# 11

# Reimagining Our Menu for Sustainable Development

Adam Rogers

## Introduction

Over the past 60 years the modern world has struggled to end poverty while finding a balance between economic development and environmental sustainability. Its efforts have included the launch of four separate 'decades of development', numerous global conferences, dozens of declarations and an ample number of agendas dating back to the early 1960s. The most recent iteration of these attempts occurred in 2015, when four additional global agendas were added to the list. While these four (The Paris Agreement, the 2030 Agenda for Sustainable Development and the SDGs, the Sendai Framework for Disaster Risk Reduction and the Addis Ababa Action Agenda on Development Finance) seem comprehensive in their approach, they fail to adequately address the underlying problem that has been literally right under our noses for the entire time: our choice of food.

A. Rogers (✉)
Strategic Communication for the SDGs, New Haven, CT, USA
e-mail: adam.rogers@undp.org


S. Flood et al. (eds.), *Creating Resilient Futures*,
https://doi.org/10.1007/978-3-030-80791-7_11

## Mammals Matter

According to an extensive study by the Union of Concerned Scientists (UCS), the production and consumption of mammal meat is the second most environmentally harmful consumer activity in the world today (Willett et al., 2019). The only other human activity that is worse for the planet is our reliance on fossil fuels and the internal combustion engine to move us and our stuff around. Thus, eating a hamburger in China that was made from a cow raised in Brazil and then transported half-way around the world has an enormously negative impact on the planet's ecosystems and should be reconsidered in any serious attempt to create a sustainable future.

For the past several millennia, human beings have enjoyed a period of relative climatic stability that has allowed us to settle, farm and create civilisations. According to the International Union of Geological Sciences (IUGS), the professional organisation in charge of defining Earth's time scale, this recent period is known as the Holocene ('entirely recent') epoch. It started about 11,700 years ago after the last major ice age (Stromberg, 2013).

Many scientists are now speculating that we are leaving the Holocene period and entering the 'Anthropocene' (from the words *anthropo* for 'man' and *cene* for 'new') – a new global environment caused by human activity (Steffen et al., 2007). The 2017 book by John W. Kress and Jeffrey K. Stine *Living in the Anthropocene: Earth in the Age of Humans* takes a vital look at this new era (Kress & Stine, 2017). The authors write that the root causes of the Anthropocene Age are the spread of agriculture, pollution and urbanisation. As we will see here, a heavy reliance on mammal meat consumption is one of the primary reasons for the unsustainable spread of agriculture. The 2020 Human Development Report (HDR) from the United Nations Development Programme (UNDP) points out that the pressures humans are collectively putting on our planetary systems – the pressures that created the Anthropocene – are manifested not just as climate change and biodiversity loss but in pollution, ocean acidification, land degradation and more (UNDP, 2020).

In October 2018, scientists from around the world warned that we need to dramatically reduce the amount of mammal meat we eat or face apocalyptic consequences. Beef consumption, in particular, needs to drop by 90 per cent, and pork consumption by about 80 per cent, if we are to restore ecological balance and increase our long-term chance of survival (Springmann, Clark, et al., 2018). The research, which was led by the University of Oxford, is the most complete to date, combining data from every country to assess the overall impact of food production on the global environment.

However, despite the urgent appeals to reduce mammal meat consumption, the trend is still moving in the opposite direction. As more countries develop, much of the world is adopting American and European standards of living with an accompanying fixation on eating mammals. In the United States, each person now eats about 260 pounds of meat per year, while the average Brit consumes about 170 pounds (The Economist, 2013).

Fuelled by rising incomes, mammal meat consumption in China grew sevenfold over the last three decades. In the early 1980s, when there were fewer than one billion Chinese, the average person ate around 30 pounds of meat per year. Today, with an additional 380 million people, it's nearly 140 pounds per person, per year. With its higher population, the country consumes twice as much mammal meat as the United States – 28 per cent of the world's total (Rossi, 2018). The three biggest exporters of beef to the Chinese market are Argentina, Brazil and Uruguay (Schuele, 2020).

Most of Africa and South Asia consumes less than 44 pounds of mammal meat a year. In all likelihood, at the current growth rates, worldwide mammal meat consumption is likely to double by 2050, according to sources at the UNFAO (2009). The planet simply cannot support the industrial production of that much meat, unless there are radical solutions discovered and implemented. One of the most effective of these solutions may involve nothing more radical than shifting our diet away from its present focus on mammals – and, if we must eat a hamburger for lunch, to choose one made from turkey rather than beef.

## Revising Our Menu for the SDGs

Both food and agriculture feature prominently in the Sustainable Development Goals, because the two are interconnected and involve almost all aspects of the economy, the environment, human health and society. SDG2, for example, focuses explicitly on food by seeking to 'end hunger, achieve food security and improved nutrition and promote sustainable agriculture.' All of the goals relate in some way to challenges in the current systems of food production and consumption (Rogers, 2019), but I will herewith focus on just seven of the most obvious: Goal 2) Zero hunger; Goal 3) Good health and wellbeing; Goal 6) Clean water and sanitation; Goal 12) Responsible consumption and production; Goal 13) Climate action; Goal 14) Life below water, and Goal 15) Life on land. Goal 17 on partnerships is included as the 'meat' of the recommendations in the Conclusion.

### Goal 2: Zero Hunger

Today, 815 million people are hungry and every third person is malnourished, clearly reflecting a food system out of balance (UNFAO, 2018a). The SDGs aim to end all forms of hunger and malnutrition by 2030, by making sure all people – especially children – have ongoing access to sufficient and nutritious food year round. The 2030 Agenda recognises that ending hunger will require 'sustainable agricultural practices'. It highlights that these efforts in turn will necessitate the support of small-scale farmers and allow equal access to land, technology and markets (UN, 2015).

A majority of the world's poor lives in rural areas, where farming – predominantly by smallholders – is the central economic activity. To meet the world's future food security and sustainability needs, food production must grow substantially while, at the same time, agriculture's environmental footprint must shrink significantly in developed and developing regions. Large increases in agricultural investment will be needed both to raise incomes and increase the supply of food sustainably (Brooks, 2016).

Achieving the goal of ending hunger will require a complete redesign of how our food systems work. For example, tremendous progress can be made by halting agricultural expansion, closing 'yield gaps' on

under-performing lands, increasing crop efficiency, shifting diets away from red meat like beef and pork, and reducing waste (Kovacs et al., 2015). Together, these strategies could double food production while greatly reducing the harmful environmental impacts of intensive agriculture that result from the livestock industry. Whatever approach we take, we need to produce enough healthy food and we need to do it sustainably, so that production remains secure well into the future.

## Goal 3: Good Health and Wellbeing

Any discussion to achieve good health and wellbeing would fall far short of its mark without looking at how the meat industry is both creating unhealthy environments that are making us sick and polluting our bodies with carcinogens.

While good health as a Sustainabe Development Goal is primarily concerned with reducing infant mortality and providing proper healthcare where and when needed, it also addresses the need to keep all people healthy up to and through adulthood. SDG3 recognises that noncommunicable diseases are the biggest cause of premature death in the world today. Obesity and malnutrition are major culprits behind this epidemic of poor health, so switching to healthier diets at any age can turn things around, giving people longer, more enjoyable lives.

Empirical studies demonstrate that reducing or eliminating mammals from our diet can add years to our lives, while also improving the way we feel throughout those years. Researchers at Oxford University estimate that by 2020, 2.4 million deaths annually will be attributable to the consumption of mammals – as well as a $285 billion healthcare bill for those who cling to life in a hospital bed (Springman, 2018). The World Health Organization (WHO) links these deaths to diabetes, heart problems and cancer – all a result of eating beef, lamb and/or pork on a regular basis (Frank et al., 2020).

A report from the Harvard School of Public Health also determined that regularly consuming mammal meat could lead to an untimely or early death (Harvard Medical School, 2012). Their data was taken from a study that followed more than 72,000 women for 18 years. They

discovered that those who ate a Western-style diet high in red and processed meats had an increased risk of heart disease, cancer and death. Another study by the same researchers followed 121,000 men and women for 24 years. All the participants submitted information about their diets every four years. Over the course of this study, almost 24,000 of the participants died. Death rates among those who ate the most mammal meat were higher than for those who ate the least. It found that people who ate one additional 3 ounce serving of red meat daily faced a 13 per cent higher risk of premature death. If that serving was processed meat (such as bacon or hot dogs), the risk went to 20 per cent (Skerrett, 2012).

As is well established, good health and wellbeing can be achieved by eliminating or reducing our consumption of beef, pork, mutton, veal and other mammals. It is not just eating mammal meat that is unhealthy – the industrial production of it is polluting our water, our air and our bodies. The first step in promoting a healthier lifestyle is to pay attention to what we choose to eat and how government policies are subsidising and encouraging certain industries.

## Goal 6: Clean Water and Sanitation

The sixth of the 17 SDGs seeks to ensure that everyone, everywhere has clean water to drink. Furthermore, access to safe water resources is recognised as a human right by the UN, calling on all countries to provide safe, clean, accessible and affordable drinking water and sanitation for all (UN, 2010).

Despite it being a human right, water scarcity affects more than 40 per cent of people in the world – an alarming figure that is projected to increase with the rise of global temperatures from climate change (Joint SDG Fund, 2021). When people can get water, it sometimes contains contaminants that can lead to adverse health effects, including gastrointestinal illness, reproductive problems and neurological disorders (USCDC, 2014).

Where are these contaminants coming from? We know that about 70 per cent of freshwater is used for agriculture – and most of it is used to grow crops that are then fed to livestock. A January 2012 report in

*National Geographic* pointed out that irrigating the land for cattle feed uses almost three times as much water as for all the other foods combined. On the other hand, dairy cows require much less water and their products (primarily milk and cheese) contribute the most calories to diets, but do not involve killing the cow (Scientific American, 2009).

The nitrogen and phosphorus runoff from the chemical fertilisers used for intensive agriculture needed to feed livestock is polluting freshwater aquifers around the world. In the United States alone, nitrates now contaminate the public water supplies of nearly 1700 communities at levels the National Cancer Institute says could increase the risk of cancer (Schechinger, 2018).

Removing nitrates from tap water is expensive. The city of Des Moines, Iowa, had to spend $3.7 million to build a water treatment facility for precisely this reason (City of Des Moines Water Works, 2015). In October of 2017, Hiawatha, Kansas, built a plant for $3.5 million to deal with nitrate levels that were so high that residents were warned not to drink the tap water (May, 2017). In 2005, the City of Chino, California, spent $4.6 million on an ion exchange system to deal with its dangerously high nitrate levels (Jensen et al., 2012).

This phenomenon creates costs to society that inevitably must be paid somewhere, by somebody. Either households purchase bottled water, the costs get transferred to the healthcare sector when people fall sick, or local governments respond with higher taxes to clean up the mess. In developing countries that are now starting to raise enormous herds of cattle for export, the risks are even more perilous, as local governments cannot afford to deal with the resulting problems.

## Goal 12: Responsible Consumption and Production

By now, the picture is pretty clear to most people that the way the richer countries of the world are producing and consuming their daily meals is neither responsible nor practical. How we humans choose to feed ourselves should in theory nurture human health and support environmental sustainability. Doing so ensures a balance with the planet's carrying capacity, defined as the maximum number of individuals of a population

that the environment can actually support. Professor Will Steffen, Councillor of Australia's Climate Council, has said we may already be pushing the boundaries of this capacity and that the time is now to 'act with urgency' (Alcock, 2017).

Acting with urgency to achieve sustained and sustainable economic growth in line with the SDGs will necessitate a serious reduction of our ecological footprint by changing the way we produce and consume both goods and resources. We also need to look at the incredible waste that is a by-product of the current scenario for these activities. One-third of all food produced is never even eaten by people – despite the fact that 815 million people go to bed hungry every night and every third person is malnourished (UNFAO, 2019). The impact of such loss and waste worldwide is tremendous. Food loss and waste is responsible annually for $940 billion in economic losses and nearly 10 per cent of greenhouse gas emissions (UNFAO, 2016).

Goal 12 calls for a global standard for food waste at the retail and consumer levels and a reduction in food losses along the production and supply chains (including post-harvest losses) by 2030. It puts the onus on 'every country, every major city, and every company involved in food supply chains' to set food loss and waste reduction targets that will ensure sufficient attention and a positive focus.

## Goal 13: Climate Action

It is hard not to turn on the news these days without hearing about the changing climate. The last time atmospheric $CO_2$ amounts were this high was more than three million years ago when sea levels were 15–25 metres (50–80 feet) higher than today (Lindsey, 2020). Eighty feet of difference in sea level would wipe out most of today's coastal cities, turning places like Manhattan into Atlantis. SDG13 seeks to address this challenge by calling on all countries to take urgent action to both halt the causes and to work together to adapt to the inevitable changes that have already started (UNDESA, 2021).

The United Nations Development Programme UNDP points out that the annual average economic losses from climate-related disasters are in

the hundreds of billions of dollars. This is not to mention the human impact of geo-physical disasters which are 91 per cent climate-related and between 1998 and 2017 killed 1.3 million people and left 4.4 billion injured (UNDP, 2021a).

While increased levels of carbon can occur naturally over several millennia, and are probably partly responsible for natural cycles of glaciation, this time around it is clear that the buildup is artificial and occurring much more rapidly than ever before. Human emissions and activities have caused most, if not all, of the warming observed since 1950, according to the Intergovernmental Panel on Climate Change's (IPCC) fifth assessment report (IPCC, 2014).

While energy generation, transport and construction are identified as the usual targets when governments seek to reduce emissions, the impact from food production has been somewhat overlooked. However, based on the current trend, with intensive agriculture increasingly geared toward livestock production, food production is now also a major factor to be considered. The Intergovernmental Panel on Climate Change IPCC, an intergovernmental body of the United Nations that is dedicated to providing the world with objective, scientific information relevant to understanding the scientific basis of the risk of human-induced climate change, has said the current geographic spread of the use of land and the loss of biodiversity are unprecedented in human history. The IPCC recently reported that inefficient land use contributes about one-quarter of global greenhouse gas emissions, notably $CO_2$ emissions from deforestation, CH4 emissions from rice and ruminant livestock and $N_2O$ emissions from chemical fertilisers (IPCC, 2019).

Throughout much of the world, forests have been cleared to make way for livestock. The inefficient farming of cattle feed, together with methane emissions from cows and fertiliser use, creates as much greenhouse gas emissions as all the world's cars, trucks and airplanes combined (Milman, 2018). Producing a kilogram of beef (2 pounds) generates around 26 kilograms (57pounds) of carbon dioxide, the highest of all the 197 foods examined using the U.S. Department of Agriculture's (USDA) food availability data set and a literature meta-analysis of emission factors for various food types (Heller & Keoleian, 2014).

Eating a kilogram of beef is responsible for more greenhouse gas emissions and pollution than driving around for three hours while leaving all the lights on back home, according to Akifumi Ogino of the National Institute of Livestock and Grassland Science in Tsukuba, Japan. Ogino and his team looked at calf production and focused on animal management and the effects of producing and transporting feed (Fenelli, 2007).

Comprehensive research led by scientists at the Oxford Martin School found that shifting to a mostly vegetarian diet or even cutting down on meat consumption to within accepted health guidelines would reduce greenhouse gases significantly (Harvey, 2016). A 2013 report from the FAO revealed that 14.5 per cent of all human-induced emissions come from eating mammals. The report *Tackling Climate Change Through Livestock* says beef and cattle milk production account for most emissions, contributing 41 per cent and 19 per cent of the sector's emissions respectively. Pig meat production is second, contributing 9 per cent to the sector's emissions (Gerber et al., 2013).

According to the FAO study, the main sources of emissions are: feed production and processing (45 per cent of the total – with 9 per cent attributable to the expansion of pasture and feed crops into forests); fermentation from ruminants (39 per cent), and manure decomposition (10 per cent). The remainder of the carbon emissions from meat production is attributable to the processing and transportation of meat itself.

The report further states that the livestock sector can indeed make an important contribution to international efforts to curb climate change by voluntarily offsetting some of the sector's emission increases, since the worldwide demand for livestock products is expected to grow by 70 per cent by 2050 (Ibid.).

## Goal 14: Life Below Water

Oceans are our friends. More than 3 billion people depend on marine and coastal biodiversity for their livelihoods, so it is no surprise it is of great concern that at least 30 per cent of the world's fish stocks are overexploited, reaching below the level at which they can produce sustainable yields. Oceans also have a calibrating effect on climate change, as they absorb about 30 per cent of the carbon dioxide produced by humans. The

bad news is we are seeing a 26 per cent rise in ocean acidification since the beginning of the industrial revolution. Through SDG14, governments worldwide have committed to taking urgent action to prevent and significantly reduce marine pollution from all sources and to sustainably manage and protect marine and coastal ecosystems (UNDP, 2021b).

It is becoming more and more difficult to grow enough crops in the now increasingly depleted soils to feed all the cows, pigs, sheep and other livestock being raised for the meat market. Farmers are thus turning to nitrogen-rich fertilisers to grow their crops. The chemicals in these fertilisers are percolating down into our freshwater aquifers and running downstream into our oceans. The result is that algae blooms are sucking all the oxygen from the water, killing all marine life. And these 'dead zones' are expanding like a giant plague: the U.S. National Oceanic and Atmospheric Administration (NOAA) announced in June 2019 that the hypoxic (or dead) zone in the Gulf of Mexico that runs along the United States coastline was 7829 square miles – about the size of the state of New Hampshire or Massachusetts. The largest ever recorded was two years earlier, in 2017, at 8776 square miles (NOAA, 2019).

More than 3 billion people depend on marine and coastal biodiversity for their livelihoods. According to the UNFAO, fish and fish products account for 17 per cent of all animal protein consumed in the world, and 26 per cent of that 17 per cent is consumed in the poorest and least developed countries. The ocean also provides an important source of income for 60 million people who work in fisheries and aquaculture. However, nearly 90 per cent of the world's marine fish stocks are now fully exploited, overexploited and/or depleted (Thompson & Kituyi, 2018). One-third of the world's fish catch is also fed directly to livestock to be inefficiently converted into beef, thereby wasting significant amounts of this precious resource. If we are not careful, this overexploitation of 'life below water' could push the regenerative capacity of the oceans past the point of no return.

SDG14 calls on all countries to prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities. One significant way to do this is by reducing or avoiding mammal meat. In doing so, we can directly contribute to the solutions necessary to restore the health of our oceans, restoring life below water to its balance within the ecosystem.

## Goal 15: Life on Land

SDG 15 looks at our relationship with the land and how well we manage it for the benefit of future generations. We all know our lives depend on the health of the Earth for our sustenance and our livelihoods. The UN estimates that at least 1.6 billion people depend on forests for their livelihood and that 75 per cent of the world's poor are affected directly by land degradation (UN, 2021). The Center for International Forestry Research (CIFOR) reports that plant life provides 80 per cent of our human diet, which is why we rely on agriculture as an important economic resource. Forests account for 30 per cent of the Earth's surface and provide vital habitats for millions of species (CIFOR, 2016). Forests also are important sources of clean air and water, and are crucial for combating climate change through photosynthesis – the process through which plants convert CO2 from the air into biomass.

The quality of our land is deteriorating so rapidly that our ecosystems may soon be unable to sustain life as we know it today. The annual destruction of primary tropical rainforest – the wildest and most diverse swathes – has increased as much as 25 per cent since the 1990s. We are losing upwards of 80,000 acres of tropical rainforest daily and significantly degrading an additional 80,000 acres every day. As the trees disappear, so do some 135 plant, animal and insect species – some 50,000 species each year. Cattle ranching is one of the primary reasons for the clearing of these forests – both for the cattle themselves and to grow the crops to feed them (Thompson & Kituyi, 2018).

Just four commodities – beef, soy, palm oil and wood products – drive most tropical deforestation. Of these four, beef has by far the largest impact. Converting forest to pasture for beef cattle, largely happening in Latin America, is destroying millions of hectares of tropical forest each year – in 2018 alone the world lost 3.6 million hectares of primary rainforest, an area the size of Belgium (Weisse & Goldman, 2019).

The drive behind the incessant clearing of rainforests is both to do with a growing demand for beef and because much of the grazing land is rendered useless after a few years. The land suffers substantial losses of soil fertility and soil erosion because soil nutrients are rapidly depleted after clearing and grasses are soon replaced by less useless vegetation, causing

farmers to clear yet more rainforest to feed and pasture their cattle (Haan & Blackburn, 1997).

Data from the Brazilian Beef Exporters Association show that beef exports from that country increased 20 per cent in 2017 to 132,000 metric tons and then an additional 11 per cent in 2018 to 178,000 metric tons (Williams, 2019). How many Brazilian cows are required to produce 178,000t of beef? A steer produces a 750lb carcass after the fat and muscle are trimmed away. Remove the bones, and you get around 490 pounds of boneless trimmed beef (San Diego State University, 2020). Using these figures, the 178,000 metric tons of beef exports in 2018 translates into 392,422,827 lbs of meat. Divide that figure by 490, and we get around 800,862 cows that are slaughtered each year in Brazil alone. Consider the amount of land it takes to produce all those cows each year, and you will start to understand what is happening to the rainforest.

Goal 15 challenges the world to protect, restore and sustainably use terrestrial ecosystems, manage our forests, and halt and reverse land degradation and biodiversity loss. Eighty per cent of endangered mammals are now threatened by habitat loss due to ever expanding agriculture that feeds the few mammals that we eat. We simply must bring food production back within the limits of planetary boundaries. Reducing our consumption of mammal meat and eating a locally-based diet that is sustainably sourced is – in a nutshell – the single biggest action we can take to protect life on land. And remember:life on land includes us.

Scientists have long warned that unfamiliar pathogens will emerge more frequently from interactions among humans, livestock and wildlife, interactions that have steadily increased in scale and intensity, ultimately squeezing local ecosystems so hard that deadly viruses emerge (Berger, 2020). The novel coronavirus may be the latest to do so, and unless we relax our grip on nature, it will not be the last.

## Conclusions and Recommendations

In order to ensure that humankind charts a way forward that is sustainable and equitable, we must realise that we are all in this together. Personal choices have repercussions that ripple out far beyond one's personal space,

either hurting or healing the world at large. It's all about partnership and community – looking after one another. The partnerships to support the realisation of these 17 SDGs (and most other internationally-agreed commitments for global wellbeing) must, of course, happen at the global level of nation states, but are also required of subnational levels of government like states and provinces, and of cities, communities, clubs and associations, and individuals like you and me. If we all do our part to ensure a sustainable future for our children, we will together turn things around and restore our balance with the Earth – but only if we rethink our menu and look beyond mammals for our meals. The choice is easy, and the choice is ours to make.

The 2020 Human Development Report (HDR) points out that 2020 was devastating for both planet and people: record-breaking Atlantic hurricanes, enormous wildfires in Australia, the USA, Siberia and Brazil, and a pandemic in which millions have died and many millions more have lost their chance to work, study or see their loved ones. It states that all of these catastrophic events are, for the most part, consequences of past choices. To ensure a better future, according to the report, we need to start making different choices, at the individual and policy levels. (UNDP, 2020).

A January 2019 study by the EAT-Lancet Commission on Food, Planet and Health, a collaboration between the EAT Foundation, *The Lancet*, Wellcome Trust, and the Stockholm Resilience Centre, outlined the ideal healthy diet – one that is best for the health of the individual and the planet. Thirty-seven scientists from sixteen countries (all international experts in health, nutrition and sustainability) argued that 'getting it right with food will be an important way for countries to achieve the targets of the UN Sustainable Development Goals and the Paris Agreement regarding climate change' (Willett et al., 2019).

Our individual consumer choices may not be enough to avert what *The Lancet* report calls 'catastrophic damage to the planet'. Governments also will need to encourage healthy food choices and ensure access to nutritious food. Policies and government subsidies will need to be redirected away from harmful agricultural practices and toward ones that are healthier for our bodies and our environment, and indeed our planet.

It is clear that the societal costs of mammal meat consumption are far greater than the price paid by the consumer. There is now increased

discussion by policymakers in many countries (Germany, Denmark and Sweden, for example) (Kateman, 2019) to regulate red and processed meat consumption, similar to the regulations for other carcinogens and foods with public health concerns. One approach is to regulate the industry or to outlaw certain foods – as New York City has tried to do by banning sugar-sweetened drinks in cups larger than 16 ounces (0.5 litres) (Ibid.). A more market-based approach would involve taxing red and processed meats according to their health impacts. This latter approach looks at the cost of eating meat on the global economy and how much tax consumers should pay to offset the health and environmental consequences of their diets.

Looking into the most optimal taxation levels for red and processed meats in nearly 150 countries and regions, health experts at Oxford university concluded in its 2018 study that introducing a tax on meat would produce widespread health and environmental benefits. In high-income countries, the price for beef, lamb, and pork would need to be increased by more than 20 per cent, while processed meats like sausages and hot dogs would need to more than double in price to cover their true cost to society. These researchers concluded that introducing such a health tax on these products would offset healthcare costs and likely prevent more than 220,000 deaths a year globally (Springmann, Mason-D'Croz, et al., 2018).

Some argue that if the true cost of meat production were reflected in the price of the meat itself, then only elites would be able to eat meat. If so, so be it. There are many things that are so expensive that only the rich can afford them. Just because private jets can be afforded by the super wealthy doesn't mean they should be subsidised for everyone else. Let the rich eat their expensive beef that reflects the product's true cost, while the rest of us eat more healthy alternatives.

## A Transformative Change Is Needed

Achieving the vision outlined in this book will obviously require a dramatic and transformative shift within our society and the economy at large. In the United States, the mammal meat industry is responsible for 5.4 million jobs and $257 billion in wages. An estimated 527,019 people

have jobs in production and packing, import operations, sales, packaging and the direct distribution of mammal meat products. One report claims the meat industry accounts for $1.02 trillion in total economic output or, in other words, 5.6 per cent of gross domestic product (GDP) in the United States alone (NAMI, 2018).

Livestock also plays a crucial economic role for an estimated 60 per cent of rural households in developing countries – including small-holder farmers, agro-pastoralists and pastoralists. It contributes to the livelihoods of about 1.7 billion poor people. According to the UNFAO, at least 70 per cent of those employed in the sector are women (UNFAO, 2018b). Livestock, including dairy and other animal products, creates cash and in-kind incomes, and enables savings for future needs. As a result, it should be clearly recognized here that this sector – while causing harm to our health, society and the environment – also plays a major role in reducing poverty.

If everyone were to stop eating mammal meat immediately after reading this chapter, it would probably push a lot of people into poverty. However, as with all disruptive technologies, shifts in the market require economic adaptation. The suppliers and supply-chain management infrastructure would resist like they always do – but eventually, they would-have to adapt, people would need to be retrained and new jobs would have to be created. What is needed is a more sustainable alternative which can offer new technologies and thus new jobs, and an accompanying shift away from relying on the exploitation of our fellow mammals to fuel the economy.

Looking ahead, I do believe the path to inclusive prosperity will include a dramatic reduction in the production and consumption of our fellow mammals. Overcoming the complex challenges that the world is now confronting will require a political willingness to embrace the principles of sustainability and transformative action to tackle the root causes of poverty and hunger successfully. It will also require an individual willingness to be a part of the solution, and to s understand that what we choose to grow, kill and eat makes a much bigger difference than many of us realise.

## References

Alcock, K. (2017). We Have No Time Left – Professor Will Steffen on Climate Change Action and Policy. *Sustainable Business Council*. Available at: https://www.sbc.org.nz/insights/2017/we-have-no-time-left. Accessed 9 May 2021.

Berger, K. (2020). The Man Who Saw the Pandemic Coming. *Nautilus*. Available at: https://nautil.us/issue/83/Intelligence/the-man-who-saw-the-pandemic-coming. Accessed 9 May 2021.

Brooks, J. (2016). Food Security and the Sustainable Development Goals. *OECD Insights Blog*. Available at: http://wp.me/p2v6oD-2rM. Accessed 9 May 2021.

CIFR (Center for International Forestry Research). (2016). How Forestry Contributes to SDGs. Available at: https://www2.cifor.org/thinkforests/facts-figures/. Accessed 9 May 2021.

City of Des Moines Water Works. (2015). Nitrate Removal Facility Fact Sheet. Available at: http://www.dmww.com/upl/documents/water-quality/lab-reports/fact-sheets/nitrate-removal-facility.pdf. Accessed 9 May 2021.

Fenelli, D. (2007, July 18). Meat Is Murder on the Environment. *New Scientist*. Available at: https://www.newscientist.com/article/mg19526134-500-meat-is-murder-on-the-environment/. Accessed 9 May 2021.

Frank, Q., Matthew, R., Judith, W. R., & Frank, H. (2020). Red and Processed Meats and Health Risks: How Strong Is the Evidence? *Diabetes Care*. https://doi.org/10.2337/dci19-0063

Gerber, P. J., Steinfeld, H., Henderson, B., Mottet, A., Opio, C., & Dijkman, J. (2013). *Tackling Climate Change Through Livestock – A Global Assessment of Emissions and Mitigation Opportunities*. Food and Agriculture Organization of the United Nations (FAO).

Haan, C., & Blackburn, H. (1997). Livestock-Environment Interactions: Issues and Options. *United Nations Food and Agriculture Organization*. Available at: http://www.fao.org/ag/againfo/resources/documents/Lxehtml/. Accessed 9 May 2021.

Harvard Medical School. (2012). What's the Beef with Meat? *Harvard Health Publishing*. Available at: https://www.health.harvard.edu/healthy-eating/whats-the-beef-with-meat. Accessed 9 May 2021.

Harvey, F. (2016). Eat Less Meat to Avoid Dangerous Global Warming, Scientists Say. *The Guardian*. Available at: https://www.theguardian.com/environment/2016/mar/21/eat-less-meat-vegetarianism-dangerous-global-warming. Accessed 21 Mar 2021.

Heller, M. C., & Keoleian, G. A. (2014). Greenhouse Gas Emission Estimates of U.S. Dietary Choices and Food Loss. *Journal of Industrial Ecology: Supporting Information*. https://doi.org/10.1111/jiec.12174

IPCC (Intergovernmental Panel on Climate Change). (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R. K. Pachauri, & L. A. Meyer (eds.)]. Available at: https://www.ipcc.ch/report/ar5/syr/. Accessed 9 May 2021.

IPCC (Intergovernmental Panel on Climate Change). (2019). P. R. Shukla, J. Skea, R. Slade, R. van Diemen, E. Haughey, J. Malley, M. Pathak, & J. Portugal Pereira (eds.) Technical Summary, 2019. In: *Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems.* Available at: https://www.ipcc.ch/srccl/. Accessed 9 May 2021.

Jensen, V. B., et al. (2012). *Technical Report 6: Drinking Water Treatment for Nitrate*. Center for Watershed Sciences, University of California. Available at: http://groundwaternitrate.ucdavis.edu/files/139107.pdf. Accessed 8 May 2021.

Joint SDG Fund. (2021). Ensure Access to Water and Sanitation for All. Available at: https://jointsdgfund.org/sustainable-development-goals/goal-6-clean-water-and-sanitation. Accessed 9 May 2021.

Kateman, B. (2019). Is a Meat Tax a Good Idea? *Forbes.* Available at: https://www.forbes.com/sites/briankateman/2019/08/27/is-a-meat-tax-a-good-idea/?sh=3b7998692d3a. Accessed 9 May 2021.

Kovacs, B., et al. (2015). Sustainable Agriculture, Forestry and Fisheries in the Bioeconomy – A Challenge for Europe. Available at: http://ec.europa.eu/research/scar/pdf/feg4-draft-15_may_2015.pdf. Accessed 10 Mar 2021.

Kress, W. J., & Stine, J. K. (2017). *Living in the Anthropocene: Earth in the Age of Humans* (p. 198). Smithsonian Books.

Lindsey, R. (2020). Climate Change: Atmospheric Carbon Dioxide. *The US National Oceanic and Atmospheric Administration*. Available at: https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide. Accessed 10 Mar 2021.

May, J. (2017). City of Hiawatha Issues High Nitrate Warning. *Hiawatha World*. Available at: https://www.hiawathaworldonline.com/news/city-of-hiawatha-issues-high-nitrate-warning/article_71208a3a-b98e-54a4-bc20-1c4b9bdd7a10.html. Accessed 10 Mar 2021.

Milman, O. (2018). Why Eating Less Meat Is the Best Thing You Can Do for the Planet in 2019. *The Guardian*. Available at: https://www.theguardian.com/environment/2018/dec/21/lifestyle-change-eat-less-meat-climate-change?CMP=fb_gu. Accessed 9 May 2021.

NAMI (The North American Meat Institute). (2018). The United States Meat Industry at a Glance. Available at: https://www.meatinstitute.org/index.php?ht=d/sp/i/47465/pid/47465. Accessed 9 May 2021.

NOAA (National Oceanic and Atmospheric Administration). (2019). Press Release: NOAA Forecasts Very Large 'Dead Zone' for Gulf of Mexico. Available at: https://www.noaa.gov/media-release/noaa-forecasts-very-large-dead-zone-for-gulf-of-mexico. Accessed 10 Mar 2021.

Rogers, A. (2019). *No Mammal Manifesto, Diet for a New and More Sustainable World*. Phoenix Press.

Rossi, M. (2018). The Chinese Are Eating More Meat than Ever Before and the Planet Can't Keep Up. *Mother Jones*. Available at: https://www.motherjones.com/environment/2018/07/the-chinese-are-eating-more-meat-than-ever-before-and-the-planet-cant-keep-up/. Accessed 11 Mar 2021.

San Diego State University. (2020). How Much Meat Can You Expect from a Fed Steer? Available at: https://extension.sdstate.edu/how-much-meat-can-you-expect-fed-steer. Accessed 6 Aug 2020.

Schechinger, A. W. (2018). America's Nitrate Habit Is Costly and Dangerous. Available at: https://www.ewg.org/research/nitratecost/. Accessed 9 May 2021.

Schuele, J. (2020). This Week in Agribusiness. *Beef Magazine*. Available at: https://www.beefmagazine.com/exports/china-s-beef-imports-continue-soar-obstacles-us-beef-increase. Accessed 9 May 2021.

Scientific American. (2009). Measuring the Daily Destruction of the World's Rainforests. Available at: https://www.scientificamerican.com/article/earth-talks-daily-destruction/. Accessed 10 May 2021.

Skerrett, P. J. (2012). Study Urges Moderation in Red Meat Intake. *Harvard Health Publishing*. Available at: https://www.health.harvard.edu/blog/study-urges-moderation-in-red-meat-intake-201203134490. Accessed 9 May 2021.

Springman, M. (2018). Tax on Meat Could Offset Health Costs. *University of Oxford News and Events*. Available at: https://www.ox.ac.uk/news/2018-11-06-tax-meat-could-offset-health-costs#. Accessed 10 May 2021.

Springmann, M., Clark, M., Mason-D'Croz, D., Wiebe, K., Bodirsky, B. L., Lassaletta, L., … (2018). Options for Keeping the Food System Within

Environmental Limits. *Nature.* Available at: https://www.nature.com/articles/s41586-018-0594-0. Accessed 11 Mar 2021.

Springmann, M., Mason-D'Croz, D., Robinson, S., Wiebe, K., Godfray, H. C. J., Rayner, M., et al. (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. https://doi.org/10.1371/journal.pone.0204139

Steffen, W., Crutzen, P. J., & McNeill, J. R. (2007). The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature. *AMBIO: A Journal of the Human Environment, 36*(8): 614–621. Available at: https://www.researchgate.net/profile/John_Mcneill4/publication/5610815_The_Anthropocene_Are_Humans_Now_Overwhelming_the_Great_Forces_of_Nature/links/0fcfd511e373d55e47000000/The-Anthropocene-Are-Humans-Now-Overwhelming-the-Great-Forces-of-Nature.pdf. Accessed 10 Mar 2021.

Stromberg, J. (2013). What Is the Anthropocene and Are We in It? *Smithsonian Magazine*. Available at: https://www.smithsonianmag.com/science-nature/what-is-the-anthropocene-and-are-we-in-it-164801414/. Accessed 9 May 2021.

The Economist. (2013). Meat and Greens: How Bad for the Planet Is Eating Meat? *The Economist*. Available at: https://www.economist.com/feast-and-famine/2013/12/31/meat-and-greens. Accessed 9 Mar 2021.

Thompson, P., & Kituyi, M. (2018). 90 Percent of Fish Stocks Are Used Up – Fisheries Subsidies Must Stop. *World Economic Forum*. Available at: https://www.weforum.org/agenda/2018/07/fish-stocks-are-used-up-fisheries-subsidies-must-stop/. Accessed 10 May 2021.

UN General Assembly. (2010). The Human Right to Water and Sanitation: Resolution/Adopted by the General Assembly, 3 August 2010, A/RES/64/292. Available at: https://www.refworld.org/docid/4cc926b02.html. Accessed 18 Feb 2021.

UN General Assembly. (2015). Transforming Our World: The 2030 Agenda for Sustainable Development, 21 October 2015, A/RES/70/1. Available at: https://www.refworld.org/docid/57b6e3e44.html. Accessed 10 May 2021.

UNDESA (United Nations Department of Economic and Social Affairs). (2021). Take Urgent Action to Combat Climate Change and Its Impacts. Available at: https://sdgs.un.org/goals/goal13. Accessed 10 May 2021.

UNDP (United Nations Development Programme). (2020). The Next Frontier – Human Development and the Anthropocene. Available at: http://hdr.undp.org/en/2020-report. Accessed 9 May 2021.

UNDP (United Nations Development Programme). (2021a). Goal 13: Climate Action. Available at: https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-13-climate-action.html. Accessed 10 Mar 2021.

UNDP (United Nations Development Programme). (2021b). Goal 14: Life Below Water. Available at: https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-14-life-below-water.html. Accessed 10 Mar 2021.

UNFAO (United Nations Food and Agriculture Organization). (2009). 2050: A Third More Mouths to Feed. Available at: http://www.fao.org/news/story/en/item/35571/icode/. Accessed 9 May 2021.

UNFAO (United Nations Food and Agriculture Organization). (2016). Sustainable Development Goals Target 12.3 on Food Loss and Waste: 2016 Progress Report. Available at: http://www.fao.org/save-food/news-and-multimedia/news/news-details/en/c/436985/. Accessed 9 May 2021.

UNFAO (United Nations Food and Agriculture Organization). (2018a). Transforming Food and Agriculture for the SDGs: 20 Interconnected Actions to Guide Decision-Makers. Available at: http://www.fao.org/3/I9900EN/i9900en.pdf. Accessed 10 May 2021.

UNFAO (United Nations Food and Agriculture Organization). (2018b). Decent Rural Employment. Available at: http://www.fao.org/rural-employment/agricultural-sub-sectors/livestock/en/. Accessed 10 Mar 2021.

UNFAO (United Nations Food and Agriculture Organization). (2019). *The State of Food and Agriculture 2019. Moving Forward on Food Loss and Waste Reduction*.

United Nations. (2021). Sustainably Manage Forests, Combat Desertification, Halt and Reverse Land Degradation, Halt Biodiversity Loss. Available at: https://www.un.org/sustainabledevelopment/biodiversity/. Accessed 9 May 2021.

USCDC (United States Center for Disease Control and Prevention). (2014). Water-Related Diseases and Contaminants in Public Water Systems. Available at: https://www.cdc.gov/healthywater/drinking/public/water_diseases.html. Accessed 10 Mar 2021.

Weisse, M., & Goldman, E. D. (2019). The World Lost a Belgium-Sized Area of Primary Rainforests Last Year. *World Resources Institute*. Available at: https://www.wri.org/blog/2019/04/world-lost-belgium-sized-area-primary-rainforests-last-year. Accessed 9 May 2021.

Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., Garnett, T., Tilman, D., DeClerck, F., Wood, A., & Jonell, M. (2019). Food in the Anthropocene: The EAT–Lancet Commission on Healthy Diets from Sustainable Food Systems. *The Lancet, 393*(10170), 447–492. Available at: https://eatforum.org/eat-lancet-commission/. Accessed 16 Mar 2021.

Williams, A. (2019). Brazil Closes 2018 with Largest-Ever Beef Volume Exports. *Global Meat News*. Available at: https://www.globalmeatnews.com/Article/2019/01/22/Largest-ever-beef-exports-by-volume-for-Brazil. Accessed 16 Mar 2021.