Dorset Council

FOOD & DRINK

Detailed Technical Paper

15 July 2021

FOOD & DRINK

1. CONTEXT

National

The production of food has an impact on both climate change and ecology. Food production is the fourth highest greenhouse gas emitting sector globally, contributing 10-12% of global carbon emissions. It also involves the removal of natural vegetation, causing a dramatic loss of biodiversity through habitat loss and by isolating populations in fragments of suitable habitat. This is as well as the use of insecticides and herbicides, which reduce biodiversity through direct toxic effects.

Food production contributes to climate change in a number of ways. Farm machinery and transport cause CO_2 to be released, crop fertilisers emit nitrous oxide, and methane is released by livestock and rice paddy fields. Agriculture also contributes to warming indirectly through deforestation.

In the UK, agriculture accounts for 10% of total carbon emissions, equating to 46 million tonnes of CO_2, and this level has hardly changed since 2008. When emissions from food processing, transport, and food waste are taken into account, the Waste and Resources Action Programme (WRAP) estimates that the total carbon footprint of food and drink consumed in the UK is 130 million tonnes CO_2e per year. This is equivalent to approximately two tonnes of CO_2e per person per year.

What we eat has a big impact on the carbon footprint of our food and drink. For example, for every 1kg of lamb produced, nearly 40kg of CO_2 is emitted, whilst for every 1kg of lentils produced, only 0.9 kg CO_2 is emitted.

Excluding emissions from wasted items, the average impact of one tonne of food and drink purchased is between 3.4 tonnes CO_2e, and 3.8 tonnes CO_2e. The total carbon footprint of the UK's household food and drink waste is 25.7 million tonnes CO_2e, of which 20 million tonnes CO_2e is associated with avoidable waste[1].

What we don't eat is also becoming as important a part of the food system as what we do eat. WRAP estimates annual food waste arisings within UK households, hospitality and food service (HaFS), food manufacture, retail, and wholesale sectors in 2018 to be around 9.5 million tonnes. Furthermore, 70% of this was intended to be consumed by people, with 30% being what is perceived to be the inedible parts. This had a value of over £19 billion a year, and would be associated with more than 25 million tonnes of greenhouse gas (GHG) emissions.

Over 85% (by weight) of this wasted food arises in households and food manufacture, although waste arising in one part of the supply chain is certainly influenced by other parts of the chain. The amount of

[1] The water and carbon footprint of household food and drink waste in the UK, WRAP, 2011

food wasted post-farm-gate in the UK is equivalent to between a fifth and a quarter of that purchased by consumers for in home and out of home consumption (22%)[2].

At the same time, UN data shows that an estimated 8.4 million people in the UK, which is approximately 10% of the population and the equivalent of entire population of London, were living in households that report to having insufficient food in the UK in 2014[3]. Furthermore, 5.6% of people aged 15 or over in the UK reported struggling to get enough food to eat and a further 4.5% reported that, at least once, they went a full day without anything to eat. In this respect, the UK ranks in the bottom half of European countries.

The production of food is a sector that is most vulnerable in regards to the impacts of climate change, which has implications for food security. There is an increasing risk of multi breadbasket failure; a concept whereby the global breadbasket (Canada, US, China, and Russia) could experience climate change induced poor productivity in the same year, creating a serious global food shortage. However, any level of climate change will affect the growing conditions for fruit, vegetables, cereals, and livestock.

Higher temperature increases will cause heat stress in livestock, leading to reduced welfare, health, and productivity, and changes in rainfall and water availability will be a key constraint on crop and fodder yields. The increasing frequency of extreme weather events, such as drought and floods, will damage crop and livestock populations, as well as farming infrastructure and livelihoods.

Further pressure will be placed on food production by increases in pests, weeds, and diseases. Warmer temperatures increase winter survival of existing insect pests, leading to increases in crop damage and pesticide use. Changing temperatures may shift the ranges of pests and diseases to new areas where crops lack resistance.

More frequent extreme temperatures and changes to rainfall patterns will lead to overall negative impacts on production in the UK, even if a warmer UK climate may improve growing conditions for some crops. For example, livestock are vulnerable to the migration of diseases with climate change. Bluetongue disease has appeared in sheep in northern Europe, possibly because of temperature-driven shifts in the range of disease-carrying midges.

Crop production is already being impacted by the availability of water resources. For example, in 2018, a heatwave led to low yields of most UK crops, such as cereals, carrots, potatoes, and livestock fodder. In addition, the importance of global climate change impacts affecting the UK through trade networks must be considered. For example, the UK imports 3.8% of fruit and vegetables from highly climate vulnerable countries such as Belize and India, and a further 13.8% from moderately vulnerable countries such as South Africa and Brazil. Reductions in fruit and vegetable availability in the UK will have negative impacts on health.

Climate change may affect food choice through price and availability and will definitely result in the UK population eating different food, produced in different geographical areas. Predicted increases in extreme weather events are likely to have negative impacts on the availability of food and therefore

[2] Food Surplus and waste in the UK – Key Facts, WRAP, January 2020
[3] Too Poor to Eat: Food insecurity in the UK, A Taylor and R Loopstra, May 2016.

result in prices increases. This is likely to lead to some consumers choosing lower cost food, with a negative impact on health as a result.

The nutritional quality of food will be affected as climate change alters the geographical locations from which food is sourced, as food from varying parts of the world has different vitamin, antioxidant, and amino acid compositions. Climate change may affect how foods are grown, processed, stored, prepared, and cooked, which will also have a knock on effect on the nutritional content of food.

Food production is often started by the removal of natural vegetation to plant crops or creating pasture for livestock. This change in land use causes a dramatic loss of biodiversity through habitat loss and by isolating populations in fragments of suitable habitat. Satellite data shows that 28% of the Earth's surface is used for food production[4].

The use of insecticides and herbicides reduce biodiversity through direct toxic effects. Many widely used insecticides are known to affect a broad range of insects, not only the target species. They can also pass their toxicity through the food chain by being eaten by a predator.

Dorset

With more than 8,000 years of farming and fishing heritage, Dorset is justifiably famous for the quality of its produce. Dorset boasts many specialities, such as Dorset Knob biscuits and handmade ice-cream to Portland Dough Cakes and tingling Dorset Naga chillies.

About 75% of Dorset's land is used for agriculture, which is on par with the national average. There are 2,241 commercial farm holdings in Dorset covering 197,008.6 ha., with a gross output of £306 million and GVA of £112 million. Food production in Dorset directly employs 5,974 people, which is 9.8% of the total employed in the sector in the South West.

69,310 ha of this (35%) is given over to arable crops, with 60.4% of this being cereal crops (21.2% of Dorset's farmed area and 13.9% of all the south west's cereal production). Dorset's horticultural sector is comparatively small, covering an area of only 4.7km2 and contributing 4.7% of the South West's fruit and vegetable production.

In terms of livestock, Dorset has 178,895 cattle (10% of SW total), 176,238 sheep (6% of SW total), 67,697 pigs (17.5% of SW total), 1,829,027 poultry (9.4% of SW total), and the largest number of goats in the South West (50%).

Total expenditure on environmental stewardship schemes in Dorset in 2011/2012 amounted to £7.2 million. According to the Countryside and Community Research Institute, for every £1 spent on stewardship activities, the total output in the local economy (within 40 minutes of the farm) is £1.42. That's a £10.2 million contribution to the local economies in Dorset.

[4] BIOADVERSITY: CAN BIODIVERSITY AND FOOD PRODUCTION COEXIST?, E Ashe-Jepson, December 13 2016

Farming practices in Dorset will have to evolve to cope with climate change. A warmer and wetter environment brought on by climate change will cause a change in planting and harvesting dates and also cause a change in the variety of crops planted. While the increased atmospheric CO2 levels will stimulate photosynthesis and, in turn increase crop yields, warmer temperatures could increase and change animal. Furthermore, crop pests and diseases may cause greater fungal and insect attacks.

In Dorset, almost 11% of the land is woodland, which is an increase of 1.3% from the 1990's. Warmer temperatures could increase pests and diseases, while increased rainfall will cause more soil erosion. With employment levels in the Dorset agricultural sector deceasing and with Dorset's forested areas increasing this sector, an opportunity is available to contribute significantly towards renewable energy. This is if alternative land use can be influenced towards carbon sequestration, habitat restoration, and regenerative farming practices.

Food poverty is also an issue in Dorset, with homelessness charity Crisis publishing figures that indicate Dorset residents would have to scrimp on their food budgets, because the level of housing benefit does not cover the full cost of rent. The average weekly rent for a low priced two bedroom property is £149.59 in Mid and West Dorset, including Weymouth, Portland, and Dorchester. The average housing benefit rate is £136.93, leaving a shortfall of £12.66. This is equivalent to 21% of a family's weekly food budget, costing an average of £59. Recent studies also reveal that Weymouth's foodbank is the busiest in the county[5].

Dorset has a good network of local producer and independent markets that serve a wide range of communities in both rural and urban settings. However, this approach does not always encourage families or individuals on low incomes to visit and make a purchase, as many view the products as too expensive. The same is often said about farm shops in Dorset. On average, the percentage and volume of food and drink sold at local producers' markets and farm shops is very low in comparison to the amount of food and drink consumed.

Dorset Food & Drink (DF&D) is a not-for-profit, community interest company, aiming to celebrate food and drink businesses based in Dorset. Dorset Food & Drink's mission is to demonstrate, nurture, support, and celebrate the fantastically diverse, high-quality products, producers, suppliers, distributors, and servers of Dorset food and drink. They work with members' businesses to support and help them get their food and drink businesses seen, known, and experienced by consumers here in Dorset and beyond. This is acheieved by collaborating and learning from each other, demonstrating new products and new ways of working for improved business and environmental performance. The creation of a website hub provides a straightforward directory of local, food and drink products that enables both trade and consumers to buy direct from DF&D Members.

The Dorset Farmers Market was established in 2004, offering a diverse range of local produce. Customers are guaranteed that whatever they buy will have been produced or made within 30 miles of the market. The markets are a great way of shortening the chain between food producer and purchaser, delivering excellent quality and good value local food. In addition, markets and farmers markets can have a role in creating a vibrant high street or town centre and can add value and vibrancy to communities.

[5] Universal Credit could force Dorset families into food banks, Ellie Maslin, Dorset Echo, 01/02/2020

Food waste and food packaging are also an issue in Dorset and are discussed in sections on Waste and Economy. Collaborative campaigns with Dorset Food and Drink and Litter Free Coast and Sea - Plastic Surgery Campaign aim to tackle the issue of packaging waste.

Dorset Council

Dorset Council operates a canteen at County Hall, as well as cafes based at Country Parks and Thorncombe Wood. Schools have their own contracts for either on site-catering, or in the case of primary schools, transported meals, whilst Tricuro provide meals in their care homes and day centres.

Dorset council also have a county farms estate, which helps prospective farmers climb the first step on the farming ladder. The County Farms Estate comprises of 46 farms and is spread over 2,600 hectares throughout Dorset. Over the last decade, the County Farm Estate Property Review has been successful in funding the modernisation of the estate and contributing to the County Council's wider corporate capital programme through the sale and amalgamation of estate properties. The estate is run for the tax payer on a commercial basis, with all of the profit being ploughed back into the Council. The aims of the Estate, as set out in the County Farm Estate Management Plan 2016 to 2021, are to:

- Provide a gateway into agriculture for persons to farm on their own account, whilst ensuring a financial return to us
- Provide us with a direct interest in the land management of the county, promoting the integration of good environmental and farming practices, as well as best practice and innovation in estate management and agriculture
- Sustain rural communities whilst providing opportunities for greater public access and understanding of agriculture and the countryside.

2. THE FUTURE FOR FOOD AND DRINK

Approximately 50% of the Earth's surface is used for food production. However, 80% of this area is used to raise livestock, which produces less than 20% of the world's supply of calories. Therefore, *what* we eat is more important than *how much* we eat[6].

To meet rising food demand while reducing the environmental impacts of food production, more food will need to be produced using less land and emitting less GHGs. A reduction in emissions from food production can be achieved by:

Less carbon intensive food production
Adopting best farming practices, which has the potential to reduce global agricultural GHG emissions, could be reduced by 10– 20%[7]. The Government believes that it is right for the agricultural industry to take responsibility for reducing its emissions and so, rather than resort to regulation, has encouraged

[6] Land Use, Hannah Ritchie and Max Roser, September 2019.
[7] Climate Change and Agriculture. Houses of Parliament POSTNOTE 600 May 2019

an industry partnership to lead in tackling the challenge. The Agriculture Industry GHG Action Plan: Framework for Action [8] outlined how reductions could be made through greater resource efficiency, generally involving changes in farming practice which are also good in terms of business operations. Examples include nutrient management (through efficient use of fertilisers or slurry / manures), feed efficiency as part of good animal husbandry, and the potential of agricultural land to provide Carbon sequestration.

Eat less carbon intensive foods

Reducing demand for high GHG foods, such as meat and diary (variable GHG intensity depending production methods), and substituting them for lower GHG foods, such as cereals, legumes, and vegetables will reduce the impact on climate change and have health benefits. Eating over 90g of red meat a day increases your risk of high cholesterol, with processed meats (such as sausages) classified as cancer-causing by the World Health Organisation.

The production of beef, lamb, and milk is a large source of agricultural emissions in the UK. In 2016, cattle and sheep directly accounted for around 58% of agriculture emissions[9], while there are additional soil emissions associated with growing their feed (e.g. grass and cereals).

The UK could shed close to a fifth of its greenhouse gas emissions from food production if every resident stuck to a healthy diet, based on government guidelines. A switch from the "average diet", which is rich in meat and dairy, to a nationally recommended diet, which includes more fruit, vegetables and nuts, could cause food-related emissions to fall by up to 17%[10].

The 'Eatwell Guide'[11] is the Government's official guide to achieving a healthy and balanced diet. If the UK population ate in accordance with the guidelines, there would be a large reduction in the consumption of red meat, by 89% for beef and 63% for lamb, together with a 20% decline in dairy products. The amount of plant based food in the diet would increase, with meat protein being replaced with more pulses and legumes (up by 86%), and consumption of fruit and vegetables would also increase by around 54%.

Eat more locally

Growing your own fruit and vegetables and supporting your local butcher saves fuel emissions and reduces pesticide usage in industrial farming. It also helps to support local businesses and, in the case of growing food, spend more time outside in a green space. The trust aims to source produce from local suppliers.

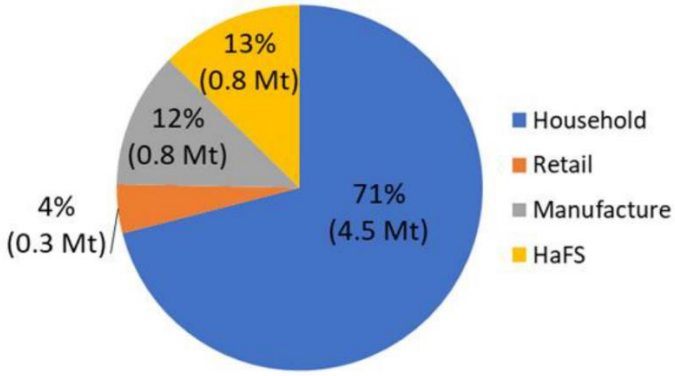
"*Cooking is all about homes and gardens, it doesn't happen in restaurants.*" **Delia Smith**

[8] Agricultural Statistics and Climate Change 6th Edition, DEFRA, July 2015
[9] Land Use: Reducing Emissions and Preparing for Climate Change, Committee on Climate Change, 2018
[10] Behrens et al. (2017) Evaluating the environmental impacts of dietary recommendations, PNAS, http://www.pnas.org/cgi/doi/10.1073/pnas.1711889114
[11] Public Health England, in association with the Welsh Government, Food Standards Scotland and Food Standards Agency (2016) The EatwellGuide

Reducing food waste

The amount of food wasted post-farm-gate in the UK is equivalent to between a fifth and a quarter of that purchased by consumers for in home and out of home consumption (22%). The amount of food waste generated by households and the hospitality and food service sector, as a percentage of the amounts of food purchased, are similar at between 16% and 18% respectively (Figure 4). For manufacturing, the percentage food waste of food produced / sold is less than 3%, whilst for retail the figure is under 1%[12]. Reducing food waste therefore has a significant role in recuing carbon emissions from food and drink.

Figure 1: Amounts of food (excluding inedible parts) wasted in the UK in 2018 by Sector



Wider adoption of regenerative farming practices

In order to divert products of arable lands to direct human consumption, we could and should grow more fruit, vegetables and nuts on what is now arable land. We should also eat more UK (and Dorset)-grown cereals and feed less of it to livestock. Furthermore, we should use less of it for industrial processes (a lot of wheat goes for glucose manufacture). Intercropping will lead to fewer monocultures and create a wider diversity of sown crops and herb rich leys, both of which have positive ecological and carbon sequestration benefits. Greater ecological connectivity within farmland can be achieved though priority habitat restoration and adopting nature friendly farming practices. This is as well as the strategic planting of trees, which will lead to more infield trees in pasture for shade and nutrient cycling, more hedgerow trees, and a more treed landscape.

Eating less

In 2014, 61.7% of adults were either overweight or obese. Eating less helps to reduce weight and the health problems associated with it, such as diabetes and some types of cancer. Environmentally, it prevents wild lands from being converted to farmland, saving wildlife and the atmosphere from habitat destruction and greenhouse gases respectively.

Adapting agriculture to climate change to ensure a secure food supply will also be essential. Options for adaptation include:

[12] Food Surplus and waste in the UK – Key Facts, WRAP, January 2020

- Breeding new crop varieties, through gene editing and other approaches, that are more resilient to changing environmental conditions, such as reduced water availability or increased salinity
- Breeding new livestock varieties that are more resilient to heat stress or diseases, and adoption of heat stress abatement measures, such as improved ventilation in livestock housing
- Controlled-environment farming (CEF), where heat, light, water, and CO2 can be optimised for crop growth in enclosed environments. However, CEF requires high energy inputs. Using low-carbon electricity, waste heat or CO2 from industrial processes can alleviate this
- Diversity of crops - In principle, a high diversity of crops and mixed land uses, such as the integration of livestock, increases the resilience of farm productivity to climatic changes.

Changes in food demand and farming practices may enable land to be taken out of agricultural use for land uses that deliver climate change mitigation and adaptation.

In terms of protecting the environment whilst producing food, many of the benefits of increasing biodiversity can present a useful tool on farmland, including pest control, reduced reliance on outside resources such as imported feed and chemical fertilisers, and crop pollination. A move to "agroecological" farming has seen a revival in recent years as a response to the many challenges facing agriculture globally. There is growing evidence that agroecological farming systems keep carbon in the ground, support biodiversity, rebuild soils, and sustain yields, providing a basis for secure livelihoods.

Sustainable farming techniques, such as rotating crops, planting a diverse range and cover crops can all help protect and enhance ecology. This is in addition to reducing or eliminating tillage, applying integrated pest management, and integrating livestock and cops, as well as adopting agroforestry practices and managing whole systems and landscapes.

3. KEY ISSUES

- Land made available to increase biodiversity will reduce the amount of land available for food production or the value of the grazable land
- High volumes of food waste generated
- High energy density and increased carbon emissions (usually more processed foods with high sugar and fat contents) is often cheaper than its less energy dense counterparts[13]
- Locally produced, organic foods carry a price premium which limits its accessibility to low income families
- The Dorset County Farm Estate is currently focused on carbon intensive practices providing little ecological or carbon sequestration gain.

[13] Food & Climate Change: A review of the effects of climate change on food within the remit of the Foods Standard Agency, undated

4. OPPORTUNITIES

- Developing a vibrant and diverse sustainable food economy in Dorset, including exotic food previously not grown in UK
- Aligning food production to agroecological or regenerative principles
- The County Farm Estate can play an important role demonstrating low carbon, ecologically friendly farming techniques
- Reduced air pollution due to reduced transportation of food
- Improve local diets
- Tackle food poverty
- Reducing climate impact aligns with the Government's guidance on a healthy diet
- Work with local communities, existing food projects, and schools to help develop a plot to plate approach. E.g. The Dorset Urban Food Project Food Future Bridport Local Food Links Community Cooking Kit Transition Towns Network)

5. OBJECTIVES

- Increase diverse, local, low-carbon and ecological friendly food production
- Reduce the consumption of foods from systems which emit comparatively high levels of GHGs
- Encourage uptake of regenerative agricultural practices
- Reduce food waste
- Encourage more low carbon cooking and meals
- Minimise any impact of climate change on the local food economy
- Ensure food and drink supplies are resilient to climate change.

6. CASE STUDIES

- Real Food Heroes (Cornish Mutual)
- Dorset Farmers Market
- Conker Spirit Community Spirit Hand Sanitiser made to supply the UK's and Dorset's frontline services during COVID-19.