.
- 41 <http://www.fao.org/faostat> as reported in Foley, J. A., Ramankutty, et al (2011). Solutions for a cultivated planet. *Nature*, 478(7369), 337–42.
- 42 Additional data, including by country, available here: <https://data.worldbank.org/indicator/AG.LND.AGRI.ZS>.
- 43 Barrett, M., Belward, A., Bladen, S., Breeze, T., Burgess, N., Butchart, S., ... & Di Carlo, G. (2018). Living Planet Report 2018: Aiming higher.
- 44 Food and Agriculture Organization of the United Nations, Rome (2006). Livestock's Long Shadow – Environmental issues and options.
- 45 Barrett, M., Belward, A., Bladen, S., Breeze, T., Burgess, N., Butchart, S., ... & De Carlo, G. (2018). Living Planet Report 2018: Aiming higher.
- 46 Bar-On, Y. M., Phillips, R., & Milo, R. (2018). The biomass distribution on Earth. *Proceedings of the National Academy of Sciences*, 115(25), 6506-6511.
- 47 Hallmann, C. A., Sorg, M., Jongejans, E., Siepel, H., Hofland, N., Schwan, H., & Goulson, D. (2017). More than 75 percent decline over 27 years in total flying insect biomass in protected areas. *PloS One*, 12(10), e0185809.
- 48 Aune, D., Ursin, G. and Veierod, M.B. (2009), 'Meat consumption and the risk of type 2 diabetes: a systematic review and meta-analysis of cohort studies', *Diabetologia*, 52, pp. 2277–87.
- 49 Bouvard, V., Loomis, D., Guyton, K.Z., Grosse, Y., El Ghissassi, F., Benbrahim-Tallaa, L., Guha, N., Mattock, H. and Straif, K. (2015), 'Carcinogenicity of consumption of red and processed meat', *The Lancet Oncology*, published online 29 October 2015.
- 50 UK National Health Service (2018). <https://www.nhs.uk/news/food-and-diet/could-red-and-processed-meat-tax-save-thousands-lives/> Accessed 27 Jan 2019.
- 51 Springmann, M., Mason-D'Croz, D., Robinson, S., Wiebe, K., Godfray, H. C. J., Rayner, M., & Scarborough, P. (2018). Health-motivated taxes on red and processed meat: A modelling study on optimal tax levels and associated health impacts. *PloS One*, 13(11), e0204139.
- 52 FAIRR (2017) The livestock levy: are regulators considering meat taxes?
- 53 <https://www.theguardian.com/world/2016/jun/20/chinas-meat-consumption-climate-change/> Accessed 27 Jan 2019.
- 54 Rozin, P., Markwith, M., & Stoess, C. (1997). Moralization and Becoming a Vegetarian: The Transformation of Preferences Into Values and the Recruitment of Disgust. *Psychological Science*, 8(2), 67-73.

- 55 Eating Better (2019) Eating Better YouGov Survey: Public Attitudes to Meat Consumption.
- 56 Mintel (2018). Summary of stats available at <http://www.mintel.com/press-centre/food-and-drink/more-than-half-of-all-meat-free-new-product-launches-in-the-uk-carry-a-vegan-claim-1/> Accessed 08/11/2018.
- 57 Eating Better (2017) Eating Better YouGov Survey: Public Attitudes to Meat Consumption.
- 58 Eating Better (2019) Eating Better YouGov Survey: Public Attitudes to Meat Consumption.
- 59 Organic-market.info, The Vegetarian Lifestyle Is a Long-Term Development, <http://organic-market.info/news-in-brief-and-reports-article/vegetarian.html/> Accessed May 2015.
- 60 Eating Better (2019) Eating Better YouGov Survey: Public Attitudes to Meat Consumption.
- 61 Yougov (2019) <https://yougov.co.uk/topics/politics/articles-reports/2019/06/05/concern-environment-record-highs> Accessed September 2019
- 62 World Business Council for Sustainable Development (2018) FReSH insight report. CONSUMPTION BEHAVIOR AND TRENDS: Understanding the shift required towards healthy, sustainable and enjoyable diets.
- 63 Waitrose Press Release. [http://waitrose.pressarea.com/pressrelease/details/78/PRODUCT%20NEWS\\_12/10203/](http://waitrose.pressarea.com/pressrelease/details/78/PRODUCT%20NEWS_12/10203/) Accessed October 2018.
- 64 World Business Council for Sustainable Development (2018) FReSH insight report. Consumption behaviour and trends: Understanding the shift required towards healthy, sustainable and enjoyable diets.
- 65 Ritchie, H & Roser, M (2017). Meat and Dairy Production. Our world in data. <https://ourworldindata.org/meat-production/> Accessed August 2018.
- 66 Food and Agricultural Organization of the United Nations (2013) Current Worldwide Annual Meat Consumption per capita, Livestock and Fish Primary Equivalent.
- 67 Ranganathan, J. et al, (2016) Shifting Diets for a Sustainable Food Future. World Resources Institute.
- 68 United Nations Food and Agriculture Organization (2009) How to Feed the World in 2050.
- 69 OECD data available from <https://data.oecd.org/agroutput/meat-consumption.htm>.
- 70 Emrich, T. E., Qi, Y., Lou, W. Y., & L'Abbe, M. R. (2017). Traffic-light labels could reduce population intakes of calories, total fat, saturated fat, and sodium. *PloS One*, 12(2).
- 71 <https://www.theguardian.com/society/2018/apr/23/ministers-urged-to-ban-fast-food-outlets-from-opening-near-schools/> Accessed January 2019.
- 72 Oddo, V.M., Bleich, S.N., Pollack, K.M. Surkan, P.J., Mueller, N.T. and Jones-Smith, J.C. (2017). The weight of work: the association between maternal employment and overweight in low- and middle-income countries. *International Journal of Behavioral Nutrition and Physical Activity*, 14(66).
- 73 Kim, S., Moon, S. and Popkin, B. (2000). The nutrition transition in South Korea', *The American Journal of Clinical Nutrition*, 71, 44-53.
- 74 Wilhelm Abel (1986). *Agricultural Fluctuations in Europe: From the Thirteenth to twentieth centuries*. Taylor and Francis.
- 75 Vermeulen, S, Park, T, Khoury, C K, Mockshell, J, Béné, C, Thi, H T, Heard, B & Wilson, B (2019). What is the role of changing diets in the transformation of the global food system? In press.
- 76 McCann, J. (2001). Maize and Grace: History, Corn, and Africa's New Landscapes, 1500–1999. *Comparative Studies in Society and History*, 43, pp. 246–72.
- 77 Lobell, D.B., Bänziger, M., Magorokosho, C. and Vivek, B. (2011). Nonlinear heat effects on African maize as evidenced by historical yield trials. *Nature Climate Change*, 1, pp. 42–45.
- 78 Collingham, L. (2011). *The Taste of War: World War II and the Battle for Food*, London: Penguin.
- 79 <https://www.telegraph.co.uk/food-and-drink/features/from-lobster-to-sushi-foods-of-the-poor-that-became-luxury-items/> Accessed February 2019.
- 80 [http://news.bbc.co.uk/onthisday/hi/dates/stories/april/1/newsid\\_2819000/2819261.stm/](http://news.bbc.co.uk/onthisday/hi/dates/stories/april/1/newsid_2819000/2819261.stm/) Accessed January 2019.
- 81 <https://www.statista.com/statistics/284475/weekly-household-consumption-of-pasta-in-the-united-kingdom-uk/> Accessed January 2019.
- 82 Aichner T., Coletti P. (2013). Customers' online shopping preferences in mass customization. *Journal of Direct, Data and Digital Marketing Practice*. 15(1): 20–35.

- 83 Herrero, M. et al. (2019). Wild futures: technologies for accelerating food-systems innovation towards the Sustainable Development Goals. In press.
- 84 Vermeulen, S., Park, T., Khoury, C. K., Mockshell, J., Béné, C., Thi, H. T., Heard, B. & Wilson, B. (2019) What is the role of changing diets in the transformation of the global food system? In press.
- 85 Bazile, D., Jacobsen, S-E. and Verniau, A. (2016). The Global Expansion of Quinoa: Trends and Limits. *Frontiers in Plant Science*, 7:622.
- 86 <https://www.economist.com/britain/2016/12/03/the-unstoppable-rise-of-free-range-eggs-in-britain/> Accessed January 2019.
- 87 Ranganathan, J. et al (2016). *Shifting Diets for a Sustainable Food Future*. Washington DC: World Resources Institute.
- 88 <https://www.telegraph.co.uk/finance/newsbysector/retailandconsumer/2783017/Organic-chickens-fly-after-Jamie-Olivers-fowl-deed.html/> Accessed January 2019.
- 89 <https://www.stuff.co.nz/life-style/food-wine/food-news/105367829/we-want-free-range-eggs-right-up-to-the-point-of-buying-them/> Accessed January 2019.
- 90 <https://www.brewersassociation.org/press-releases/2016-growth-small-independent-brewers/> Accessed January 2019.
- 91 <https://www.theatlantic.com/business/archive/2018/01/craft-beer-industry/550850/> Accessed January 2019.
- 92 Leicester, A. (2011). *Small beer? Assessing the Government's alcohol policies*. London: The Institute for Fiscal Studies.
- 93 Donnelly, L. (2015). Britain turns its back on strong beer. *The Telegraph*.
- 94 Vallianos, C., Sherry, J., Hoford, A & Baker, J. (2018) *Sharks in Crisis. Evidence of Positive Behavioral Change in China as New Threats Emerge*. WildAid.
- 95 <https://www.wri.org/blog/2018/01/3-americas-next-favorite-foods/> Accessed January 2019.
- 96 [http://www.npa-uk.org.uk/AHDB\\_pork\\_campaign\\_generates\\_millions\\_for\\_industry.html/](http://www.npa-uk.org.uk/AHDB_pork_campaign_generates_millions_for_industry.html/) Accessed January 2019.
- 97 <https://impossiblefoods.com/food/> Accessed January 2019.
- 98 Harper, H. (2018). Sugaring the Bill: why lower revenue from sugar tax is probably a good thing. The Behavioural Insights Team.
- 99 <https://www.nature.com/articles/d41586-019-02409-7/> Accessed January 2019.
- 100 Vermeulen, S., Park, T., Khoury, C. K., Mockshell, J., Béné, C., Thi, H. T., Heard, B. & Wilson, B. (2019) What is the role of changing diets in the transformation of the global food system? In press.
- 101 <http://time.com/5419208/denmark-food-label-climate/> Accessed January 2019.
- 102 <https://www.bloomberg.com/news/features/2018-08-15/tyson-s-quest-to-be-your-one-stop-protein-shop/> Accessed January 2019.
- 103 'Meat is crucial to a balanced diet, Michael Gove tells farmers' <https://www.theguardian.com/politics/2018/apr/27/meat-is-crucial-to-balanced-diet-gove-tells-farmers/> Accessed January 2019.
- 104 18 <https://www.bbc.co.uk/news/science-environment-45838997/> Accessed October 2018.
- 105 Wellesley, L., Happer, C., & Froggatt, A. (2015) *Changing Climate, Changing Diets: Pathways to Lower Meat Consumption*. Chatham House.
- 106 Ritchie, H. & Roser M. (2017) *Meat and Seafood Production & Consumption*. Our World In Data. <https://ourworldindata.org/meat-and-seafood-production-consumption> Accessed October 2018.
- 107 Survey published by by BBMG, GlobeScan, and SustainAbility. Summary available at <https://www.fastcompany.com/1681019/people-say-they-want-sustainable-consumption-but-do-they-mean-it/> Accessed January 2019.
- 108 Poortinga, W. Sautkina, E. Thomas, G.O, and Wolstenholme, E. (2016). *The English Plastic Bag Charge: Changes in Attitudes and Behaviour*. Cardiff: Welsh School of Architecture/School of Psychology, Cardiff University.
- 109 Dolan, P., Hallsworth, M., Halpern, D., King, D., Metcalfe, A. & Vlaev, I. (2010). *Influencing behaviour: The mindspace*

way.

110 Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1991). Anomalies: The Endowment Effect, Loss Aversion, and Status Quo Bias. *The Journal of Economic Perspectives*, 5(1), 193-206.

111 de Boer, J., de Witt, A. & Aiking, H. (2016). Help the climate, change your diet: A cross-sectional study on how to involve consumers in a transition to a low-carbon society. *Appetite*, 98, pp 19-27.

112 Marteau, T. M. (2017). Towards environmentally sustainable human behaviour: targeting non-conscious and conscious processes for effective and acceptable policies. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 375(2095).

113 Petrescu, D. C., Hollands, G. J., Couturier, D. L., Ng, Y. L., & Marteau, T. M. (2016). Public Acceptability in the UK and USA of Nudging to Reduce Obesity: the Example of Reducing Sugar-Sweetened Beverages Consumption. *PLoS One*, 11(6), e0155995.

114 [https://www.edmonton.ca/city\\_government/city\\_vision\\_and\\_strategic\\_plan/citizens-panel-energy-climate.aspx/](https://www.edmonton.ca/city_government/city_vision_and_strategic_plan/citizens-panel-energy-climate.aspx/)  
Accessed October 2018.

115 Dworkin, G. (2014). Paternalism. *The Stanford Encyclopedia of Philosophy*.

116 Allcott, H., & Sunstein, C. R. (2015). Regulating Internalities. *Journal of Policy Analysis and Management*, 34(3), 698-705.

117 Wellesley, L., Happer, C., & Froggatt, A. (2015) Changing Climate, Changing Diets: Pathways to Lower Meat Consumption. Chatham House.

118 Hoek, A. C., Pearson, D., James, S. W., Lawrence, M. A., & Friel, S. (2017). Shrinking the food-print: A qualitative study into consumer perceptions, experiences and attitudes towards healthy and environmentally friendly food behaviours. *Appetite*, 108, 117-131.

119 Stoll-Kleemann, S., & Schmidt, U. J. (2017). Reducing meat consumption in developed and transition countries to counter climate change and biodiversity loss: a review of influence factors. *Regional Environmental Change*, 17(5), 1261-1277.

120 Hagman, W., Andersson, D., Västfjäll, D., & Tinghög, G. (2015). Public views on policies involving nudges. *Review of Philosophy and Psychology*, 6(3), 439-453.

121 Steentjes, K., Pidgeon, N. F., Poortinga, W., Corner, A. J., Arnold, A., Böhm, G. and Sonnberger, M. 2017. European Perceptions of Climate Change (EPCC): Topline findings of a survey conducted in four European countries in 2016. Cardiff: Cardiff University.

122 Garnett T, Mathewson S., Angelides P., Borthwick F. (2015) Policies and actions to shift eating patterns: What works? A review of the evidence of the effectiveness of interventions aimed at shifting diets in more sustainable and healthy directions. Food Climate Research Network (FCRN) and Chatham House, Oxford.

123 Stoll-Kleemann, S., & Schmidt, U. J. (2017). Reducing meat consumption in developed and transition countries to counter climate change and biodiversity loss: a review of influence factors. *Regional Environmental Change*, 17(5), 1261-1277.

124 Macdiarmid, J. I., Douglas, F., & Campbell, J. (2016). Eating like there's no tomorrow: Public awareness of the environmental impact of food and reluctance to eat less meat as part of a sustainable diet. *Appetite*, 96, 487-493.

125 Potter, C (2019). Unpublished data, personal communication by email, 9th Oct.

126 Dibb S., Fitzpatrick I (2014) Let's talk about meat: changing dietary behaviour for the 21st century. Eating Better, London.

127 Stoll-Kleemann, S., & Schmidt, U. J. (2017). Reducing meat consumption in developed and transition countries to counter climate change and biodiversity loss: a review of influence factors. *Regional Environmental Change*, 17(5), 1261-1277.

128 Lea, E., & Worsley, A. (2001). Influences on meat consumption in Australia. *Appetite*, 36, 127-136.

129 Lea, E. J., Crawford, D., & Worsley, A. (2006). Consumers' readiness to eat a plant-based diet. *European Journal of Clinical Nutrition*, 60, 342-351.

130 Pohjolainen, P., Vinnari, M., & Jokinen, P. (2015). Consumers' perceived barriers to following a plant-based diet. *British Food Journal*, 117, 1150-1167.

131 Thorndike, A. N., Riis, J., Sonnenberg, L. M., & Levy, D. E. (2014). Traffic-light labels and choice architecture: promoting healthy food choices. *American Journal of Preventive Medicine*, 46(2), 143-149.

132 Bianchi, F., Dorsel, C., Garnett, E., Aveyard, P., & Jebb, S. A. (2018). Interventions targeting conscious determinants of human behaviour to reduce the demand for meat: a systematic review with qualitative comparative analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 15(1), 102.

133 Cadario, R. and Chandon, P. 2018. 'Which Healthy Eating Nudges Work Best? A Meta-Analysis of Field Experiments',

Marketing Science (forthcoming). doi: 10.2139/ssrn.3090829.

134 Chandon, P. and Wansink, B. (2012). Does food marketing need to make us fat? A review and solutions. *Nutrition Reviews*, 70, pp. 571–593.

135 Lappalainen, R., Kearney, J., & Gibney, M. (1998). A pan EU survey of consumer attitudes to food, nutrition and health: an overview. *Food quality and Preference*, 9(6), 467-478.

136 Glanz, K., Basil, M., Maibach, E., Goldberg, J., & Snyder, D. A. N. (1998). Why Americans eat what they do: taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption. *Journal of the American Dietetic Association*, 98(10), 1118-1126.

137 Neumark-Sztainer, D., Story, M., Perry, C., & Casey, M. A. (1999). Factors influencing food choices of adolescents: findings from focus-group discussions with adolescents. *Journal of the American Dietetic Association*, 99(8), 929-937.

138 World Business Council for Sustainable Development (2018) FReSH insight report. Consumption, Behaviour and Trends: Understanding the shift required towards healthy, sustainable and enjoyable diets.

139 YouGov (2017 and 2019). Eating Better Surveys.

140 Rozin, P., Markwith, M., & Stoess, C. (1997). Moralization and Becoming a Vegetarian: The Transformation of Preferences Into Values and the Recruitment of Disgust. *Psychological Science*, 8(2), 67-73.

141 Food Climate Research Network.

142 Rozin, P., Markwith, M., & Stoess, C. (1997). Moralization and Becoming a Vegetarian: The Transformation of Preferences Into Values and the Recruitment of Disgust. *Psychological Science*, 8(2), 67-73.

143 Kollmuss, A., and Agyeman, J. 2002. Mind the Gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), pp. 239-260.

144 Marteau, T. 2017. Towards environmentally sustainable human behaviour: targeting non-conscious and conscious processes for effective and acceptable policies. *Philosophical Transactions. Series A, Mathematical, physical, and engineering sciences*, 375 (2095).

145 Moser, S. and Kleinhüchelkotten, S. 2017. Good Intent, but Low Impacts: Diverging Importance of Motivational and Socioeconomic Determinants Explaining Pro-Environmental Behavior, Energy Use, and Carbon Footprint. *Environment and Behavior*, 50(6), pp.626-656.

146 Blake, J. 1999. Overcoming the 'value-action gap' in environmental policy: Tensions between national policy and local experience. *Local Environment*, 4(3), pp. 257–278.

147 Moser, S., & Kleinhüchelkotten, S. (2018). Good Intent, but Low Impacts: Diverging Importance of Motivational and Socioeconomic Determinants Explaining Pro-environmental Behavior, Energy Use, and Carbon Footprint. *Environment and Behavior*, 50(6), 626-656.

148 Kollmuss, A., and Agyeman, J. 2002. Mind the Gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), pp. 239-260.

149 Moser, S., & Kleinhüchelkotten, S. (2018). Good Intent, but Low Impacts: Diverging Importance of Motivational and Socioeconomic Determinants Explaining Pro-environmental Behavior, Energy Use, and Carbon Footprint. *Environment and Behavior*, 50(6), 626-656.

150 Gino, F., Norton, M. I., & Weber, R. A. (2016). Motivated Bayesians: Feeling Moral While Acting Egoistically. *Journal of Economic Perspectives*, 30(3), 189-212.

151 Moser, S., & Kleinhüchelkotten, S. (2018). Good Intent, But Low Impacts: Diverging Importance of Motivational and Socioeconomic Determinants Explaining Pro-environmental Behavior, Energy Use, and Carbon Footprint. *Environment and Behavior*, 50(6), 626-656.

152 Joy M (2011). *Why We Love Dogs, Eat Pigs and Wear Cows. An Introduction to Carnism*. Conari Press, San Francisco.

153 Hope, A. L., Jones, C. R., Webb, T. L., Watson, M. T., & Kaklamanou, D. (2018). The Role of Compensatory Beliefs in Rationalizing Environmentally Detrimental Behaviors. *Environment and Behavior*, 50(4), 401-425.

154 Khan, U. and Dhar, R. 2006. Licensing effect in consumer choice. *Journal of Marketing Research*, 43(2), pp. 259-266.

155 Tiefenbeck, V., Staake, T., Roth, K., & Sachs, O. (2013). For better or for worse? Empirical evidence of moral licensing in a behavioral energy conservation campaign. *Energy Policy*, 57, 160-171.

156 Paharia, N., Vohs, K. D. and Deshpandé, R. 2013. Sweatshop labor is wrong unless the shoes are cute: Cognition can both help and hurt moral motivated reasoning. *Organizational Behavior and Human Decision Processes*, 121(1), pp. 81-88.

157 Gifford, R. (2011). *The Dragons of Inaction: Psychological Barriers That Limit Climate Change Mitigation and*

Adaptation. *American Psychologist*, 66(4), 290.

158 Piazza J., Ruby M.B., Loughnan S., Loung M., Kulik J., Watkins H.M., Seigerman M. (2015) Rationalizing meat consumption: the 4Ns. *Appetite* 91:114–128.

159 Bergmann I., von der Heide T., Maller C. (2010) Cognitive dissonance and individuals' response strategies as a basis for audience segmentation to reduce factory farmed meat consumption. In: Russell-Bennett R., Rundle-Thiele S. (eds) *International Non-profit and Social Marketing conference, conference proceedings*, Griffith University, Nathan, QLD, Brisbane, pp 32–35.

160 Diekmann, A., & Preisendörfer, P. (2003). Green and greenback: The Behavioral Effects of Environmental Attitudes in Low-cost and High-cost Situations. *Rationality and Society*, 15(4), 441–472.

161 Kahneman, D. (2011). *Thinking, Fast and Slow*. Macmillan.

162 Ibid.

163 Ariely, D. (2008). *Predictably Irrational*. New York: HarperCollins.

164 Graça J., Oliveira A., Calheiros M.M. (2015). Meat, beyond the plate. Data-driven hypotheses for understanding consumer willingness to adopt a more plant-based diet. *Appetite* 1(90):80–90.

165 Gronow, J., & Warde, A. (Eds.). (2001). *Ordinary Consumption* (Vol. 2). Psychology Press.

166 Ogden, J., Coop, N., Cousins, C., Crump, R., Field, L., Hughes, S., & Woodger, N. (2013). Distraction, the desire to eat and food intake. Towards an expanded model of mindless eating. *Appetite*, 62, 119–126.

167 Dibb S., Fitzpatrick I. (2014) Let's talk about meat: changing dietary behaviour for the 21st century. *Eating Better*, London.

168 Lea E.J., Crawford D., Worsley A. (2006) Consumers' readiness to eat a plant-based diet. *Eur J Clin Nutr* 60:342–351.

169 Hargeaves, T. (2011) Practice-ing behaviour change: Applying social practice theory to pro-environmental behaviour change. *Journal of Consumer Culture* 11 (1), 79–99.

170 Goldstein, N.J., Cialdini, R. B., & Griskevicius, V. (2008). A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels. *Journal of Consumer Research*, 35(3), 472–482.

171 Wyker B.A., Davison K.K. (2010) Behavioral change theories can inform the prediction of young adults' adoption of a plant-based diet. *J Nutr Educ Behav* 42(3):168–177.

172 Sparkman, G., & Walton, G. M. (2017). Dynamic Norms Promote Sustainable Behavior, Even if It Is Counternormative. *Psychological Science*, 28(11), 1663–1674.

173 Barclay P. & Barker J. Greener Than Thou: People Who Protect the Environment are More Cooperative, Compete to Be Environmental, and Benefit from Reputation. *Journal of Environmental Psychology*, in revision.

174 BIT-RARE report.

175 Stoll-Kleemann, S., & Schmidt, U. J. (2017). Reducing meat consumption in developed and transition countries to counter climate change and biodiversity loss: a review of influence factors. *Regional Environmental Change*, 17(5), 1261–1277.

176 Verain M., Dagevos H., Antonides G. (2015) Flexitarianism: a range of sustainable food styles. In: Reisch LA, Thøgersen J (eds) *Handbook of Research on Sustainable Consumption*. Edward Elgar Publishing, Cheltenham, pp 209–223.

177 Ruby MB, Heine SJ (2011) Meat, morals, and masculinity. *Appetite* 56:447–450

178 Ruby, M. B., & Heine, S. J. (2011). Meat, morals, and masculinity. *Appetite*, 56(2), 447–450.

179 Brough, A. R., Wilkie, J. E., Ma, J., Isaac, M. S., & Gal, D. (2016). Is eco-friendly unmanly? The green-feminine stereotype and its effect on sustainable consumption. *Journal of Consumer Research*, 43(4), 567–582.

180 Tobler C, Visschers VHM, Siegrist M (2011) Eating green. Consumers' willingness to adopt ecological food consumption behaviors. *Appetite* 57:674–682.

181 Kollmuss A, Agyeman J. (2002). Mind the Gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environ Educ Res* 8(3):239–260.

182 Ruby, M. B., & Heine, S. J. (2011). Meat, Morals, and Masculinity. *Appetite*, 56(2), 447–450.

183 Lea E., Worsley A. (2001). Influences on Meat Consumption in Australia. *Appetite* 36:127–136.

184 Brough, A. R., Wilkie, J. E., Ma, J., Isaac, M. S., & Gal, D. (2016). Is Eco-Friendly Unmanly? The Green-Feminine Stereotype and Its Effect on Sustainable Consumption. *Journal of Consumer Research*, 43(4), 567–582.

- 185 Smil, V. (2002). Eating meat: Evolution, Patterns, and Consequences. *Population and Development Review*, 28, 599-639.
- 186 Ruby, M. B., & Heine, S. J. (2011). Meat, Morals, and Masculinity. *Appetite*, 56(2), 447-450.
- 187 Vartanian, L. R., Herman, C. P., & Polivy, J. (2007). Consumption stereotypes and impression management: how you are what you eat. *Appetite*, 48(3), 265-277.
- 188 Withana S., ten Brink P., Franckx L., Hirschnitz-Garbers M., Mayeres I., Oosterhuis F., Porsch L. (2012) Study supporting the phasing out of environmentally harmful subsidies. A report by the Institute for European Environmental Policy (IEEP), Final Report. Institute for Environmental Studies—Vrije Universiteit (IVM), Ecologic Institute and VITO for the European Commission—DG Environment, Brussels.
- 189 WBGU (2011) *World in Transition. A Social Concept for Sustainability*. Flagship Report. German Advisory Council on Global Change, Berlin.
- 190 Joy M (2011) *Why We Love Dogs, Eat Pigs and Wear Cows. An Introduction to Carnism*. Conari Press, San Francisco.
- 191 <https://www.meatinsitute.org/index.php?ht=d/sp/i/47465/pid/47465/> Accessed October 2018.
- 192 Withana S., ten Brink P., Franckx L., Hirschnitz-Garbers M., Mayeres I., Oosterhuis F., Porsch L. (2012). Study supporting the phasing out of environmentally harmful subsidies. A report by the Institute for European Environmental Policy (IEEP), final report. Institute for Environmental Studies—Vrije Universiteit (IVM), Ecologic Institute and VITO for the European Commission—DG Environment, Brussels.
- 193 Heinrich-Böll-Stiftung, Chemnitz, C., & Becheva, S. (2014). *Meat Atlas: Facts and figures about the animals we eat*. Heinrich Böll Foundation.
- 194 OECD. (2018). *OECD Agricultural Policy Monitoring and Evaluation 2018*. Paris: Organisation for Economic Cooperation and Development.
- 195 Franck, C., Grandi, S.M. and Eisenberg, M.J. (2013). Agricultural subsidies and the American obesity epidemic. *American Journal of Preventive Medicine*, 45, pp. 327-333.
- 196 Edjabou L.D., Smed S. (2013). The effect of using consumption taxes on foods to promote climate friendly diets—The case of Denmark. *Food Policy* 39:84–96.
- 197 Lanfranco B.A., Rava C. (2014). Household demand elasticities for meat products in Uruguay. *Span J Agric Res* 12(1):15–28.
- 198 Furst T., Connors M., Bisogni C.A., Sobal J., Winter-Falk L. (1996) Food choice: a conceptual model of the process. *Appetite* 26:247–266.
- 199 Andreyeva, T., Long, M. W., & Brownell, K. D. (2010). The Impact of Food Prices on Consumption: A Systematic Review of Research on the Price Elasticity of Demand for Food. *American journal of public health*, 100(2), 216-222.
- 200 Keller M., Kretschmer J. (2012) *Instrumente im Sinne einer nachhaltigen, klimafreundlichen Fleischproduktion. Eine Untersuchung im Auftrag von MISEREOR. Bischofliches Hilfswerk MISEREOR e. V., Aachen.*
- 201 [https://www.huffingtonpost.co.uk/entry/we-spend-more-time-watching-food-shows-than-cookin\\_uk\\_57e3d141e4b004d4d86237fd](https://www.huffingtonpost.co.uk/entry/we-spend-more-time-watching-food-shows-than-cookin_uk_57e3d141e4b004d4d86237fd).
- 202 World Business Council for Sustainable Development (2018) *The Future of Food: A lighthouse for future living, today*.
- 203 Ebeling, F., & Lotz, S. (2015). Domestic uptake of green energy promoted by opt-out tariffs. *Nature Climate Change*, 5(9), 868.
- 204 Bucher, T., Collins, C., Rollo, M. E., McCaffrey, T. A., De Vlieger, N., Van der Bend, D., Truby H., & Perez-Cueto, F. J. (2016). Nudging consumers towards healthier choices: a systematic review of positional influences on food choice. *British Journal of Nutrition*, 115(12), 2252-2263.
- 205 Kurz, V. (2018). Nudging to reduce meat consumption: Immediate and persistent effects of an intervention at a university restaurant. *Journal of Environmental Economics and Management*, 90, 317-341.
- 206 Dayan, E., & Bar-Hillel, M. (2011). Nudge to nobesity II: Menu positions influence food orders. *Judgment and Decision Making*, 6(4), 333-342.
- 207 Garnett, Balmford, Sandbrook, Pilling, Marteau (2019) *PNAS* in press.
- 208 Bucher, T., Collins, C., Rollo, M. E., McCaffrey, T. A., De Vlieger, N., Van der Bend, D., Truby H., & Perez-Cueto, F. J. (2016). Nudging consumers towards healthier choices: a systematic review of positional influences on food choice. *British Journal of Nutrition*, 115(12), 2252-2263.
- 209 Guyader, H., Ottosson, M., & Witell, L. (2017). You can't buy what you can't see: Retailer practices to increase the green premium. *Journal of Retailing and Consumer Services*, 34, 319-325.



- 210 Van Loo, E. J., Caputo, V., Nayga Jr, R. M., Seo, H. S., Zhang, B., & Verbeke, W. (2015). Sustainability labels on coffee: Consumer preferences, willingness-to-pay and visual attention to attributes. *Ecological Economics*, 118, 215-225.
- 211 <http://tenudge.eu/project/little-less-meat-little-green-action-nudging-towards-sustainable-healthy-portion-sizes-supermarket/> Accessed October 2018.
- 212 Cadario, R., & Chandon, P. (2018). Which Healthy Eating Nudges Work Best? A Meta-Analysis of Field Experiments. *Marketing Science*.
- 213 Ölander, F., & Thøgersen, J. (2014). Informing versus nudging in environmental policy. *Journal of Consumer Policy*, 37(3), 341-356.
- 214 Cadario, R., & Chandon, P. (2018) Which Healthy Eating Nudges Work Best? A Meta-Analysis of Field Experiments. *Marketing Science*.
- 215 Hagmann, D., Ho, E. H., & Loewenstein, G. (2019). Nudging out support for a carbon tax. *Nature Climate Change*, 1. 216
- 216 Vanhonacker, F., Van Loo, E. J., Gellynck, X., & Verbeke, W. (2013). Flemish consumer attitudes towards more sustainable food choices. *Appetite*, 62, 7-16.
- 217 Elzerman, J. E., van Boekel, M. A., & Luning, P. A. (2013). Exploring meat substitutes: consumer experiences and contextual factors. *British Food Journal*, 115(5), 700-710.
- 218 FAIRR (2017) The Livestock Levy: Are Regulators Considering Meat Taxes?
- 219 <https://www.theguardian.com/environment/2017/dec/11/meat-tax-inevitable-to-beat-climate-and-health-crises-says-report/> Accessed October 2018.
- 220 <https://www.wri.org/blog/2018/02/flavor-packed-burger-saves-many-emissions-taking-2-million-cars-road/> Accessed October 2018.
- 221 UK Treasury data. Reported here <https://www.reuters.com/article/us-britain-sugar/britains-sugar-tax-on-soft-drinks-comes-into-effect-idUSKCN1HD1K2/> Accessed January 2019.
- 222 Leicester, A. (2011). *Small beer? Assessing the Government's alcohol policies*. London: The Institute for Fiscal Studies.
- 223 Raghunathan, et. al. (2006) The Unhealthy = Tasty Intuition and Its Effects on Taste Inferences, Enjoyment, and Choice of Food Products. *Journal of Marketing*, 70(4), 170-184.
- 224 Suher, J., Raghunathan, R. and Hoyer, W. (2016) Eating Healthy or Feeling Empty? How the 'Healthy=Less Filling' Intuition Influences Satiety. *Journal of the Association for Consumer Research*, (1) 1, 26-40.
- 225 Vennard, D., Park, T., & Attwood, S. (2019). Encouraging Sustainable Food Consumption By Using More-Appetizing Language.
- 226 Turnwald, B. P., Boles, D. Z., & Crum, A. J. (2017). Association Between Indulgent Descriptions and Vegetable Consumption: Twisted Carrots and Dynamite Beets. *JAMA internal medicine*, 177(8), 1216-1218.
- 227 <https://www.theguardian.com/food/2019/apr/04/eu-to-ban-non-meat-product-labels-veggie-burgers-and-vegan-steaks/> Accessed April 2019.
- 228 Plunke, C., & Prabhakar, B. (2013). INSINC: A Platform For Managing Peak Demand in Public Transit. *JOURNEYS*, Land Transport Authority Academy of Singapore, 31-39.
- 229 Schneider, C. R., Zaval, L., Weber, E. U., & Markowitz, E. M. (2017). The influence of anticipated pride and guilt on pro-environmental decision making. *PloS One*, 12(11), e0188781.
- 230 Bissing-Olson, M. J., Fielding, K. S., & Iyer, A. (2016). Experiences of pride, not guilt, predict pro-environmental behavior when pro-environmental descriptive norms are more positive. *Journal of Environmental Psychology*, 45, 145-153.
- 231 Patrick, V. M., Chun, H. H., & Macinnis, D. J. (2009). Affective Forecasting and Self-Control: Why Anticipating Pride Wins Over Anticipating Shame in a Self-Regulation Context. *Journal of Consumer Psychology*, 19(3), 537-545.
- 232 Willemsen, M., & Nguyen, T. (2017). Chi Briefing Paper - providing insights of the impact of a behaviour change campaign to reduce the demand for rhino horn in Viet Nam.
- 233 Ipsos MORI & Chatham House (2014).
- 234 Camilleri, A., Larrick, R. P., Hossain, S., & Echeverri, D. (2018). Consumer Underestimation of Energy Use and Greenhouse Gas Emissions Associated with Food.
- 235 Eating Better (2019) Eating Better YouGov Survey: Public Attitudes to Meat Consumption.
- 236 Macdiarmid, J. I., Douglas, F., & Campbell, J. (2016). Eating like there's no tomorrow: Public awareness of the



- environmental impact of food and reluctance to eat less meat as part of a sustainable diet. *Appetite*, 96, 487-493.
- 237 Marteau, T. M. (2017). Towards environmentally sustainable human behaviour: targeting non-conscious and conscious processes for effective and acceptable policies. *Philosophical Transactions of the Royal Society A*, 375(2095).
- 238 Portney, K. E., Hannibal, B., Goldsmith, C., McGee, P., Liu, X., & Vedlitz, A. (2017). Awareness of the Food–Energy–Water Nexus and Public Policy Support in the United States: Public Attitudes Among the American People. *Environment and Behavior*, 0013916517706531.
- 239 Joyce, A., Dixon, S., Comfort, J., & Hallett, J. (2012). Reducing the Environmental Impact of Dietary Choice: Perspectives from a Behavioural and Social Change Approach. *Journal of Environmental and Public Health*, 2012.
- 240 Ibid.
- 241 Girod B., van Vuuren D.P., Hertwich E.G. (2014) Climate policy through changing consumption choices: Options and obstacles for reducing greenhouse gas emissions. *Global Environ Change* 25:5–15.
- 242 Dibb S., Fitzpatrick I. (2014) Let's talk about meat: changing dietary behaviour for the 21st century. *Eating Better*, London.
- 243 Ranganathan, J. et al (2016). *Shifting Diets for a Sustainable Food Future*. Washington DC: World Resources Institute.
- 244 <https://www.telegraph.co.uk/finance/newsbysector/retailandconsumer/2783017/Organic-chickens-fly-after-Jamie-Olivers-fowl-deed.html/> Accessed January 2019.
- 245 Hayns-Worthington, S. (2018) The Attenborough Effect: searches for plastic recycling rocket after Blue Planet II. <https://resource.co/article/attenborough-effect-searches-plastic-recycling-rocket-after-blue-planet-ii-12334/> Accessed January 2019.
- 246 Martin, R. E., Villanueva, Y., Stephano, T., Franz, P. J., & Ochsner, K. N. (2018). Social influence shifts valuation of appetitive cues in early adolescence and adulthood. *Journal of Experimental Psychology: General*, 147(10), 1521-1530.
- 247 United Nations Environment (2017) *Consuming Differently, Consuming Sustainability: Behavioural Insights for Policy-making*.
- 248 Sparkman, G., & Walton, G. M. (2017). Dynamic Norms Promote Sustainable Behavior, Even If It Is Counternormative. *Psychological Science*, 28(11), 1663- 1674.
- 249 Allcott, H. (2011). Social norms and energy conservation. *Journal of public Economics*, 95(9-10), 1082-1095.
- 250 Goldstein, N. J., Cialdini, R. B., & Griskevicius, V. (2008). A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels. *Journal of consumer Research*, 35(3), 472-482.
- 251 Sparkman, G., & Walton, G. M. (2017). Dynamic Norms Promote Sustainable Behavior, Even If It Is Counternormative. *Psychological Science*, 28(11), 1663- 1674.
- 252 Meyer, R. (2017). Google's New Product Puts Peer Pressure to a Sunny Use. <https://www.theatlantic.com/technology/archive/2017/06/googles-new-product-puts-peer-pressure-to-a-sunny-use/529974/> Accessed January 2018.
- 253 Plumer, B. (2015). Solar power is contagious: Installing panels often means your neighbors will too. <https://www.vox.com/2014/10/24/7059995/solar-power-is-contagious-neighbor-effects-panels-installation/> Accessed January 2018.
- 254 Barclay P. & Barker J. Greener Than Thou: People Who Protect the Environment are More Cooperative, Compete to Be Environmental, and Benefit from Reputation. *Journal of Environmental Psychology*, in revision.
- 255 Alpizar, F., Carlsson, F., & Johansson-Stenman, O. (2008). Anonymity, reciprocity, and conformity: Evidence from voluntary contributions to a national park in Costa Rica. *Journal of Public Economics*, 92(5-6), 1047-1060.
- 256 Griskevicius, V., Tybur, J. M., & Van den Bergh, B. (2010). Going Green to be Seen: Status, Reputation, and Conspicuous Conservation. *Journal of Personality and Social Psychology*, 98(3), 392.
- 257 Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annu. Rev. Psychol.*, 55, 591-621.
- 258 Ranganathan, J., et al (2016). *Shifting Diets for a Sustainable Food Future*. Washington DC: World Resources Institute.
- 259 <https://www.technomic.com/membership-programs/menu-trends/> Accessed January 2019.
- 260 World Resources Institute (2018) <https://www.wri.org/blog/2018/01/3-americas-next-favorite-foods/> Accessed January 2019.
- 261 McClure, T & Spence, R (2006). *Don't Mess with Texas: The Story Behind the Legend*, Idea City Press.
- 262 Fernandez, Manny (2013). "Not to Be, Um, Trifled With, Texas Guards Its Slogans". *The New York Times*.
- 263 de Boer, J., Schösler, H., & Aiking, H. (2017). Towards a reduced meat diet: Mindset and motivation of young vegetarians,

low, medium and high meat-eaters. *Appetite*, 113, 387-397.

264 BBC (2018) <http://www.bbc.com/future/story/20181127-ikumen-how-japans-hunky-dads-are-changing-parenting/> Accessed January 2019.

265 Government of Australia (2013) <https://bi.dpc.nsw.gov.au/blog/2013/08/09/case-study-series-pinkie-challenging-masculine-social-norms-on-nsw-roads-transport-for-nsw/> Accessed January 2019.

266 <https://www.wri.org/blog/2018/01/3-americas-next-favorite-foods>

267 [http://www.npa-uk.org.uk/AHDB\\_pork\\_campaign\\_generates\\_millions\\_for\\_industry.html/](http://www.npa-uk.org.uk/AHDB_pork_campaign_generates_millions_for_industry.html/) Accessed January 2018.

268 Schlee, C. (2017). <https://www.pret.co.uk/en-gb/prets-next-experiment/> Accessed October 2018.

269 Bacon, L. (2017). Don't Put Vegetables in the Corner. World Resources Institute.

270 Rubens, K. (2017) <https://www.behavioraleconomics.com/a-nudge-in-the-green-direction/> Accessed October 2018.

271 Guyader, H., Ottosson, M., & Witell, L. (2017). You can't buy what you can't see: Retailer practices to increase the green premium. *Journal of Retailing and Consumer Services*, 34, 319-325.

272 Luca, M. (2016). Reviews, Reputation, and Revenue: The case of Yelp.com. Harvard Business School NOM Unit Working Paper, (12-016).

273 Survey published by by BBMG, GlobeScan, and SustainAbility. Summary available at <https://www.fastcompany.com/1681019/people-say-they-want-sustainable-consumption-but-do-they-mean-it/> Accessed January 2019.

274 Garnett, E., Balmford, A., Sandbrook, C., Pilling, M., & Marteau, T. (2019). Impact of increasing vegetarian availability on meal selection and sales: observational and experimental studies in cafeterias. *PNAS*.

275 Kurz, V. (2018). Nudging to reduce meat consumption: Immediate and persistent effects of an intervention at a university restaurant. *Journal of Environmental Economics and Management*, 90, 317-341.

276 Guyader, H., Ottosson, M., & Witell, L. (2017). You can't buy what you can't see: Retailer practices to increase the green premium. *Journal of Retailing and Consumer Services*, 34, 319-325.

277 Van Loo, E. J., Caputo, V., Nayga Jr, R. M., Seo, H. S., Zhang, B., & Verbeke, W. (2015). Sustainability labels on coffee: Consumer preferences, willingness-to-pay and visual attention to attributes. *Ecological Economics*, 118, 215-225.

278 Garnett, E., Balmford, A., Sandbrook, C., Pilling, M., & Marteau, T. (2019). Impact of increasing vegetarian availability on meal selection and sales: observational and experimental studies in cafeterias. *PNAS*.

279 Dinner, I., Johnson, E. J., Goldstein, D. G., & Liu, K. (2011). Partitioning Default Effects: Why People Choose Not to Choose. *Journal of Experimental Psychology: Applied*, 17(4), 332.

280 Ebeling, F., & Lotz, S. (2015). Domestic uptake of green energy promoted by opt-out tariffs. *Nature Climate Change*, 5(9), 868.

281 The New York Times (2018) <https://www.nytimes.com/2018/07/20/business/wework-vegetarian.html?partner=rss&emc=rss&smid=tw-nytimes&smtyp=cur/> Accessed January 2019.

282 Garnett, Balmford, Sandbrook, Pilling, Marteau (2019) *PNAS* in press.

283 Rubens, K. (2017) <https://www.behavioraleconomics.com/a-nudge-in-the-green-direction/> Accessed October 2018.

284 Takahashi, R., Todo, Y., & Funaki, Y. (2018). How Can We Motivate Consumers to Purchase Certified Forest Coffee? Evidence From a Laboratory Randomized Experiment Using Eye-trackers. *Ecological Economics*, 150, 107-121.

285 Poore, J & Nemecek, T (2018) Reducing food's environmental impacts through producers and consumers. *Science*. 360 (6392) 978-992.

286 Sustainable food trust (2017) response to Food Climate Research Network (2017) *Grazed and Confused*. Full response can be accessed from <https://www.fcrrn.org.uk/fcrn-blogs/fcrn/commentary-sustainable-food-trust-grazed-and-confused-report> Accessed September 2019

287 [https://foodsource.org.uk/sites/default/files/chapters/pdfs/foodsource\\_chapter\\_3.pdf/](https://foodsource.org.uk/sites/default/files/chapters/pdfs/foodsource_chapter_3.pdf/) Accessed January 2019.

288 Food Climate Research Network (2017). *Grazed and Confused? Ruminating on cattle, grazing systems, methane, nitrous oxide, the soil carbon sequestration question – and what it all means for greenhouse gas emissions.*

289 Food Climate Research Network (2017). *Grazed and Confused? Ruminating on cattle, grazing systems, methane, nitrous oxide, the soil carbon sequestration question – and what it all means for greenhouse gas emissions.*

290 Weber, C. L. & Matthews, H. S. (2008). Food-miles and the relative climate impacts of food choices in the United States. *Environ. Sci. Technol.* 42, 3508–3513.

291 Food and Agricultural Organization of the United Nations (2011). *Energy-smart food for people and climate.*

292 Tilman, D. & Clark, M. (2014). Global diets link environmental sustainability and human health. *Nature* 515, 518–522.

293 Montgomery, D. R. (2017). Healthy soil is the real key to feeding the world. *The Conversation.*

294 Tuomisto, H. L., Hodge, I. D., Riordan, P. & Macdonald, D. W. (2012). Does organic farming reduce environmental impacts? - A meta-analysis of European research. *Journal of Environmental. Management.* 112, 309–320.

295 Clark, M. & Tilman, D. (2017). Comparative analysis of environmental impacts of agricultural production systems, agricultural input efficiency, and food choice. *Environmental Research Letters.* 12.

296 NHS Choices. (2015). Red meat and the risk of bowel cancer. <http://www.nhs.uk/Livewell/Goodfood/Pages/red-meat.aspx/> Accessed July 2017.

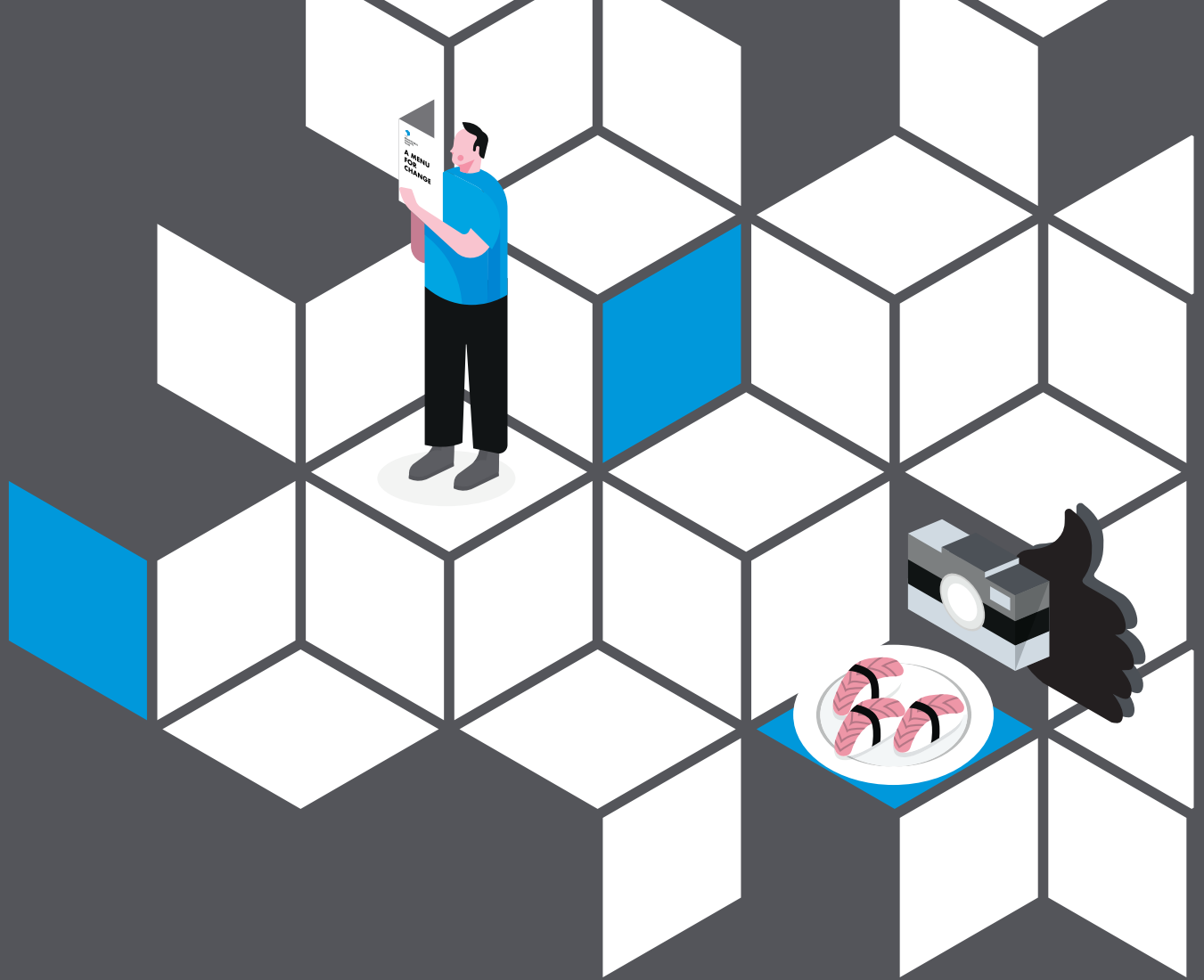
# Stay in touch

---

Contact the team at [\*\*www.bi.team/contact\*\*](http://www.bi.team/contact)

Stay up to date with our latest work, findings and job vacancies. Subscribe for email updates at [\*\*www.bi.team/subscribe\*\*](http://www.bi.team/subscribe)





# The Behavioural Insights Team

---

[www.bi.team](http://www.bi.team)

4 Matthew Parker Street  
London SW1H 9NP

© Behavioural Insights Ltd. Not to be reproduced without  
the permission of the Behavioural Insights Team

