



# EATING FOR NET ZERO

HOW DIET SHIFT CAN ENABLE A NATURE  
POSITIVE NET-ZERO TRANSITION IN THE UK

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WWF is an independent conservation organisation, with over 30 million followers and a global network active in nearly 100 countries. Our mission is to stop the degradation of the planet's natural environment and to build a future in which people live in harmony with nature, by conserving the World's biological diversity, ensuring that the use of renewable natural resources is sustainable and promoting the reduction of pollution and wasteful consumption.

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# FOREWORD

We are faced with an urgent challenge: how to ensure food and nutrition security for a growing population while averting dangerous climate change and restoring the natural world on which all of this depends. What we buy, cook and eat every day, and how that food is produced, are key to addressing this ‘triple challenge’.



Tanya Steele  
CEO, WWF-UK



The UK is one of the most nature-depleted countries in the world. Our current food system is driving nature loss, polluting waterways and depleting soils at home and overseas. Paradoxically, in our efforts to feed ourselves we are destroying the very systems that food production depends on – a stable climate, rich soils, clean rivers and intact terrestrial and marine ecosystems.

The health of the planet is intimately connected with our own. Alongside the climate and nature crises, we are experiencing a public health crisis here in the UK – rising levels of obesity, food insecurity and poor diets that lack key nutrients. All of this comes at an economic cost as well as a cost for people and planet. The NHS spends £6 billion on diet-related illness each year – money that could be used to provide better quality diets.

We will not solve this challenge simply by producing more food. We need to transform our food systems – from farm to fork. We must move to a new food paradigm; away from a focus on producing as much food as possible and towards ensuring everyone can access and afford the nutritious food they need to live healthy lives.

The role of healthy, sustainable diets in delivering a nature-positive net zero transition is clear – we won’t meet our climate and nature targets without shifting our diets. In this report, we show that achieving a healthy, sustainable diet for the UK population is possible – without everyone having to go vegetarian or vegan or give up treats.

Livewell is a flexible diet that involves rebalancing our protein consumption toward plants, eating more vegetables, pulses and wholegrains, and fewer foods high in fat, salt and sugar. Crucially, it can be achieved without costing more. But the shift we need will not happen through individual behaviour change alone.

People want change – this comes up time and again in public polls, including our own at WWF. Diets are not just a question of personal preferences. Food choices are deeply influenced by food environments – what is available, affordable and accessible, and how it is marketed. These factors are determined by governments and businesses and are largely beyond the control of the individual. Delivering change will therefore not just be a question of winning hearts and minds but of changing food environments. Right now, these are pushing us to consume more than we need, often promoting foods that are harmful to our health and the planet.

The cost-of-living crisis is adding ever more pressure to people’s food choices. Enabling and encouraging shifts to healthy, sustainable diets has never been more important. The most effective policies and actions are those that will improve the accessibility, affordability, availability and desirability of healthy, sustainable food, making it the easy choice. In this report we outline seven key areas for implementation by government and businesses.

We need an urgent focus on healthy, sustainable diets. Without such concerted action we will not bring our food system within the boundaries of what the planet can sustain.





# EXECUTIVE SUMMARY

Please note all references can be found in the main report.  
All were accessed April 2023.

Humanity is facing a triple challenge: how to ensure food and nutrition security for all, while keeping global warming to 1.5°C and reversing nature loss. The food we eat and the input-intensive way it is produced are driving nature loss, polluting waterways, depleting soils and undermining food and nutrition security.

The health of the planet is intimately connected with our own. We must dramatically reduce our greenhouse gas emissions and our impact on the natural world – and adopting healthy, sustainable diets will be needed to achieve this.



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Around 30% of global greenhouse gas emissions are associated with the food system. Urgent action is needed to maximise emissions reductions from the food system if we are to achieve net zero by 2050 and limit global temperature rise to 1.5°C. Equally urgent is the need to halt and reverse the loss of nature by 2030 within the UK and globally.

Research shows that diet shift is needed to unlock the transition to climate- and nature-friendly land use and agricultural practices. In this report, we investigate how dietary shift could reduce the climate and nature impacts of the UK food system and demonstrate that a healthy, sustainable, socially acceptable diet for the UK population is possible. This diet – Livewell – is a flexible diet that includes a wide variety of foods. It is rich in plants, including fruit, vegetables, pulses, and wholegrains; contains moderate amounts of meat, dairy and eggs, and sustainably sourced lower footprint seafood; and minimal amounts of products high in fat, salt and sugar. Transitioning to this diet will deliver health benefits, and it is imperative from an environmental perspective.

Adopting Livewell recommendations could deliver a 36% reduction in emissions and a 20% reduction in biodiversity loss compared to the current average diet, while also enabling the shift to net-zero and nature-positive farming and food production. Adoption at scale would deliver benefits for people as well as planet. It would lessen the burden on the NHS, which currently spends an estimated £6 billion annually on diet-related illness and obesity.

The public wants to adopt healthy, sustainable diets. But less than 1% of the UK population currently meet all the UK government diet recommendations. Diets are not just a question of personal preferences: people face barriers to better choices that are beyond their control. The food choices that make up diets are deeply influenced by what's available, affordable and accessible, and how it's marketed. These factors are determined by government and businesses. They have a vital role to play in enabling and encouraging a shift to healthy, sustainable diets, especially during the current cost-of-living crisis when many are struggling to feed their families.

Healthy, sustainable food should be available, affordable and accessible for everyone, both now and in the future.

**FOOD CHOICES  
ARE DEEPLY  
INFLUENCED BY  
WHAT'S AVAILABLE,  
AFFORDABLE  
AND ACCESSIBLE,  
AND HOW IT'S  
MARKETED**

We need an urgent focus on healthy, sustainable diets between now and 2030 to support a nature-positive, net-zero transition in the UK. The UK government and businesses should focus action on the following key levers:

1

## DIETARY GUIDELINES

Dietary guidelines set out government recommendations on what a healthy, balanced diet looks like. They have the potential to be a key policy tool if leveraged more effectively to enable the shift to healthy, sustainable diets.

2

## PUBLIC FOOD PROCUREMENT

Everyone should be able to eat good food. Public procurement presents an opportunity for government to support those who need it most, and improve the quality of food served in schools, hospitals, care homes, government buildings and other public institutions. Ambitious action on public procurement will also set an example for private procurement.

3

## SAFETY NETS AND TARGETED SUPPORT

Measures that improve access to healthy, sustainable diets are critical to improve nutrition security for the most vulnerable while also helping to tackle the climate and nature crises. This is particularly pertinent during the current cost-of-living crisis. While the Livewell diet need not cost more than current consumption, targeted support is needed to address health inequalities and barriers to eating well.

4

## FOOD ENVIRONMENTS

To enable diet shift at scale, healthy, sustainable products and meals need to be the most available, affordable, accessible and appealing options. Consumers expect businesses to encourage the adoption of healthier, more sustainable diets by increasing the availability of plant-rich foods and ensuring they are available, affordable and accessible in supermarkets, restaurants and canteens.

5

## TRANSPARENCY AND ACCOUNTABILITY

Greater transparency and accountability can help accelerate the shift to healthy, sustainable diets by enabling improved monitoring of health and sustainability impacts and providing a level playing field for businesses to source and sell healthy, sustainable food.

6

## EDUCATION AND INFORMATION

Education and training are important levers to improve understanding of healthy, sustainable diets in the population, including across key actors such as chefs, healthcare practitioners and local authority staff.

7

## INVESTMENT IN SUSTAINABLE PRODUCTION

For everyone to eat a sustainable, healthy diet, we will need to invest in sustainable production of a wider variety of nutritious foods at scale. This will create economic benefits as well as improving environmental and health outcomes, but farmers and growers need financial support, a fair reward for their produce and a level playing field.

## KEY MESSAGES

Aligning the national diet with Livewell recommendations would be a triple win for climate, nature and people. This creates a synergy, linking the health of the planet with our own.

- **Shifting to a healthier, more sustainable diet can unlock opportunities to transform agriculture.** Adopting Livewell recommendations could deliver a 36% reduction in emissions and a 20% reduction in biodiversity loss compared to the current average diet, while also supporting a transition to nature-friendly farming practices.
- **Achieving a healthy, sustainable diet for the UK population is possible within current social norms and without costing more.** Livewell is a flexible diet made up a wide variety of foods. It is plant-rich, includes a moderate amount of meat, dairy and eggs, and prioritises lower-footprint seafood. Livewell emphasises whole foods, and features only a minimal amount of products high in fat, salt and sugar.
- **Diets are not just a question of personal preferences.** Food choices are deeply influenced by what's available, affordable and accessible, and how it's marketed. The most effective policy changes are therefore those that target the food environment, ensuring every citizen has access to and can afford healthy, sustainable food rather than relying solely on individual choice.
- **Healthy, sustainable food should be accessible and affordable for everyone, both now and in the future.** Government and businesses have a vital role to play in enabling and encouraging a shift to healthy, sustainable diets, especially during today's cost-of-living crisis.
- **We need an urgent focus on shifting to healthy, sustainable diets between now and 2030 to support a nature-positive net-zero transition in the UK.** Without concerted action on healthy, sustainable diets from government and businesses, we will fail to bring our food system within planetary boundaries.

## WHAT WE INVESTIGATED

WWF-UK commissioned Blonk Sustainability Tools to model a diet that would meet UK government nutritional recommendations and be socially acceptable (not deviating drastically from the current average diet, and not costing more), while minimising greenhouse gas emissions and other environmental impacts – we call this the Livewell diet.

The research compared the Livewell diet to the current average diet, based on National Diet and Nutrition Survey data of more than 3,000 food products eaten by the UK population, including food produced domestically and imported food.







# INTRODUCTION

The food that we buy, cook and eat every day of the year comes from all corners of the world – but the current global food system threatens the future of the planet. Technological innovations including the mechanisation of agriculture, artificial nitrogen-based fertilisers, herbicides and pesticides, and selective breeding of crop and animal species increased yields and reduced the retail cost of food. We now produce more than enough food to feed the world.<sup>1</sup> But achieving this has come at a cost to the climate, nature and people. Now is the time to rethink our approach to food so that it delivers the nutrition people need without putting further pressure on climate and nature.

The way we produce and consume food is one of the main causes of climate change and the most significant driver of nature loss, behind almost 70% of biodiversity loss across the globe.<sup>2</sup> Food systems are responsible for around 30% of global greenhouse gas emissions,<sup>3</sup> and are driving deforestation and habitat loss, soil degradation, freshwater pollution and the destruction of marine wildlife. Today's farming systems are centred on monocultures and dependent on artificial inputs, with negative impacts on nature. Paradoxically, in our efforts to feed ourselves we are destroying the very systems that food production depends on – a stable climate, rich soils, clean rivers, and functioning terrestrial and marine ecosystems.

## ENABLING A SHIFT TO HEALTHY, SUSTAINABLE DIETS IS IMPERATIVE TO RELIEVE PRESSURE ON NATURE AND CREATE THE OPPORTUNITY FOR A TRANSITION TO REGENERATIVE FARMING

The world's food is also unevenly distributed. The double burden of malnutrition – characterised as the co-existence of undernutrition alongside overweight and obesity – is growing. Almost 40% of the world's adult population is overweight or obese – in the UK this figure is 64%<sup>4</sup> – while almost 10% face hunger.<sup>5,6</sup> Diet-related ill health comes at a financial cost. In the UK, the NHS currently spends over £6 billion annually on diet-related illness and obesity, a figure which is predicted to rise to almost £10 billion by 2050.<sup>7</sup>

Beyond acute hunger, a third of the global population did not have access to adequate food in 2020.<sup>8</sup> Although there is no lack of food globally, part of the rise in hunger is due to the spread of plant diseases exacerbated by climate change, leading to crop losses which threaten food security for the most vulnerable.<sup>9</sup>

On top of this, 36% of crops produced worldwide are used to feed livestock rather than people.<sup>10</sup> In the UK, half of the annual wheat harvest goes into livestock feed.<sup>11</sup> Using arable land to feed livestock, rather than to feed people directly, means far fewer calories per area of production reach the human population.

### Today, humankind faces the triple challenge of ensuring food and nutrition security for a growing population while keeping global warming to 1.5°C and reversing nature loss.<sup>12</sup>

To do this, we urgently need to transform our food system so that it provides nutritious and affordable food for everyone, in line with globally agreed climate and nature targets. We must move to a new food paradigm, away from a focus on maximising volume and yield to a holistic vision where everyone can access and afford the nutritious food they need to live healthy lives.

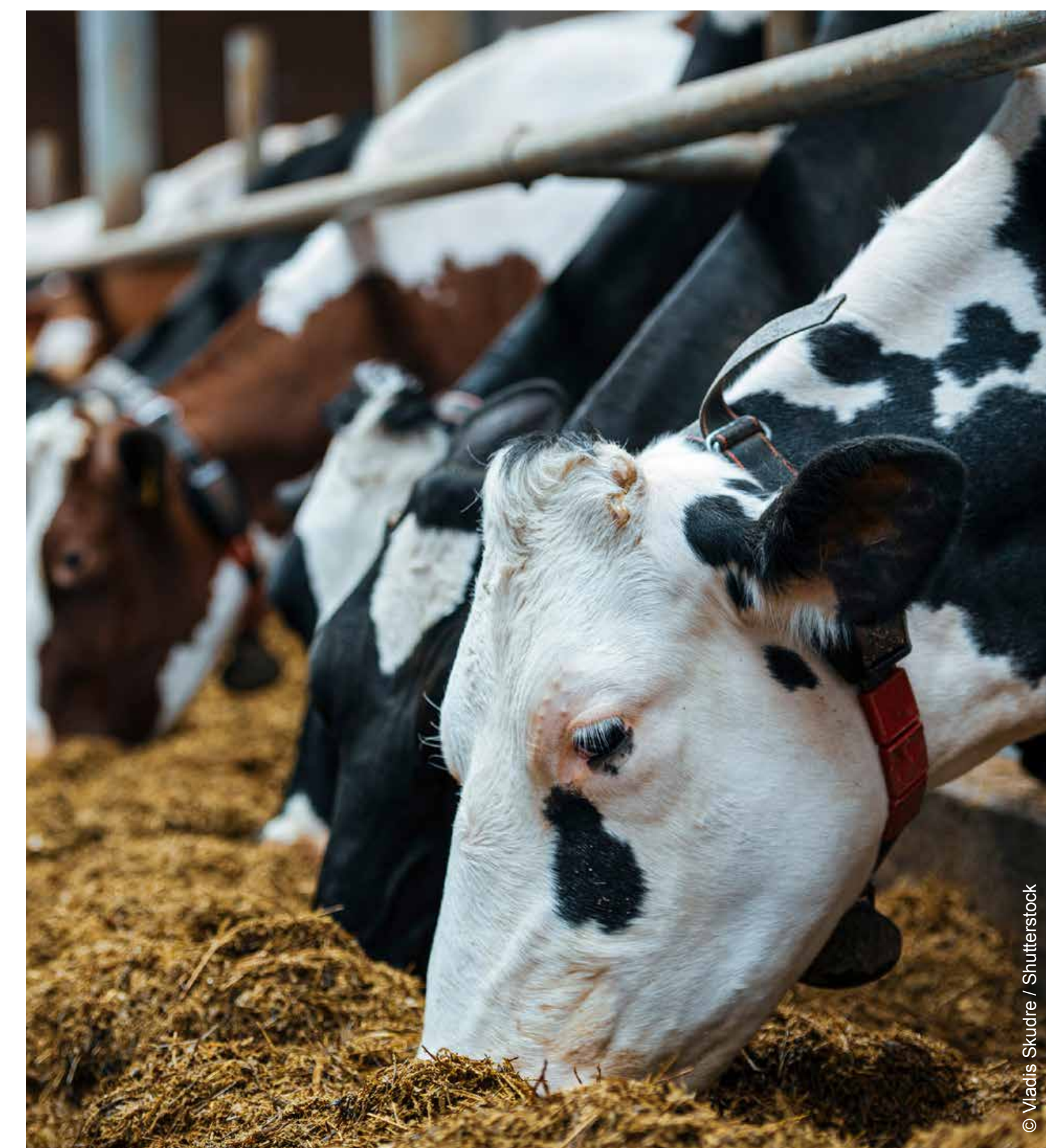
Aligning food production and nutrition to deliver more diverse diets will bring benefits for climate and nature. The provision of healthy, diverse diets will require greater agrobiodiversity, facilitating a shift away from input-intensive monoculture systems and restoring soils and nature. Prioritising the production of nutritious food for direct human consumption will enable us to halt the expansion of new agricultural land and preserve natural habitats, which is vital if we are to have any chance of bending the curve of biodiversity loss and reaching net zero.<sup>13</sup>

Diet shift is needed to achieve this transformation. The latest Intergovernmental Panel on Climate Change (IPCC) report demonstrates how a shift to healthy, sustainable diets can deliver 'gigatonne-scale' emissions reductions and free up several million square kilometres of land worldwide.<sup>14</sup> Diet shift can help mitigate the impacts of climate change, slow biodiversity loss and prevent an estimated 19–24% of unnecessary deaths globally.<sup>15,16</sup> Enabling a global shift to healthy, sustainable diets is imperative to relieve pressure on nature – it creates the opportunity for a transition to regenerative farming and frees up land for nature restoration and carbon sequestration.<sup>17</sup>

In 2021, the UK government published the Net Zero Strategy: Build Back Greener, which sets out how we will reach net zero carbon emissions by 2050, and passed the Environment Act, which sets legally binding targets to protect nature and eliminate illegal deforestation from commodity supply chains.<sup>18,19</sup> The food system has a crucial role to play in enabling a nature-positive transition to net zero in the UK. Maximising the food system's contribution to this transition will require joined-up thinking and action across the supply chain.<sup>20</sup> Shifting to healthy, sustainable diets will unlock opportunities to achieve this. WWF-UK's *Land of Plenty* report<sup>21</sup>

identifies diet shift as the most effective strategy to reduce UK agriculture emissions, delivering a 50% reduction. Diet shift could also release three million hectares of land from agriculture by 2035 according to the Climate Change Committee's Sixth Carbon Budget analysis, providing opportunities to restore nature and sequester carbon.<sup>22</sup>

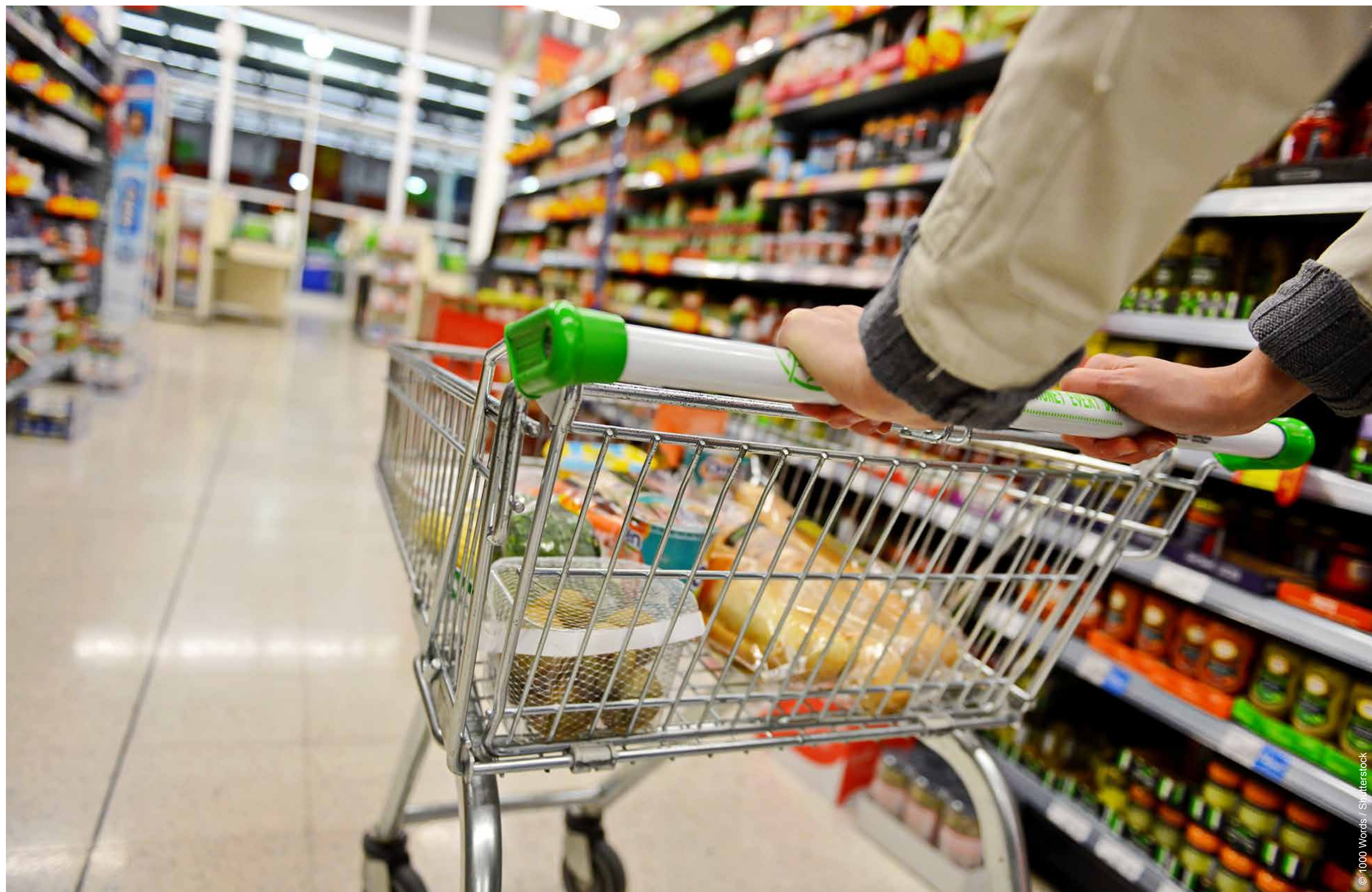
In this report we show that it is possible to achieve healthy, sustainable diets for the UK population without deviating drastically from current consumption and without costing more. We also demonstrate how diet shift can play a meaningful role in supporting the achievement of national climate and nature targets.



## COST OF LIVING

Increases in housing, energy and transport costs have put pressure on household budgets, meaning people have less money to spend on food.<sup>23</sup> These factors, combined with food price inflation, are driving many families into food poverty.<sup>24</sup> The challenge is not that food is too expensive, but that access to food is unequal. The UK has the cheapest food in Western Europe,<sup>25</sup> but many families are struggling to access the nutritious food they need to live healthy lives. In 2022, vegetable consumption decreased by 7.5%, with children from the poorest fifth of households consuming less fruit, vegetables and oily fish than those from the richest fifth.<sup>26, 27, 28</sup>

This is because healthy, sustainable food costs more per calorie than unhealthy, unsustainable food, and is less available and accessible.<sup>29</sup> Government and businesses urgently need to act to increase access to healthy, sustainable food for those who need it most, especially during the cost-of-living crisis. Healthy, sustainable food should be accessible and affordable for everyone both now and in the future.





**LIVEWELL**

Livewell is WWF-UK’s approach to illustrate what an achievable healthy, sustainable diet can look like. The analysis is based on modelling, using existing dietary guidelines and adding environmental constraints to help us identify diets with lower environmental impact.

WWF-UK has applied this approach to advocate for healthy, sustainable diets since 2011, when the first Livewell report modelled healthy diets that minimised greenhouse gas emissions.<sup>30</sup> The approach was successfully applied to national dietary guidelines in France, Spain and Sweden in 2011-15<sup>31</sup> and was updated in the UK in 2017<sup>32</sup> to reflect the revised UK dietary guidelines. At this point we also included water and land in our analysis.

In this third iteration of Livewell, we set out to model a healthy diet with lower environmental impacts for the UK population. Crucially, to remain culturally and socially acceptable, we wanted to understand how to deliver on health and environmental objectives with the least possible deviation from the current average diet, and without costing more.

We model how dietary change can maximise emissions reductions (both including and excluding land use change) to support the UK government’s net-zero strategy while reducing impacts across other environmental metrics – land use, water use, soil acidification, freshwater eutrophication, marine eutrophication and biodiversity loss. The analysis in this report is based on updated consumption and environmental datasets in full alignment with the latest science. For more information, please see ‘Methods’ section.

# ENVIRONMENTAL BENEFITS

Our analysis shows that the carbon footprint of the current UK diet is 4.84kg of carbon dioxide equivalent (CO<sub>2</sub>e) per person per day. This far exceeds where we need to get to if we are to limit global warming to 1.5°C and achieve net zero by 2050. Adoption of Livewell brings the carbon footprint down to 3.12kg CO<sub>2</sub>e per person per day, equating to a 36% reduction in emissions. This would deliver over half of the food emissions reductions needed by 2030, with the remaining emissions reductions being achieved through changes to food production and reductions in food loss and waste (see Figure 1).

Notably, 69% of this is the result of reductions in meat and dairy consumption. In the UK, meat consumption declined by an estimated 17% between 2008 and 2019,<sup>34</sup> showing that many people already choose to moderate the amount of animal protein they eat. Moving the whole UK population in this direction, including encouraging people who eat larger volumes of meat and dairy to reduce their intake, will drive higher emissions reductions. Adopting the Livewell diet would also deliver significant benefits for nature, including a 23% reduction in land occupation, a 57% reduction in terrestrial acidification, a 45% reduction in freshwater eutrophication and 47% reduction in marine eutrophication.

Land released from agriculture can be used for carbon sequestration and nature restoration, while addressing acidification and eutrophication, linked to excessive use of chemical fertilisers and pesticides, and poor manure management, is crucial to improve the health

of our soils and rivers. A reduction in pork, poultry and dairy consumption correlates with reduced acidification and eutrophication due to the manure release associated with these production systems.<sup>35</sup>



## TERRESTRIAL ACIDIFICATION

An increase in soil acidity caused by excess nitrogen and sulphur deposits, impacting soil health.



## FRESHWATER EUTROPHICATION

An excess of nutrients caused by nitrogen and/or phosphorus deposits in freshwater bodies (such as rivers, lakes and wetlands), causing algae growth and impacting water quality.



## MARINE EUTROPHICATION

An excess of nutrients caused by nitrogen and/or phosphorus deposits in marine ecosystems (such as oceans, seas and coasts), causing algae growth and impacting water quality.

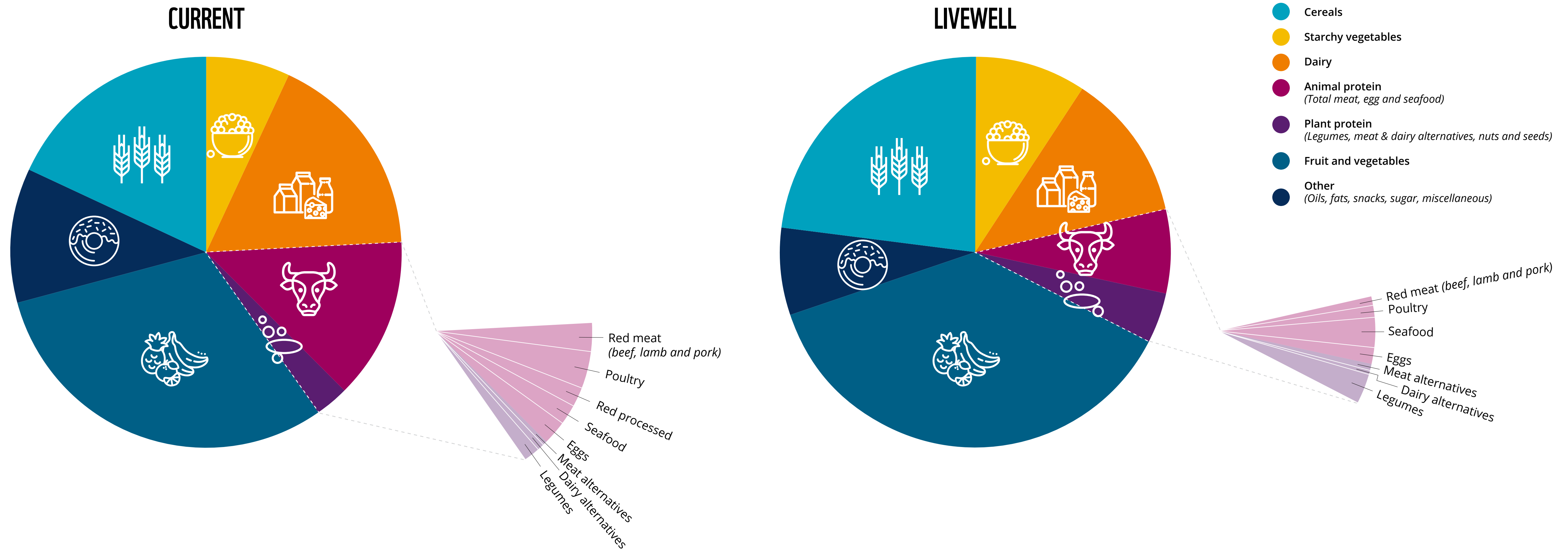


**Figure 1.** Journey of changes from current consumption to a 1.5°C aligned consumption pattern. Measured as CO<sub>2</sub>e per person per day, using per capita food carbon footprint targets from Broekema et al., 2020.<sup>33</sup>

# CHANGES TO THE DIET

Compared to current consumption, the Livewell diet contains a greater proportion of fruit, vegetables, wholegrain cereals and plant proteins (such as beans and lentils), as well as lower-footprint seafood, and potatoes and other starchy tubers. It includes less meat (red, white and processed), dairy and eggs, and fewer products high in fat, salt and sugar.




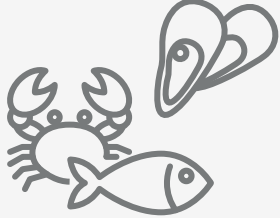


The changes involved in our Livewell diet can be achieved while ensuring suitable nutrient intakes, as we included appropriate macro- and micro-nutrient constraints in our model.



**Figure 2.** Composition of current consumption and the adult Livewell Plate in percentage of total daily food intake (grams per day, excluding beverages). The wedges illustrate the breakdown of animal and plant protein. Further details, including composition of the diets in grams per day, can be found in the technical report.

Our analysis aligns with the existing evidence on sustainable diets, including EAT-Lancet, which also emphasises the need to eat more plant-based foods, especially as sources of protein.<sup>36, 37, 38</sup> There is a growing body of evidence on the health benefits of a diet rich in plants with limited amounts of animal-based foods including meat.<sup>39, 40, 41, 42</sup>

## CHANGES IN DETAIL

	<p><b>FRUIT AND VEGETABLES</b></p>	<p>Fruit and vegetable consumption goes up by 45%, alongside a 49% reduction in fruit juices and smoothies due to their sugar content.</p>
	<p><b>PULSES</b></p>	<p>Pulses such as beans and lentils become a greater part of our diet with a 50% increase.</p>
	<p><b>ANIMAL PROTEIN</b></p>	<p>Animal protein consumption is significantly reduced across all land-based meat types with 69% less meat, 25% less dairy and 32% less eggs.</p>
	<p><b>SEAFOOD</b></p>	<p>Consumption of seafood goes up by 83% to align with health recommendations, reflecting current low levels of consumption. This must be met by lower-footprint, sustainably sourced seafood to avoid further exacerbating pressure on fish stocks and marine habitats.</p>
	<p><b>WHOLEGRAIN CEREALS</b></p>	<p>Consumption of wholegrain cereals increases by 35%, replacing white, refined varieties of bread, rice and pasta.</p>
	<p><b>HIGH IN FAT, SALT AND SUGAR</b></p>	<p>Consumption of products high in fat, salt and sugar (such as savoury snacks, desserts and sugary drinks) goes down.</p>



## FRUIT AND VEGETABLES

Diets rich in fruit and vegetables are associated with significant benefits for health, climate and nature. Fruit and vegetables are a good source of fibre, vital for good digestive health and offering a wide range of health benefits including lower blood pressure and reduced risk of stroke, heart disease and cancer.<sup>43, 44, 45</sup> Diets with a greater proportion of fruit and vegetables are also associated with lower diet-related emissions, reduced water use, less land cleared for agriculture and less fertiliser use.<sup>46, 47, 48</sup>

But only a third of adults and one in eight children meet the UK government's recommendation of five portions of fruit and vegetables a day,<sup>49</sup> and average fibre intake is currently below the recommended 30g per day.<sup>50</sup> This means there is significant scope to increase the proportion of fruit and vegetables in our diet. Building on the recommended five portions a day, our Livewell diet recommends eating 45% more fruit and vegetables compared to current consumption.

## PLANT AND ANIMAL PROTEINS

In the UK we consume on average more protein than needed – at 76g per person per day compared to recommendations of 45g and 56g for women and men respectively.<sup>51</sup> Most of our protein comes from animal-based sources, though plant-based protein sources are associated with significant health and environmental benefits.<sup>52, 53</sup> This means that there is scope to reduce our consumption of meat, dairy and eggs to align protein consumption with recommended healthy levels.

Although animal products, such as beef, contain more protein per 100g than plant sources, such as peas, plant sources can replace meat in the diet without compromising on nutrition. The British Dietetic Association's environmental sustainability diet project One Blue Dot concludes that people who reduce their animal protein consumption can still more than meet their daily protein requirements.<sup>54</sup> To reap the full climate and environmental benefits of shifting towards plant-rich diets without any unintended consequences for nutrition, changes must be well planned. Some nutrients are either not present, present at low quantities or less easily absorbed in plants, and may be missed when removing or limiting meat and/or dairy from the diet.<sup>55</sup> Limitations to plant protein quality can be overcome through means such as consuming appropriate portion sizes, fortification and blending protein.<sup>56</sup>



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## LEGUMES AND PULSES

Despite the role legume crops have historically played in European food and farming systems, current consumption is at an all-time low<sup>57</sup> with less than 25g consumed per person per day in the UK (see Figure 3). The Livewell diet includes a 50% increase in consumption of pulses such as beans and lentils. This would deliver benefits for health, climate and nature without deviating too drastically from the current average diet.

From an environmental perspective, producing peas has on average 36 times less climate impact than producing beef.<sup>58</sup> And legume production provides other environmental benefits: chickpeas, lentils and beans fix nitrogen in the soil, improving soil health and helping to store carbon.<sup>59,60</sup> Introducing these crops into modern cropping and intercropping systems can help achieve the goals of nature-friendly farming – farming methods that reduce emissions and help protect and restore nature – through a transition to regenerative agriculture.

## MEAT

High levels of red and processed meat consumption have been associated with health risks. The Department of Health and Social Care and the Eatwell Guide recommendation is to cut down to 70g red and processed meat a day if you currently eat more than 90g per day to reduce the risk of colorectal cancer.<sup>61</sup> Over 50% of food-related emissions relate to livestock farming, including crop production for animal feed.<sup>62</sup>

UK poultry production has increased at a time when the UK's total agricultural output has fallen.<sup>63</sup> Today, it's the most popular type of meat in the UK, with the average consumer eating more poultry than beef, lamb and pork combined. As the consumption of poultry and the amount of feed required continue to increase, Livewell recommends a significant reduction of poultry consumption compared to current levels. Overall, our Livewell diet suggests a 69% reduction in meat – red, white and processed. A breakdown of this can be seen in Figure 3.



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## DAIRY

Dairy foods including milk, yoghurt, butter and cheese are valuable sources of protein, calcium, and other vitamins and minerals including iodine. But dairy consumption is high in the UK. In the Livewell diet, dairy intake is reduced by 25% to levels in line with health recommendations, although for some people a higher dairy intake is important for nutritional reasons, for example women who are pregnant or breastfeeding, and young children.<sup>64</sup>

Cheese can be part of a healthy, sustainable diet, but as it tends to be high in saturated fat and salt it is recommended to prioritise reduced-fat, low-salt options from a health perspective.<sup>65</sup> Considering the significant environmental impact of these products – cheese production is associated with almost 25kg CO<sub>2</sub> equivalent and significant land use per kilo<sup>66</sup> – Livewell recommends a 67% reduction in cheese consumption.

## SEAFOOD

The UK government's national dietary guidelines, the Eatwell Guide, recommend consuming two portions of fish a week, one of which should be oily as this is high in long-chain omega-3 fatty acids and a good source of vitamin D.<sup>67</sup> To avoid exacerbating impacts on fish stocks and marine habitats, it will be crucial to meet this recommendation by increasing consumption of lower-footprint seafood.

WWF-UK's *Risky Seafood Business* report<sup>68</sup> suggests consuming a diverse range of lower-footprint seafood such as mussels and small pelagic oily fish like sardines and herring from well-managed sources as a more sustainable alternatives to the 'big five' species that currently make up the majority of UK consumption (cod, haddock, prawns, salmon, tuna). Although well-managed fisheries and farms for the 'big five' exist, even the best managed sources couldn't satisfy large increases in demand as this pressure affects the whole marine ecosystem. For our future generations to have sufficient resources to thrive, both WWF-UK's global footprint report, *Thriving within our planetary means*,<sup>69</sup> and the WWF Basket<sup>70</sup> call for all seafood consumed in the UK to be from sustainable sources by 2030.



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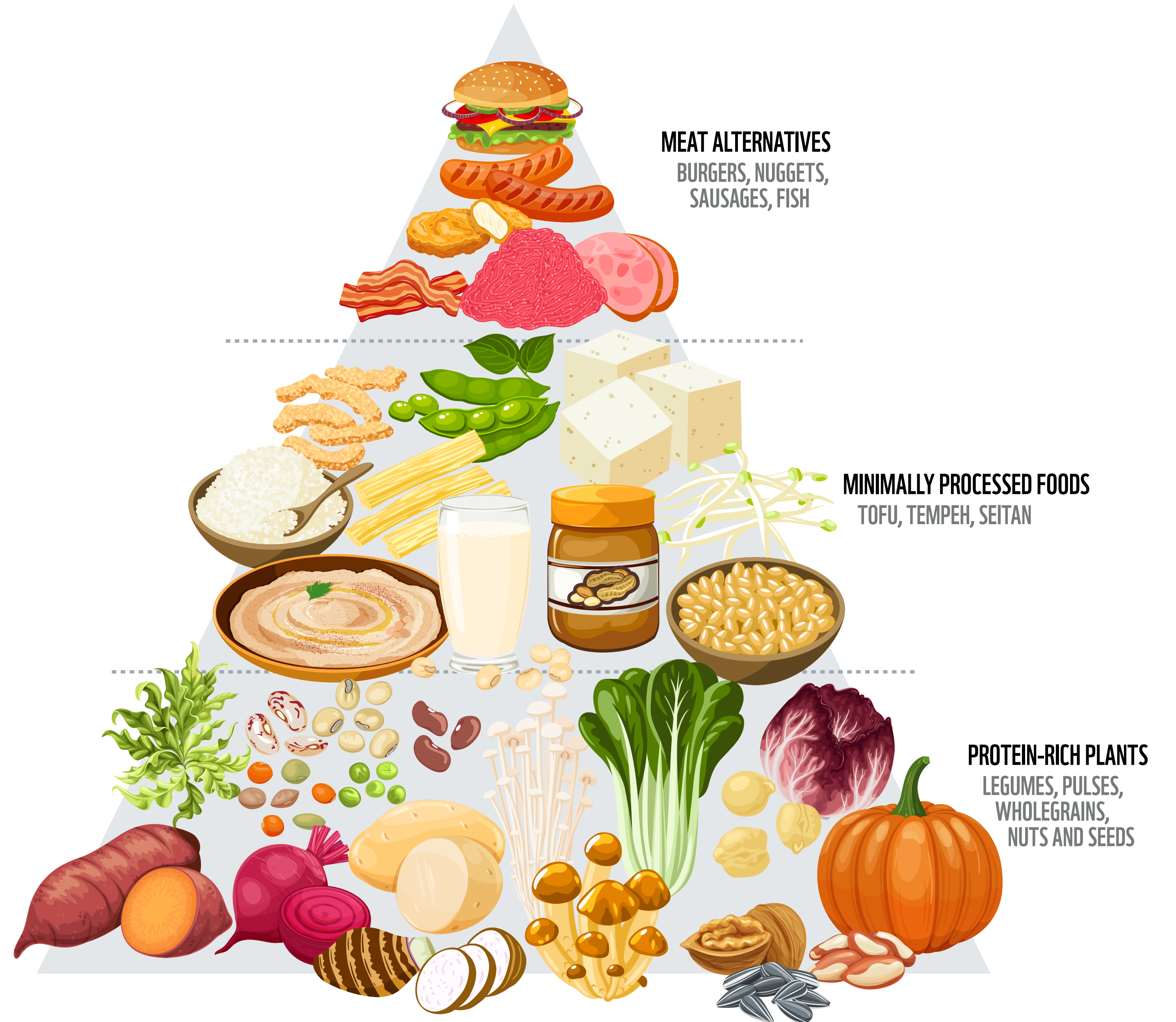
# MEAT AND DAIRY ALTERNATIVES

Meat alternatives are designed to mimic the texture, flavour and/or nutrient profiles of meat products. These include sausages, burgers, mince and other ‘meat mimics’. Adopting the Livewell diet involves a slight increase in consumption of meat alternatives compared to current levels. These products can play a role in helping to reduce the consumption of meat and dairy products with high environmental impact, while increasing convenience and variety within the diet, but they are often high in fat, salt and/or sugar. As certain essential micronutrients may be missed when removing or limiting meat and/or dairy intake, it’s important that these are replaced, including through the use of fortified products where relevant. Reformulation of meat alternatives to improve their nutritional profile will be crucial if they are to play a role in supporting a transition to healthy, sustainable diets.

Within the plethora of meat alternatives, minimally processed plants can often play a vital role in providing key micronutrients, among other health benefits. Plant proteins like tofu and tempeh (from soy) and seitan (from wheat) can provide healthy meat replacers, with soy providing all the essential amino acids found in meat.<sup>71</sup>

Milk alternatives can have a lower environmental impact than dairy products, although this varies depending on the indicator – for example, oat and soy milk use less fresh water and produce fewer emissions than other alternatives but use more land than almond and rice milk.<sup>72</sup> However, from a nutritional perspective, milk alternatives are largely composed of water with varying amounts of solids from the plant material (soy and oat milk alternatives typically contain about 10% solids, and nut alternatives typically contain around 2–3%). Consequently, milk alternatives offer inferior nutrition compared to dairy milks on a number of indicators and should, at a minimum, be fortified with essential micronutrients (calcium, iodine, vitamin B12 and vitamin D).<sup>73</sup> This is why we see a minor decrease in consumption of milk alternatives in the Livewell diet.

A more detailed picture of the proposed rebalancing of protein sources can be seen opposite, showing where the average UK citizen currently gets their protein, and how this would change if they shifted to a Livewell diet.



**Figure 3.** Pyramid illustrating which plant proteins we should prioritise in a healthy, sustainable diet.

## WHOLEGRAIN CEREALS AND CARBOHYDRATES

Starchy carbohydrates like bread, pasta, potatoes and rice are an important source of energy and fibre in the diet, and also provide protein. They also typically have a low environmental impact to produce<sup>74, 75</sup> making them a healthy and sustainable option. Our Livewell diet includes 33% more wholegrain cereals (such as wholemeal bread, wholegrain rice and wholewheat pasta) than we currently eat on average in the UK, replacing white, refined varieties of bread, rice and pasta.

## FOODS HIGH IN FAT, SALT AND SUGAR

These foods are not needed for a healthy diet, so Livewell recommendations involve minimising consumption of foods high in fat, salt and sugar. The UK population consumes too much sugar and saturated fat. Replacing products high in fat, salt and sugar with more nutritious foods including fruit, vegetables and wholegrains would improve health outcomes and ensure we are using scarce natural resources to only produce nutritious foods.



## ULTRA-PROCESSED FOODS

Food processing has an essential role in providing safe, nutritious and convenient foods, as well as allowing for food preservation, which can help reduce waste. But ‘processing’ is a very general term, and these processes can bring risks as well as benefits.

Ultra-processed foods – industrially produced products that are ready to eat or heat<sup>76</sup> – have been associated with poorer nutritional quality,<sup>77</sup> and their consumption has been linked to excess calorie intake and increased obesity risk.<sup>78,79</sup> These links, however, require further research; it is not yet clear if negative health outcomes are due to levels of processing or the average poorer nutritional quality of ultra-processed foods – or whether the sensory properties of the food lead to increased consumption.<sup>80,81</sup>

There is widespread evidence that eating more minimally processed plant foods and fewer products high in fat, salt and sugar is healthier and reduces non-communicable diseases including heart disease, diabetes and some cancers.<sup>82</sup>

Ultra-processed foods also have a significant negative impact on the environment across many indicators.<sup>83</sup> The rise in ultra-processed foods has been accompanied and enabled by the rise in industrial, input-intensive production practices. Ultra-processed foods are reliant on standardised commodity monoculture ingredients produced at scale. These systems are associated with devastating impacts on nature.<sup>84</sup>

Livewell encourages change towards a healthy, sustainable diet which favours natural whole foods. More broadly, it seeks to drive a just transition towards sustainable production methods and land use that work with nature, rather than pursuing technologies such as limited crop species and intensive monocultures, which can have negative impacts on health and the environment.<sup>85</sup> This will not be achieved without placing farmers and fishers at the very heart of these changes, and ensuring they are properly supported through this transition.





# TRANSFORMING FOOD PRODUCTION AND REDUCING FOOD LOSS AND WASTE

Delivering a nature-positive, net zero transition in the UK will require significant changes to food production and reductions in food loss and waste – elements of the food system that closely interact with consumption patterns. Diet shift can drive changes in food production by changing demand signals, while changes to food production and reductions in food loss and waste can increase availability of healthy, sustainable foods.

Agroecological and regenerative farming practices seek to have positive impacts on nature. While both have evolving definitions, agroecological and regenerative practices are ultimately about creating agricultural systems that rely on healthy ecosystems and use far less agrochemicals, such as artificial fertilisers and pesticides.

Regenerative agriculture focuses on improving ecosystem health and resilience, particularly soil health, by reducing the use of energy and chemical inputs. Agroecology has a broader frame, and seeks to boost the resilience and the wider ecological, socioeconomic and cultural sustainability of farming systems, through enhancing knowledge, values, resilience and governance. These approaches are often described as nature-friendly farming. Nature-friendly methods help store carbon, and include low or no tillage, cover crops, mob-grazing and extended rotations, and using organic matter such as manure or compost instead of artificial fertilisers.

These agricultural practices, along with diet shift, are also key to cutting nitrogen pollution. Excess nitrogen not only contributes to climate change, with nitrous oxide being a potent greenhouse gas, but also drives water pollution, air pollution, and soil and ecosystem degradation.

Adopting the Livewell diet could free up land currently used for animal feed and grazing livestock to grow food for direct human consumption, as well as to restore nature. The reduction in consumption of highly processed foods and increase in the diversity of plant-based foods in the diet – such as legumes – will also enable a transition to regenerative agriculture and facilitate nature restoration by reducing pressure on land and improving soil health. This transition will require policies to support the farming sector and ensure the economic viability of farm businesses, including reforming farm payment systems to incentivise actions that deliver wider benefits (such as reducing emissions, creating habitats and improving water quality), and delivering a wider land use framework process.<sup>86</sup> The government must also set minimum standards for imported food, as the UK imports about 46% of the food it consumes.<sup>87</sup>

The UK government has targeted a 50% reduction in post-farm-gate food waste by 2030, but greater action is needed from government and businesses to meet this target. But action is also needed at the farm level: an estimated 6.9 billion meals' worth of edible food is wasted on UK farms every year,<sup>88</sup> undermining our food security, the availability of whole foods and the sustainability of our food system. WWF's *Land of Plenty*,<sup>89</sup> *Driven to Waste*<sup>90</sup> and *Hidden Waste*<sup>91</sup> reports highlight the importance of integrating food surplus and waste reduction into sustainable agriculture agendas to decarbonise UK agriculture. Some 10% of greenhouse gas emissions from UK agriculture stem from food waste.

Positive interactions between diets, food production and food loss and waste will ultimately reduce the impact of our food system on the environment and our health if the right incentives are in place to drive the needed changes.

AN ESTIMATED  
**6.9 BILLION**  
 MEALS' WORTH OF EDIBLE  
 FOOD IS WASTED ON UK  
 FARMS EVERY YEAR

## 'LESS AND BETTER' ANIMAL-SOURCED FOODS

If the global livestock sector were to maintain business as usual, it would account for half the emissions budget (that is, the amount of greenhouse gases we can afford to emit if we're to limit global temperature rise to 1.5°C) by 2030.<sup>92</sup> Diet shift involving 'less and better' animal products is essential to deliver on climate, nature and public health goals in the UK, and to enable a transition to regenerative agriculture.

The focus on 'less' should cover all land-based animal-sourced foods (meat, dairy and eggs), while recognising that appropriate planning and adequate support will be needed to ensure a just transition. The Eating Better Alliance defines 'better' meat, dairy and eggs as coming from animals reared within healthy ecosystems, favouring more natural diets from sustainable sources, in well-managed farms that deliver high standards of animal welfare,<sup>93</sup> Farming this way will make our food system more resilient by reducing reliance on artificial inputs such as fossil-fuel based fertilisers and pesticides, maintaining good soil health and fertility for crop production, and enabling nature restoration.



# HOW WILL WE GET THERE?



“We cannot rely on large-scale and unproven technologies alone to achieve the transition to net zero. Behaviour change across the whole population is essential to meet net zero and reduce environmental harms. Government policy and engagement are critical to achieving this level of change, which will produce many other benefits to health and wellbeing.”

*House of Lords Environment and Climate Change Committee.*<sup>94</sup>

We have shown that a healthy, sustainable diet for the UK population is possible within current social norms and without costing more. But intervention will be needed to align the current diet with Livewell recommendations. Successfully creating population-level diet shift will require a combination of policy measures that together create a level playing field for businesses to source and sell sustainable food and enable citizens to make healthier, more sustainable choices.

Polling shows that citizens want to adopt healthier, more sustainable diets.<sup>95, 96, 97</sup> But currently less than 1% of the UK population follow all of the UK government’s healthy diets guidance, and only 31% meet five out of the nine recommendations.<sup>98</sup> Citizens face barriers largely beyond their direct control that make it challenging for them to eat better, including cost, limited choice, convenience, and confusion over what makes up a sustainable diet.<sup>99</sup> Diets are not just a question of personal preference: food choices are deeply influenced by what’s available, affordable and accessible, and how it’s marketed.

## BUILDING BETTER FOOD ENVIRONMENTS

The choices we make are a product of food systems and the drivers and incentives that underpin them. Demand shapes supply, and supply shapes demand. Food production practices determine the health, environmental and animal welfare characteristics of a product, meaning agriculture, fisheries, aquaculture and trade policies need to be redesigned to promote healthy, sustainable food production. But this does not automatically translate to healthy, sustainable food consumption. Consumption patterns come to life in food environments as a product of food availability, affordability, accessibility and desirability. These factors are determined to a large extent by businesses, informed by perceptions of consumer trends and influenced by government interventions.

Putting the onus on individuals to ‘make the right choices’ is unrealistic, unjust and risky. Individual preferences play a role in informing food choices, but decisions are shaped by factors beyond the control of the individual, as illustrated in Figure 4. Choices are made within complex physical, economic, political and socio-cultural contexts comprising a myriad of factors including food marketing and store layouts, food prices and cost of living, laws and regulations, and cultural norms.<sup>100</sup>

The adoption of healthy, sustainable diets – like Livewell – should not be seen solely as the responsibility of individual citizens. It requires successful policy and business interventions applied across the supply chain. Building better food environments that enable and empower citizens to make healthy, sustainable food choices should be at the core of public policy and business objectives.

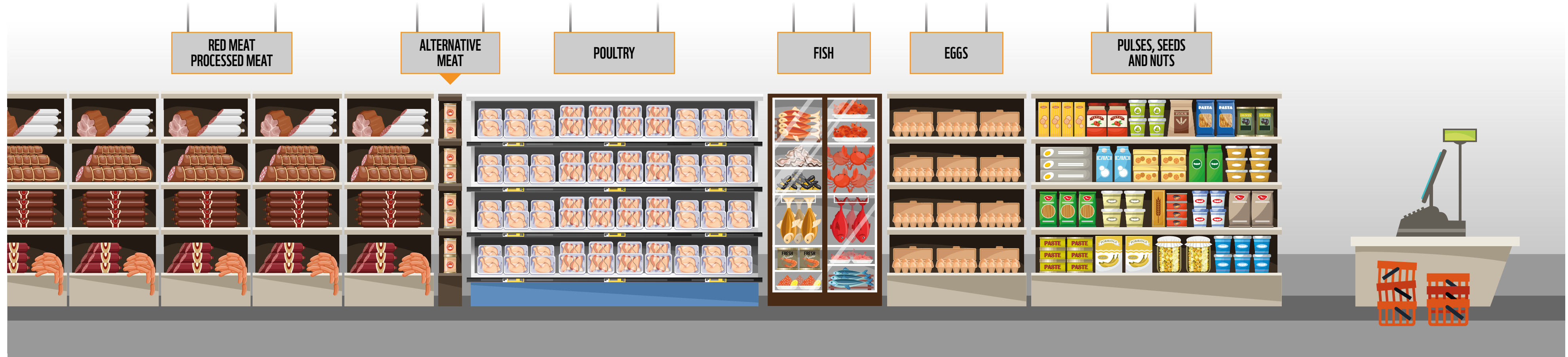
Government and businesses have a clear mandate to act. Citizens want and expect them to encourage healthier, more sustainable diets, including by increasing the availability of plant-rich foods and ensuring they are available, affordable and accessible in schools, supermarkets, restaurants and canteens.<sup>101, 102, 103</sup> This should be an urgent priority between now and 2030.



**Figure 4.** Food environments represent a messy intersection between consumers and producers – choices made translate into demand patterns that shape supply, while production determines food availability and characteristics.

*Diagram from: [https://foodpolicycoalition.eu/wp-content/uploads/2021/10/Food-Environments-for-SFS\\_EU-FPC.pdf](https://foodpolicycoalition.eu/wp-content/uploads/2021/10/Food-Environments-for-SFS_EU-FPC.pdf)*

# CURRENT SUPERMARKET PROTEIN AISLES



# LIVEWELL PROTEIN AISLES



Figure 5. How the retail environment could change to enable adoption of healthy, sustainable diets.

# POLICY LEVERS FOR HEALTHY, SUSTAINABLE DIETS

Urgent action is needed to accelerate the shift to healthy, sustainable diets, giving citizens the freedom to make healthier, more sustainable choices.

A number of policy areas are set out below. UK government dietary guidance (the Eatwell Guide) applies across the UK. However, responsibilities for policy relating to climate change, environment and many food system levers are largely devolved, resulting in different targets and agricultural policies across the nations. We will consider the policy implications from a Scotland and Wales perspective in future research.



## 1 DIETARY GUIDELINES

Dietary guidelines set out government recommendations on what a healthy, balanced diet looks like, and are a key nutrition policy tool. The UK's national dietary guidelines, known as the Eatwell Guide,<sup>104</sup> are used by the NHS and healthcare professionals as well as by food businesses, local authorities, charities and schools.

**Government can maximise the potential of dietary guidelines to deliver for health, climate and nature by:**

- Developing implementation guides for food businesses, local authorities and public health practitioners
- Ensuring public-facing guidance and recommendations reflect the modelled diet, providing more detail on appropriate consumption of high-impact foods such as meat and dairy
- Integrating environmental indicators into the modelling that informs public-facing recommendations – this report demonstrates how this can be done.

Since the Eatwell Guide was last updated in 2016, many other countries have recognised this potential and updated their guidelines, providing additional advice and guidance (Brazil, Denmark, Spain) or including environmental indicators in their modelling (France, Italy).<sup>105</sup>

## 2 PUBLIC FOOD PROCUREMENT

Everyone should be able to eat good food. Public procurement presents an opportunity for government to support those who need it most, and improve the quality of food served in schools, hospitals, care homes, government buildings and other public institutions.

**In England, government can improve public food procurement standards by:**

- Updating mandatory and best practice requirements to serve more legumes, pulses, fruit and vegetables, and promote a shift toward 'less and better' meat, in line with Livewell recommendations
- Setting targets to require a percentage of food procured to meet clearly defined higher environmental standards (e.g., organic), with preference given to local suppliers if their produce meets these standards
- Extending mandatory buying standards so that they apply across all public sector bodies including local councils, schools, NHS services, care homes, prisons and government departments.

## 3

## SAFETY NETS AND TARGETED SUPPORT

Measures that improve access to healthy, sustainable diets are critical to improve nutrition security for the most vulnerable, while also helping to tackle the climate and nature crisis. While the Livewell diet does not cost more than current consumption, targeted support is needed to address health inequalities and improve access to healthy, sustainable diets.

**In England, the following policy measures would improve access to healthy, sustainable diets:**

- Providing free nutritious and sustainable school meals. As recommended by the Feed the Future Campaign,<sup>106</sup> the government in England should at a minimum commit to extending free school meals to children in households on Universal Credit. Devolved governments in Wales and Scotland have committed to provide free school meals to all primary school children.<sup>107</sup>
- Expanding and strengthening existing support mechanisms, including Healthy Start<sup>108</sup> and Best Start,<sup>109</sup> to improve uptake.
- Targeting cost-of-living support by, for example, increasing the relevant benefits in line with inflation, as recommended by the Food Foundation, to support households hardest hit by food price inflation and food insecurity.<sup>110</sup>

## 4

## FOOD ENVIRONMENTS

To enable diet shift at scale, healthy, sustainable products and meals need to be the most available, affordable, accessible and appealing options. Consumers expect businesses to encourage the adoption of healthier, more sustainable diets by increasing the availability of plant-rich foods and ensuring they are available, affordable, and accessible in supermarkets, restaurants and canteens.<sup>111, 112</sup>

**UK retailers, catering companies, restaurants and public canteen operators can accelerate adoption of healthy, sustainable diets by:**

- Focusing product or meal development and innovation on plant-based wholefoods such as beans and lentils.
- Focusing advertising and promotions on plant-rich options, and ensuring they are cheaper (or no more expensive) than meat and dairy options.
- Including a greater proportion of plant-rich options than meat and dairy options in supermarkets and on menus.
- Placing plant-rich options in prominent positions in supermarkets, on menus and in canteens, and making them the default option where possible.

## 5

## TRANSPARENCY AND ACCOUNTABILITY

Greater transparency and accountability can help make healthy, sustainable diets a reality by enabling improved monitoring of health and sustainability impacts and providing a level playing field for businesses to source and sell healthy, sustainable food.

**UK Government can improve transparency and accountability on healthy, sustainable diets by:**

- Introducing mandatory reporting for large food companies on food sales volumes (fruit, vegetables, animal and plant proteins, and foods high in fat, salt and sugar) and climate and nature impacts, as recommended in the National Food Strategy.
- Developing a standardised methodology for environmental labelling to encourage product reformulation, improve ingredient sourcing, create a competitive advantage for sustainably produced food and enable consumers to identify more sustainable food products.
- Supporting the adoption of a standardised and comprehensive approach to measuring on-farm environmental impacts, such as the Global Farm Metric system.

Existing voluntary initiatives such as the WWF Basket, WRAP & WWF's Scope 3 climate reporting and the Food Foundation's Plating Up Progress can support the development of a standardised framework for measuring environmental impact by demonstrating to government what businesses can report on.

# 6

## EDUCATION AND INFORMATION

Education and training are important to improve understanding of healthy, sustainable diets in the population, including across key actors such as chefs, healthcare practitioners and local authority staff.

**UK Government and businesses can improve education and information on healthy, sustainable diets by:**

- Embedding food education in school curriculums, including a focus on the benefits of plant-rich diets<sup>79</sup> to enable young people to make healthier, more sustainable choices.
- Establishing comprehensive food systems and nutrition training for key food system actors, including catering staff and healthcare practitioners, with a focus on healthy and sustainable diets.
- Providing clear guidance for industry and public sector actors to deliver campaigns on healthy, sustainable diets that focus messaging and spend on fruit, vegetables and plant proteins.

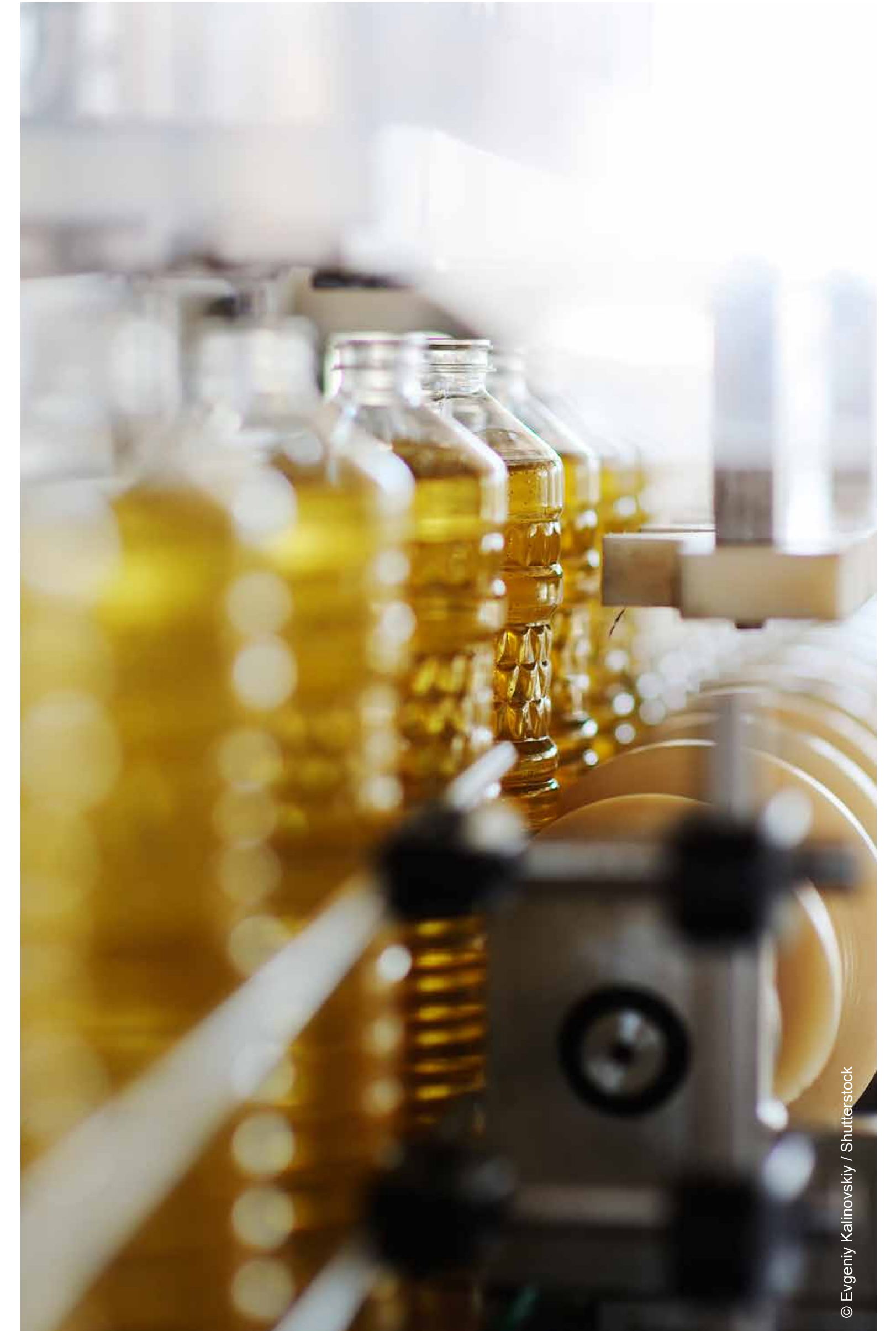
# 7

## INVESTMENT IN SUSTAINABLE PRODUCTION

Investing in sustainable production of a wider variety of nutritious foods will create economic benefits and increase uptake of healthy, sustainable diets at scale. To do this, farmers and growers need financial support, a fair reward for their produce and a level playing field.

**UK governments should focus innovation, research and investment into sustainable production and drive a just transition by:**

- Supporting sustainable growth in domestic pulse and legume production, including in ways that support restoration of peatlands, investing in new varieties of protein-rich crops, and supporting efficient and fair supply chain practices and routes to market.<sup>113</sup>
- Enabling livestock farmers to transition to mixed regenerative farming practices that deliver positive outcomes across environmental, animal welfare and human health factors, supporting a just transition to ‘less and better’ meat and dairy production. This will require an urgent scale-up of government payment schemes focused on rewarding climate and environmental outcomes in addition to food production.
- Investing in the development of, and incentivising use of low opportunity cost feed – feed unsuitable or undesirable for human consumption<sup>114</sup> – and alternative feeds and fertilisers.
- Investing in minimally processed product innovation using plant proteins such as beans and lentils, and funding research and development into taste and texture improvement and nutrient bioavailability.



# LOCAL AUTHORITY LEADERSHIP CASE STUDIES

Local authorities across the UK are establishing Local Food Partnerships (LFPs) and Food Systems Strategies that bring together businesses, food producers and citizens to drive food systems transformation at local level.<sup>115</sup> This can be an effective way to support and enable citizens to make healthier, more sustainable choices, and successful local pilots can be scaled to other areas and inform policy development.

## CITY FOOD ACTION IN BIRMINGHAM AND LEEDS

Birmingham established a Healthy Food City Forum in 2019, which enables stakeholders to work together to apply a whole-system approach to understanding the food landscape of the city.<sup>116</sup> Elected members include representatives from business, public and voluntary sectors, including local businesses and NHS services. In 2017, they established the Birmingham India Nutrition Initiative, a learning partnership with Pune, India. This involved the development of food policies and practices, supporting citizens in both cities to make healthier, sustainable food choices.

In 2017 the Leeds Food Partnership was established by Feed Leeds, Leeds City Council and the University of Leeds to promote a new strategic approach to sustainable, healthy and affordable food in the city.<sup>117</sup> As part of this partnership, Leeds City Council announced three pledges to the Glasgow Food and Climate Declaration to reduce the carbon impact of the food procured across its services. It also produced the Building Food Resilience toolkit for food aid providers to support people experiencing food insecurity, and is delivering a campaign to increase uptake of Healthy Start vouchers.

## INCREASING ACCESS TO HEALTHY, SUSTAINABLE DIETS: FRUIT AND VEG ON PRESCRIPTION

The UK's first large-scale 'fruit and veg on prescription' project, in the London boroughs of Tower Hamlets and Lambeth, aims to help tackle health inequality and food poverty.<sup>118</sup> The £250,000 pilot is funded by local authorities and the Alexandra Rose charitable foundation. Participants will be prescribed 'Rose Vouchers' for fruit and veg up to the value of £8 per week, plus an additional £2 per week for each household member. During the 12-month pilot, the vouchers will be distributed to a target group of 122 residents across both boroughs who are at risk of, or have, conditions such as high blood pressure, diabetes or mental health conditions and are struggling financially.

## REDUCING EXPOSURE TO UNHEALTHY FOOD ADVERTISING: HFSS ADVERTISING RESTRICTIONS

In 2019 the advertising of food and drinks high in fat, salt and sugar (HFSS) was banned across the Transport for London network. The policy formed part of the Mayor's London Food Strategy<sup>119</sup> aimed at promoting healthy eating. One study showed that, following the ban, purchases of HFSS products by energy value were 6.7% lower, equating to 1,001 fewer calories per week per household. The most striking difference was that purchases of chocolate and confectionary products fell by 19.4%, equating to 318 fewer calories per week per household.<sup>120</sup> These findings show the significant potential of advertising restrictions and demonstrate the power of local-level implementation.

## IMPROVING AVAILABILITY OF HEALTHY, SUSTAINABLE FOOD: DEFAULT PLANT-BASED MEALS IN NEW YORK CITY HOSPITALS

The Better Food Foundation, NYC Health + Hospitals and the New York Mayor's Office ran a pilot project where hospitals served plant-based meal options as the default.<sup>121</sup> The hospitals serve three million meals for lunch and dinner each year, and during the trial around 60% of patients chose vegan main dishes. Patient satisfaction with the meal offering increased, as 95% of patients were satisfied with their meal choices. Only 1% of these patients identified as vegan or vegetarian, showing that these meals can be enjoyed by all. As a result of the success of the trial, all 11 hospitals in New York City will now serve a culturally diverse, plant-based option for every meal, such as the popular Southern black-eyed pea casserole.

# CONCLUSION

Shifting to a healthier and more sustainable diet will unlock opportunities to transform agriculture and enable our food system to become a key contributor to a net-zero, nature-positive future.

The Livewell diet outlined in this report is a triple win for people, climate and nature. It meets all nutritional recommendations while significantly reducing greenhouse gas emissions and other environmental impacts. It doesn't cost more and isn't a radical departure from today's diet – although it prioritises a shift from animal to plant protein and a reduction in products high in fat, salt and sugar, it doesn't mean everyone has to become vegetarian or vegan or to give up treats.

Diets are not just a question of personal preferences. Our food choices are deeply influenced by what's available, what we can afford, and how it's marketed. Government and businesses have a vital role to play in enabling and encouraging a shift to healthier diets and a net-zero, nature-positive food system. They need to do more to help people eat better, especially during today's cost-of-living crisis. Healthy, sustainable food should be available, accessible and affordable for everyone, both now and in the future.

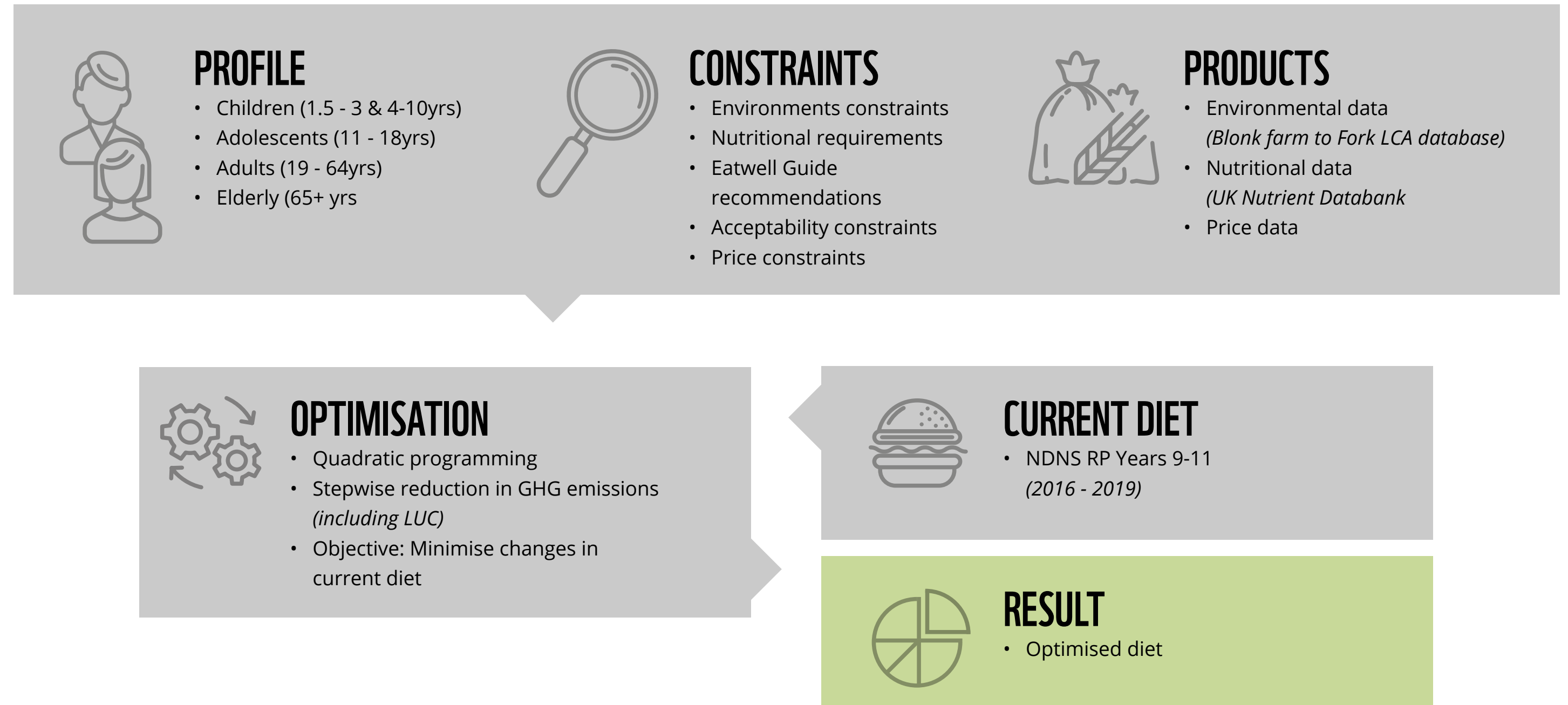


# METHODS

WWF-UK commissioned Blonk Sustainability Tools to undertake the analysis underpinning this report using optimisation modelling to identify the updated Livewell diets presented here. The dietary analysis is based on current consumption as per the latest National Diet and Nutrition Survey (NDNS) data (2020)<sup>i</sup> and we used dietary information for five age groups, based on their specific nutritional requirements. Livewell diets were modelled for children (1.5 to 3 years, and 4 to 10 years), adolescents (11 to 18 years), adults (19 to 64 years) and older people (65+ years). Adults comprise around 61% of the UK population, meaning that widespread adoption of dietary changes in this age group would have the greatest impact. We therefore refer primarily to the adult Livewell diet throughout this report.

Blonk Sustainability Tools conducted the research using the best available data. Dietary intake data is linked to the UK Nutrient Databank<sup>122</sup> and price data was based on the cost of the individual food items, calculated by collecting more than 2,700 prices of 280 food items on sale online in 14 UK supermarkets. Data on the environmental impacts of food commodities (e.g., wheat, chicken, fruit) is based on the Optimeal EU dataset where import/export data is adjusted to make it UK specific. This comes with some limitations, and more granular, accurate data is needed to compare the impacts of different farming systems and practices and therefore identify variation within specific food categories (e.g., beef, dairy, chocolate). Moving to primary farm-level data and using data collected and stored in consistent formats could enable greater differentiation between the environmental impact of food products based on production practices. When improved data becomes available, WWF-UK will look to repeat this dietary analysis.

Modelling allows the generation of optimal solutions that satisfy several constraints at once, and we use four key constraints – nutritional, acceptability, price and environmental – in our analysis. Nutritional constraints were established to ensure the optimised diet provides adequate quantities of essential macronutrients, such as carbohydrates, fibre and protein, and micronutrients including iron, vitamin B12, and zinc. Dietary reference values (DRVs) were based on recommendations from the Scientific Advisory Committee of Nutrition (SACN) and obtained from a Public Health England compilation.<sup>123</sup> Additional nutritional constraints for certain food groups were created using Eatwell Guide recommendations, for example a constraint for a minimum of five portions of fruit and vegetables.<sup>124</sup>



**Figure 6.** Overview of the process undertaken by Blonk Sustainability Tools.

<sup>i</sup> NDNS is a rolling survey of UK food consumption, which includes the amount and nutritional value of food consumed by UK citizens over 1.5 years of age. The dataset comprises details of more than 3,000 food products including composite foods.



To ensure the dietary changes proposed in the Livewell scenario are realistic, the range of change within any food group was restricted – no less than 33% of current consumption levels, and no more than 150% of current levels, unless nutritional requirements demanded greater change. Price was also added as a constraint to ensure the cost of the modelled diets would not exceed the costs of current average consumption.

The environmental impact of the diets in this report was analysed using life-cycle assessment models, which assess the environmental impact of a food throughout its life cycle – capturing production, processing, packaging, transport and consumption. Assessments were carried out for 244 food products found in the average UK diet, including whole, processed and composite foods produced domestically and imported. Environmental impact data from 2020 was used for each dietary scenario.

We assessed the environmental impact against a number of indicators – carbon footprint, greenhouse gas emissions including land-use change, land occupation, water use, acidification, freshwater eutrophication, marine eutrophication, and biodiversity loss including and excluding land-use change. The primary focus was to maximise emissions reductions – as this is imperative to ensure global warming does not exceed 1.5°C – but the other environmental constraints were applied to the analysis to ensure the changes proposed to the diet would also reduce impacts on nature, enabling a nature-positive transition to net zero.

To keep warming below 1.5°C, overall global greenhouse gas emissions need to be reduced to net zero by mid-century. The analysis in this report is based on food systems emission targets for 2030 and 2050 derived from the IPCC global carbon budget allowance for ensuring alignment with 1.5°C. These targets, translated to per capita food carbon footprint allowances, are 2.04kg and 1.10kg CO<sub>2</sub>e per person per day<sup>ii</sup> by 2030 and 2050 respectively.<sup>125</sup>

Rather than applying a reduction target, we used a stepwise reduction approach identifying a diet where there is a balance between effort required and impact achieved. As a result, the Livewell diets modelled here represent a sweet spot – the maximum environmental benefits that can be achieved without deviating too far from the current average diet.

Dietary scenarios and breakdowns for all age groups and food groups; specific nutritional considerations for each age group; and the full list of constraints applied can be found in the appendix together with a more detailed methodology.

ii CO<sub>2</sub>e is a standard unit used to measure the impact of different greenhouse gases, expressed as the amount of carbon dioxide that would produce the equivalent amount of warming.



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WILL UNLOCK OPPORTUNITIES TO TRANSFORM AGRICULTURE  
AND ENABLE OUR FOOD SYSTEM TO BECOME A KEY CONTRIBUTOR  
TO A NET ZERO, NATURE-POSITIVE FUTURE**



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