

## What people said about *The National Food Strategy* (the Dimbleby Report)

‘The Dimbleby report is a wake-up call to this country and government to do something about our food system and the epidemic of obesity and ill health destroying our country. We eat more ultra-processed unhealthy food than any other European country and it is getting relatively cheaper and more deadly each year.’

**Tim Spector**, Professor of Genetic Epidemiology at King’s College London and author of *Spoon Fed*

‘From field to fork, extraordinary work is being done to try and build a better food system for everyone, be it Jamie Oliver promoting education and a balanced diet, Henry Dimbleby’s ambitions for safe, healthy and affordable food, or Marcus Rashford whose mission off the football field is to tackle child hunger.’

**HM King Charles III**

‘Analytically tight, empirically thorough, the Dimbleby Report is not only a masterly study of the UK’s food problem, but constructs a framework wide enough to be deployed for studying the food problems societies face everywhere. The report’s recommendations are detailed, convincing, and would be entirely implementable if we cared about ourselves and the world around us.’

**Sir Partha Dasgupta**, Frank Ramsey Professor Emeritus of Economics, University of Cambridge, and author of *The Economics of Biodiversity*

‘What is it going to take for these children to be prioritised? Instead of removing support through social security, we should be focusing efforts on developing a sustainable long-term road map out of this child hunger pandemic. I am, today, pledging my support for three recommendations from the National Food Strategy.’

**Marcus Rashford**, Manchester United and England

‘This is no time for half-hearted measures. If both government and businesses are willing to take bold action and prioritise the public’s health, then we have an incredible opportunity to create a much fairer and more sustainable food system for all families.’

**Jamie Oliver**, Chef

‘This report is visionary and courageous and also much needed. It provides hope at a time when Covid 19 has exposed our vulnerability as a nation, which is in part the result of our poor diet. It is also deeply practical, offering solutions that can reverse a broken system and vested interests that currently result in healthy food being least available to those who most need it.’

**Dr Michael Dixon**, Chair of the College of Medicine

‘Dimbleby offers a nuanced and imaginative way forward, one which harnesses the capacity of farmers and land managers to be a major part of the solution in tackling these challenges, while being fairly rewarded for their hard work and ingenuity. Many farmers are up for the challenge, but will need these recommendations to be implemented to make this possible.’

**Helen Browning**, CEO Soil Association

‘Good food isn’t just about deliciousness. It’s also about health – our own health, and the health of the environment. This fascinating report elevates food to where it belongs – at the forefront of public debate.’

**Yotam Ottolenghi**, Chef

‘The best government document that’s ever come out.’

**Prue Leith**, Chef, writer, presenter

**RAVENOUS**

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# **RAVENOUS**

**How to get ourselves and  
our planet into shape**

Henry Dimbleby

with Jemima Lewis

**P**

PROFILE BOOKS

*TO JOHNNY, DORY  
AND GEORGE*

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# Introduction

**When you lift a forkful of food to your mouth, what are you actually doing?** Feeding yourself, of course. Perhaps chewing unconsciously as you scroll on your phone; or perhaps sitting down for a proper meal with family; or perhaps not using a fork at all, but munching a packaged snack while on the move.

Whichever it is, you probably think it's your decision. This is even – no, especially – true if you are eating something you know is not good for you. The guilt is experienced privately, inside your head. It may be part of an internal conversation you have been having for years, berating yourself for poor decisions and failures of willpower. And even though this reproachful voice makes you miserable, you believe it. You have free will, after all. So why do you keep making the wrong choices?

Here's why. You are not alone. You are certainly not free. You are part of a system so vast, so complex, so powerful and so intimately woven into everyday life that you hardly even know it's there. Every choice you make, everything you buy and eat, is informed by the tweaking and nudging of this giant machine, in which each of us is an unwitting cog.

You may not want to hear this. The idea of free will is precious to us, no matter how elusive it proves. No

one wants to feel like a victim of unseen forces. But you are, and so am I. All living creatures on this planet, from the plankton in the oceans to the rulers of nations, are prisoners of the food system. And not just because we must eat to live.

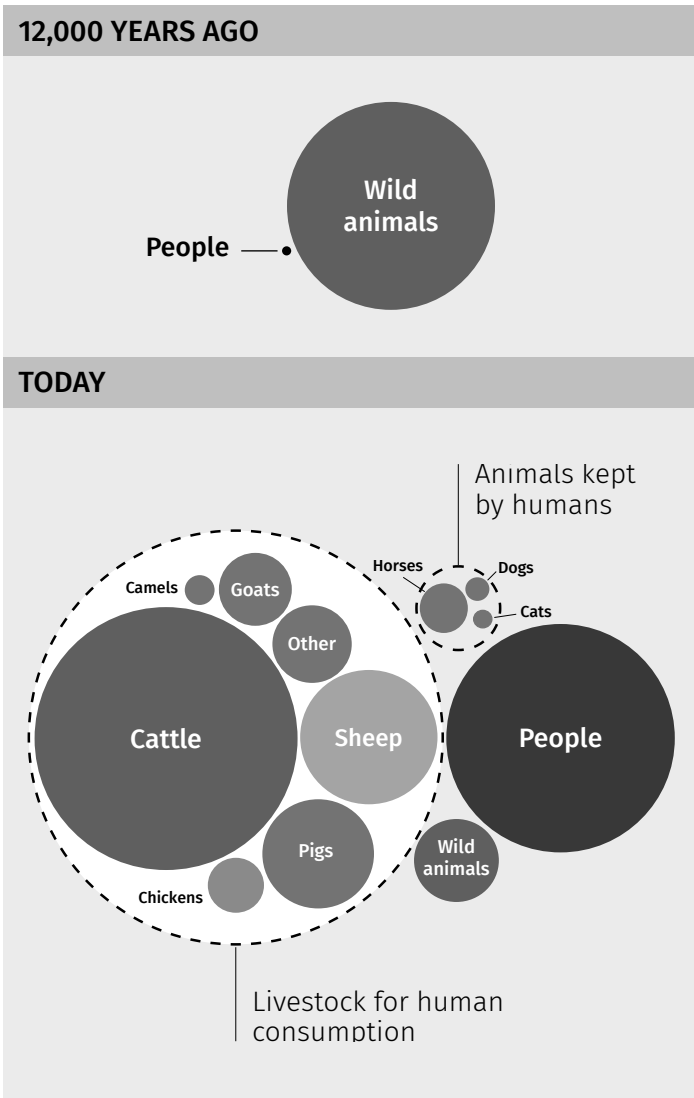
The food system is no longer simply a means of sustenance. It is one of the most successful, most innovative and most destructive industries on Earth. To understand its scale, just look at the graphics on the page opposite.

The top one shows the estimated combined weight of humans and wild animals (defined here as land-dwelling vertebrates and birds) on the planet in 10,000 BCE. This was the start of the Holocene era, when global temperatures entered an unprecedented era of stability; the moment in history where the seasons became milder and more predictable, and agriculture therefore became possible. At this point, there were 2.5 million humans on Earth – a population dwarfed by the multitude of wild animals.

The lower graphic shows the situation today – to the same scale. The population of humans has swollen to 8 billion. The food system created by *Homo sapiens* has enabled us to become Earth's dominant species.

We learned to cook plants and animals, which made it much easier for us to digest nutrients, which in turn enabled us to shrink our guts and grow bigger brains instead. We used these brains to teach ourselves how to farm the food we needed. Liberated from the relentless work of hunter-gathering, we began to trade surplus food for other goods and services, and develop more complex social networks. Civilisation, as we came to call it, was born.

But as humans have thrived, almost all other forms of wildlife have declined. You can see on this chart that the biomass of wild animals has withered by 85 percent,



12,000 years ago the total weight of humans was tiny compared to the weight of wild animals (top). Today, the combined weight of land animals bred for food dwarfs that of wild animals and birds. ('Others' includes turkeys, ducks, geese, buffalo, etc. Ocean life and invertebrates are not included.)

thanks initially to our enthusiastic hunting of megafauna,\* and then to the damage our increasingly rapacious food system has done to the natural world. These days our pets weigh almost as much as all the wild animals on the planet.

Land that used to sustain multitudes of species is now cultivated only for humans. Most animal life, too, serves the same purpose. The combined weight of animals bred for food is now twice the weight of all of the humans at any given time, and more than twenty times the combined weight of all wild vertebrates and birds.

The success of the food system goes hand in hand with its destructive power. The bigger it gets, the greater the environmental impact. It's not just biodiversity that is collapsing under the weight of our eating habits. Globally, the food system is the second-biggest emitter of greenhouse gases (after the fuel industry), and the primary cause of deforestation, drought, freshwater pollution and the depletion of aquatic wildlife.

All this, in turn, threatens our food security. The Covid pandemic, followed by the Russian invasion of Ukraine, were sharp reminders that a plentiful food supply is not something we can take for granted. Climate change is predicted to deliver even bigger shocks to the global food system, in the form of extreme weather events and catastrophic harvest failures. And then there's the toll that cheap, highly processed food is taking on our bodies.



**The cheapest, most abundant ingredients in the modern food system are sugars,** refined carbohydrates such as flour,

\* Between 50,000 and 8000 BCE, our ancient ancestors are thought to have hunted more than 178 of the world's largest mammals to extinction – including mammoths, mastodon and the giant ruffed lemur. This is known as the 'Quaternary Megafauna Extinction'.

and fats. These are ingredients that humans are biologically programmed to crave. Our species evolved in a world where calories were hard to come by, and we are predisposed to pounce on anything high in fat and sugar.

Over 80 percent of processed food sold in the UK is unhealthy.\* This is not because food manufacturers are evil: it is a simple matter of supply and demand. Unhealthy food is easier to sell. Companies therefore invest more into developing and marketing it. This in turn expands the market further still. The bigger the market, the greater the economies of scale. Highly processed foods – high in salt, refined carbohydrates, sugar and fats, and low in fibre – are on average three times cheaper per calorie than healthier foods. This is one reason why bad diet is a particularly acute problem among the poorest.

Diet-related disease is now the biggest cause of avoidable illness and death in the developed world. By 2035, the UK's National Health Service is projected to spend more on treating type 2 diabetes, just one condition caused by bad diet, than it does on all cancers today.

There are those who insist this is an issue of personal responsibility. That the answer is to 'educate the masses' in how to eat well, and leave the rest to individual willpower. But this fails to acknowledge, let alone explain, the sheer scale of the problem. In 1950, less than 1 percent of the UK population was clinically obese. Today, that figure stands at 28 percent. Are we to believe that, in the intervening years, the British public has suffered a massive collapse of willpower? Of course not. People haven't changed; the food system has.

\* This figure is based on analysis of the nutrient profiles of products sold by 18 large food companies, representing half the processed food products sold in Britain. 'Unhealthy' products are defined as those that the World Health Organization deems unsuitable to market to children.

This is not to say we are powerless in the jaws of the machine. On the contrary: to a large extent we *are* the machine. Our appetites and behaviours are crucial to how the food system arranges itself. If we adjust them, we can adjust the system. But to do that we need to understand how the system actually works.



**In 2019, the UK government asked me to write a comprehensive food strategy for the nation.** I was already well acquainted with some parts of the immense apparatus through which, in the modern world, food is produced and consumed. As the co-founder and former CEO of Leon restaurants, and as the lead non-executive director at Defra (the Department for Environment, Food and Rural Affairs), I had seen from both a commercial and a political perspective how the millions of cogs in the food system meet and turn.\*

Still, the scale of my task was daunting: to analyse the system from top to bottom, field to fork, and find solutions for an increasingly urgent problem: *How can we feed ourselves affordably, without destroying both our own health and the health of our planet?*

Assisted by a team of brilliant civil servants, and an advisory panel of scientists, farmers, academics, business

\* Prior to this review, I had, with John Vincent, conducted another review for government in 2013 – *The School Food Plan*. This led, among other things, to the introduction of free school meals for all children up to Year 2, and cooking lessons being made a right for all children up to the age of 14. In 2018, I co-founded the charity Chefs in Schools with Nicole Pisani (former head chef at Yotam Ottolenghi’s restaurant, Nopi) and Louise Nicholls, the headteacher of a federation of primary schools in east London. Chefs in School recruits professional restaurant chefs to work in schools and train existing staff in school kitchens, with the aim of improving both school lunches and food education. As a result of all this, I have spent a lot of time over the years in school kitchens.

leaders and charity and public sector workers, I set about my investigations. It felt a bit like that scene in *Modern Times*, where Charlie Chaplin falls into the factory machinery and has to pass all the way through before he can come out the other side. Together with my colleagues, I travelled the country visiting farms, food banks, high-rise greenhouses and alternative protein laboratories. We held focus groups all over the country, read academic papers from around the world, analysed data, ran mathematical models, questioned received wisdoms and inspected policy ideas, looking for hidden bear traps.

Then, in the early spring of 2020, when I was halfway through this research, an unforeseen complication arose: the first wave of Covid crashed onto our shores, bringing panic in its wake. Within weeks, supermarket shelves were being stripped bare, supply lines faltering under the strain. Over an eight-day period of hectic policymaking, the government first asked people to avoid going to pubs and restaurants, then shut these venues by law, and finally exhorted the nation to ‘stay at home’ entirely.

This meant the whole structure of the UK food system was abruptly bent out of shape. The ‘out of home’ food sector (restaurants, cafes, takeaways and pubs), which had previously supplied 20–25 percent of the UK’s food, was closed overnight. School kitchens, which provide up to 50 percent of children’s food during term time, were closed too. Wholesale ingredients for hospitality businesses – milk for coffees, flour for bakeries, prime cuts of beef – were suddenly stuck in warehouses, factories and farms, in danger of spoiling. Meanwhile, consumers, obliged to have all their meals at home, struggled to find basic ingredients such as mince or tinned tomatoes.

I helped Defra set up a group called the Food Resilience Industry Forum, whose job was to ensure that the nation



got fed. The government suspended competition laws to allow the different players within the food sector to share information and find solutions. Every morning I sat in on the 8.15am conference call between civil servants and leaders in the food system: logistics companies, supermarket chains, farmers and food producers. You could almost hear the gears crunching as the machinery of production and distribution was forced into a new mode of operation.

In the event, the food system adapted to the pressures of lockdown with extraordinary agility. From the outside, it looked like something that happened naturally. Supply lines started running smoothly again, shelves filled up, the crisis passed. But watching from behind the scenes was first alarming, then awe-inspiring. Logistics companies offered to help wholesalers, who had been selling to restaurants, divert their goods into new markets; supermarkets helped move stock into local corner shops; hospitality businesses – even as they stared into the financial abyss – teamed up with civil servants and local councils to get hot meals to the neediest. The scale and beauty of the food system was laid out before me in those meetings, and I marvelled at it. I saw how delicately interlinked its various parts are, but also how adaptable it is. The food system can change, at speed – but only under intense pressure, and with sufficient collective will.

What the world needs now is a much more fundamental adaptation. We need once again to muster our ingenuity, to reshape the way we produce, sell and consume food, so that it stops making us and our world sick.



**The scale of this challenge can hardly be overstated.** There are so many different issues to tackle, and often the solutions appear to be at odds with each other. We must solve

the health crisis created by our modern Western diet; end the environmental damage caused by intensive agriculture; ensure that good food is affordable for everyone; repair the damage we have already done to the land; restore biodiversity; and use our land to help fight climate change. We need to improve our food security, proofing ourselves against events affecting global supply chains. But we also need to repurpose some of our least productive farmland to provide habitats for our ailing wildlife, and to help mop up carbon emissions from those industries (such as air travel and heavy industry) that will depend on fossil fuels for the foreseeable future.

To most people – including most politicians – this looks like an impossible to-do list. The sheer complexity of it is paralysing. Fear of unintentionally creating new problems, pressure from the food industry, public scepticism and a truculent media ready to punish any whiff of nanny-statism, have combined to stymie successive governments. Even as the country grows fatter and sicker, and the costs to the NHS become increasingly unmanageable, politicians are afraid to act.

The so-called ‘Government Food Strategy’ that was unveiled in June 2022, in response to my review, is not a strategy at all. It is merely a handful of disparate policy ideas, many of them chosen because they are unlikely to raise much of a media storm. That doesn’t mean those ideas are worthless. Some are more interesting and important than might appear at first sight. The government accepted my recommendation to create a Land Use Framework, for example, which is critical to balancing the multiple demands on our land. If they do it right, it will be ground-breaking. But it won’t be enough on its own. The government’s ‘strategy’ is far too scant, fragmented and cautious to meet the scale of the problem.

And yet, the system is fixable. In fact, change is inevitable. Sooner or later the cost to the nation of our current eating habits, measured both fiscally and in ruined lives, will become politically unsustainable. The only question is how much harm we are prepared to inflict on ourselves before we muster the courage to intervene. Do we really want to wait until a crisis turns into a catastrophe? The faster we move to tackle both obesity and environmental damage at their source, the faster we can begin to repair that damage.

The ideas and solutions I propose in this book are based on evidence collected from around the world. They have been subjected to minute examination and merciless number crunching. The cultural reflexes and untested assumptions that shape so many of our feelings about food have been deliberately set aside, in order to understand what really works – and what doesn't.

One of the reasons change is so hard is that our instinctive beliefs about what is healthy or sustainable are often wrong. 'Low fat' is seldom healthier than full fat, for example; and 'local' food can have a bigger carbon footprint than the imported stuff.

I want to clear away the myths and misconceptions that obscure our understanding of the food system. I will take you behind the scenes and show you the mechanisms that act together, accidentally or otherwise, to make us eat what we eat. I will explain why our modern diet has created a global crisis of diet-related disease and environmental destruction. But I will also demonstrate that these outcomes are not inevitable. We do not have to remain trapped in this food system. I will show you how we can escape.

# Trapped in the system: *a brief explainer*

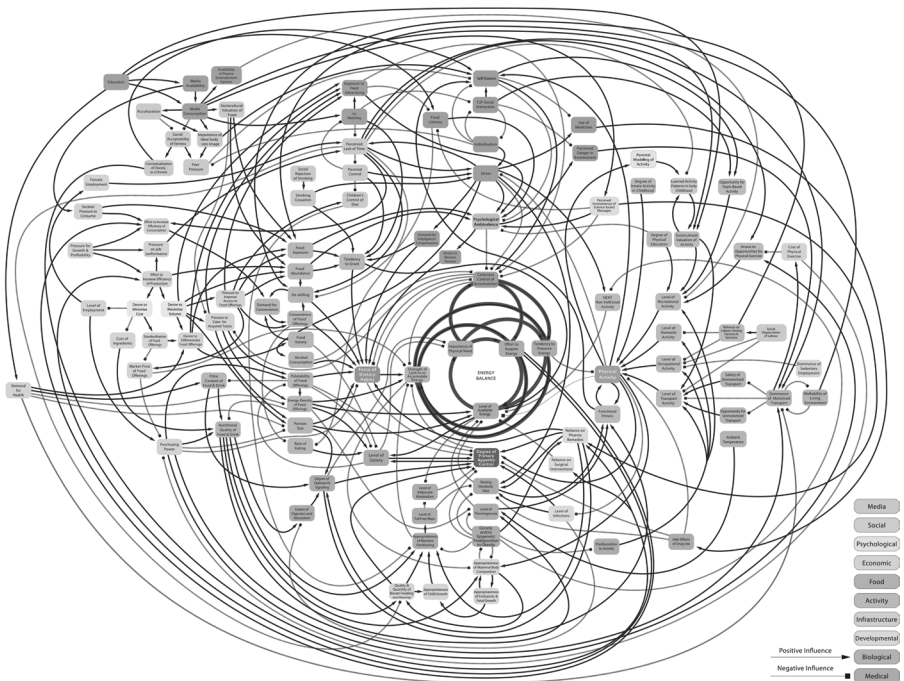
**'A bad system', said the American statistician W.E. Deming, 'will beat a good person every time.'** One reason for this is that good people often don't realise they are in a system. We experience our lives as a somewhat haphazard series of interactions with people, places, events and circumstances. It seldom feels mechanical or preordained, the way one imagines a system would. What actually is a 'system', come to that, apart from a faceless, intangible entity that can be blamed for all the ills of the world?

The simplest definition of a system is any set of things working together as a larger whole, towards some purpose or end. It might be man-made: the railway system, for example, is made up of tracks, trains, stations, train drivers and so on, all combining to get us about. Or a system can occur naturally – like photosynthesis in plants.

The food system is the sum of all of the elements that combine to produce, process, market and sell the food we eat. It contains many smaller systems within the system, and can be said to include everything from the bacteria in the soil to the layout of a supermarket aisle. The sheer

scale and ubiquity of the food system gives it a kind of invisibility: we live deep inside it, and it is hard to get enough distance to see it as a whole.

When I started working on the National Food Strategy, I was urged by many experts to take a ‘systemic approach’. But when I asked what that approach would look like I got lots of different answers. Some pointed to the (now famous in the field) Foresight Obesity System Map, which was produced in work commissioned by government in 2007 to tackle obesity. This intricate spider’s web of a chart (see below) does a great job of illustrating the



The mind-bogglingly complicated Foresight Obesity System Map, drawn up for a 2007 government report on obesity. It contains 108 variables connected by approximately 300 causal links.

multifactorial nature of obesity – just glancing at it makes the pulse race and the eyeballs swivel – but it is of limited help in devising policy. In fact, the ‘it’s complicated’ approach to changing systems can be so demoralising that it actually stops us making progress. If change is this hard, is it even worth trying?

Another chart that was often pressed on me shows how responsibility for decision-making on food policy is spread, like a thin layer of jam on toast, across government (see overleaf). There is no single department with responsibility for food, goes the argument. Instead, every department gets a shout, and so chaos ensues. I do think there is much to learn from this excellent chart. It would undoubtedly be easier to make good decisions about food policy if the chain of command wasn’t such a mess. But the food system is not unique in being regulated by multiple arms of government. An understanding of these relationships is important in policymaking, but not fundamental to understanding the system itself.

What I *have* found helpful to that end is a basic understanding of ‘system dynamics’. This is a branch of science developed in the early 1950s at the Massachusetts Institute of Technology (MIT), which uses mathematical models to understand complex system behaviour. It breaks all systems down into four component parts, each of which may be repeated many times: a ‘stock’ (which is a quantity of something); a ‘flow’ (the movement of that something from one place to another); ‘feedback loops’ (which control the flow); and the ‘purpose’ or ‘output’ of the system.

Stocks within a system don’t need to be homogeneous, or even material. It is possible to model what happens in a system when the ‘stock’ of trust in a regulator declines, for example, or when the stock of skill in a workforce increases. Feedback loops also come in many forms, including laws,



This chart, produced by Kelly Parsons from City University, London, illustrates the difficulty of making coherent food policy when responsibility is distributed between so many different departments. The Treasury, for example, decides on taxes (such as the sugary drinks levy); the Department for Digital, Culture, Media and Sport decides whether the advertising of junk food to children should be restricted; the Department for Education decides who is eligible for free school meals and is responsible for ensuring their quality; and the Department of Health and Social Care clears up the mess.

social customs, information (a speedometer prompting a driver to slow down) and biological signals (the hormone prolactin telling a mother's body to produce more milk).

There are two kinds of feedback loop: 'balancing' and 'reinforcing'. *Balancing feedback loops* (also known as *negative feedback loops*, although their effects can be positive) serve to maintain stocks at certain levels. They limit, or reverse, the direction of travel. Our appetite, for

example, responds to certain chemicals in our blood and gut which regulate how much we eat. If we eat too much, we feel full, and that stops us eating more. If we eat too little, we get hungry and go in search of more food. (Clearly, this feedback mechanism doesn't always work as well as it should, as we will see in *Chapter Four*.)

*Reinforcing feedback loops* amplify the direction of travel (they are also known as positive feedback loops, although they can have negative effects). They create both vicious circles (I eat more → I get fatter → that makes me sad → I eat more → I get fatter) and virtuous circles (more people buy free range eggs → investment increases in free range egg production → the cost of free range eggs comes down → more people buy free range eggs). These reinforcing feedback loops can create runaway systems that are very hard to stop, such as nuclear fission or melting polar ice caps.

Minuscule changes in starting conditions can, over time, lead to big differences in outcomes. Systems can appear stable, and then collapse without warning. Attempting to control them (even loosely) is extremely difficult, and many well-intentioned endeavours fail.

But that doesn't mean we shouldn't try. Systems science also shows us that different systems from very different fields tend to exhibit similar and predictable behaviours. There is a common set of identifiable patterns in which systems fail, for example. And, depending on the structure of the system, some interventions are more likely than others to lead to positive change.

In her book *Thinking in Systems*, Donella Meadows (part of the original MIT team) drew on thousands of studies to identify archetypal ways in which systems can malfunction. She called these *Systems Traps*. They can cause incredible damage, but because they are buried in a system we take for granted, we often fail to identify them as the culprit. When



things go wrong, we instinctively want to blame people or events, rather than looking for a flaw in the system.

This is one reason why political (and public) responses to structural problems are so often ineffective. 'Blaming, disciplining, firing, twisting policy levers harder, hoping for a more favourable sequence of events, tinkering at the margins – these standard responses will not fix structural problems,' wrote Meadows. 'But system traps can be escaped – by recognizing them in advance and not getting caught in them, or by altering the structure – by reformulating goals, by weakening, strengthening, or altering feedback loops, [or] by adding new feedback loops.'

Our current food system is riddled with system traps, as we shall see in the coming chapters. These are some of the worst offenders:

**Policy Resistance** This trap occurs when balancing feedback loops keep bringing the system back to the same spot, no matter how hard you try to shift it. Take traditional drug prevention policies. No matter how many wars on drugs are fought, drug dealing remains a problem. This is because, if enforcement is successful, it reduces the stock (drugs) within the system, which increases its value and incentivises drug smugglers to circumvent the system. Together, these countermoves produce a standoff, and the stock remains unchanged. Everyone makes a huge effort to achieve their own objectives, but the system is unmoved.

**The Tragedy of the Commons** This phrase was coined by the American ecologist Garrett Hardin in a 1968 article of the same name, although the problem was first identified by the nineteenth-century English economist William Forster Lloyd. It occurs when a finite resource is accessible

to everyone. Rather than preserve the resource, each actor in the system is incentivised to take as much of it for themselves as they can before it runs out.

A recent example is the collapse of the cod populations on the Newfoundland Grand Banks. When Europeans first became aware of these thriving shoals, they were 'so thicke by the shoare that we heardlie have been able to row a Boate through them' (as John Mason, governor of Newfoundland, recorded in 1620). So long as there was a technological limit on how much each fishing boat could catch, the cod provided an abundant source of food and livelihoods. But technology moved fast in the twentieth century, with the invention of bottom trawling, on-board freezing and larger boats. Fearing to be outdone by their competitors, each fishing boat became better equipped and increased its catch – until, in 1992, the cod population collapsed almost completely, signalling not just an end to the cod but to the entire ecosystem of the local coast. Despite a fishing moratorium, that has reversed the decline, the cod population in this area has still not recovered.

'Ruin is the destination toward which all men rush,' wrote Hardin in his essay, 'each pursuing his own best interest in a society that believes in the freedom of the commons.'

**Drift to low performance** Also known as the 'boiled frog syndrome',\* 'eroding goals' or 'shifting baselines', this trap occurs when a system drifts downhill slowly enough for the actors in the system to forget how much better things used to

\* Some nineteenth-century scientists suggested that if you drop a frog into boiling water it will jump out, but if you heat the water slowly it won't even notice. The frog will remain in the water and boil to death. Modern scientists refute this. In 1995, Douglas Melton, a biologist at Harvard University, said, 'If you put a frog in boiling water, it won't jump out. It will die. If you put it in cold water, it will jump before it gets hot – they don't sit still for you.'

be. Everyone is lulled into lower and lower expectations, lower effort, lower performance. The system requires a balancing feedback mechanism, a burst of energy to raise standards to where they once were. But instead, a reinforcing feedback loop is created as low expectations lead to less corrective action, which leads to continuous degradation of the system.

In the *School Food Plan*, which I co-authored in 2013 (see footnote on p.14), we argued that this is what had happened to the food served in schools, until Jamie Oliver intervened and made everyone realise how bad things had become. Standards are now increasing (albeit much too slowly) as expectations in the system have been raised.

**Escalation** This happens when the goal of a system is not absolute, but related to another variable in the system. I raise my voice to be heard over you, you yell a bit louder and soon we are both shouting at the top of our voices. There is a reinforcing feedback loop carrying the system into an arms race, a wealth race, escalating loudness, escalating violence.

We can see this in the food system. Humans have evolved to like calorie-dense food. Food companies respond to this innate desire by putting more effort into the development and marketing of calorie-dense food, which increases the consumption of that food, which in turn increases the incentive for companies to make and market it. Increasing sales increases marketing spend, which increases sales. We describe this Junk Food Cycle in greater depth in *Chapter Two*.

**Shifting the burden to the intervenor** Colloquially known as addiction or dependence. 'Addiction is finding a quick and dirty solution to the symptom of the problem,' wrote Meadows, 'which prevents or distracts one from the harder and longer-term task of solving the real problem.'

Intensive agriculture has an addiction problem. An over-reliance on fertilisers and pesticides has damaged the ecosystem and depleted the soil. This in turn results in increased reliance on fertilisers and pesticides, to make crops grow in such unfertile conditions.

**Rule-beating** Wherever there are rules, there is likely to be rule-beating. This is when people or institutions take evasive action to get around the rules of a system – abiding by the letter, but not the spirit, of the law. Rule-beating becomes a problem when it leads a system into large distortions, unnatural behaviours that would make no sense at all in the absence of the rules.

In the 1960s, for example, European countries imposed restrictions on imported grains for animal feed, in order to protect prices for their own farmers. Cassava – a good animal feed but not a grain – fell outside the restrictions. So farmers looking for cheap feed replaced corn imports from the USA with cassava imports from Asia. European farmers did not benefit. Regardless of whether you agree with the policy in the first place, it did not achieve its objective.

**Seeking the wrong goal** If the goals of a system are defined inaccurately or incompletely, the system may work obediently to produce a result that is not really intended.

We have a system of national accounting, for example, that – as the economist Sir Partha Dasgupta points out in his ground-breaking review *The Economics of Biodiversity* – bears no real relation to our national wealth or wellbeing. It counts only the capital from things we produce, and doesn't measure the indicators of 'human capital' (education or health, for example) or of

'natural capital' (the natural resources upon which all life depends). Because these stocks are not written into the system, the system does not value them.

In fact, even on its own terms our system of national accounting doesn't work. GDP (Gross Domestic Product) is not actually a record of our material wealth, but the fever chart of our consumption. It is a measure of the gross addition to stocks – the flows of stuff made and purchased in a year – rather than the stocks themselves: the houses, cars and computers that are in themselves sources of pleasure and indications of wealth.

PART ONE

# **Our Bodies**



## CHAPTER ONE

# A miracle and a disaster

*How solving the last crisis in the  
food system caused the current one*

**The food system we have today is both a miracle and a disaster.** You could say the miracle caused the disaster. The primary miracle worker was a botanist called Norman Borlaug. In a biopic of his life, Borlaug might have been played by Jimmy Stewart. Born in Iowa in 1914, he was rangy and long-faced, with a strong jaw and all-American teeth. But there has been no biopic. Outside agricultural or academic circles, Borlaug is largely unknown. And yet without the farming system he developed, more than two in three people on this planet could not be fed. Indeed, two-thirds of the people you know might not exist.



**Seventy years ago**, it was widely assumed that the world was on the brink of running out of food. The global population was rising fast – projected to increase from 2.5 billion to 9 billion over the next century, thanks to improvements in medicine and sanitation. How could all these people be fed?