

## Food and Trade Advisory Group

### Chair's report by Prof. Tim Benton

**This report reflects the views of the Group, and does not represent the views of the Climate Change Committee, nor has it been endorsed by the Climate Change Committee.**

## 1. Introduction and remit

The Food and Trade Advisory Group was a time-limited group brought together to offer independent advice to the Climate Change Committee on its 7<sup>th</sup> Carbon Budget (CB7) for the period 2038-42.<sup>1</sup> The group met three times (once jointly with the Agriculture Advisory Group).

The Advisory Group was set up to advise the CCC on:

- The role of trade and wider food system policy (beyond the policy support for agricultural production – which was the focus of the Agriculture Advisory Group) in enabling and/or posing risks to agricultural decarbonisation and increasing climate resilience.
- The priorities for UK policy actions in these areas to deliver the pathways in a fair way.

The core of the issue under discussion was that to achieve a pathway to Net-Zero requires more than technical innovation in UK agriculture, but a structural shift in what UK agriculture produces. This has been mainly modelled through simply assuming a change in what UK citizens eat, in aggregate. In a simple world, this would change the demand-side of the equation and directly map onto changing agricultural supply. However, structural change in UK agriculture can be driven in many ways through any number of supply-side or demand-side interventions, responding to policy and market forces acting domestically or internationally.

The Advisory Group was explicitly asked not to provide advice on their approach to the technicalities of modelling the 7<sup>th</sup> Carbon Budget, as that was commissioned before we first convened. Further, we could not comment on the emerging results, as these were not able to be shared during the time the group was active, due to reasons of confidentiality.

Instead, we were asked to assume results consistent with the Sixth Carbon Budget advice. These were that dietary change (corresponding to a 35% reduction in average meat consumption by 2050) as part of a wider structural change in the UK food system was a necessary part of the UK's approach to Net-Zero. **Given this, we were asked to discuss the extent to which policy could be used to encourage dietary change and whether this indeed would result in changing agriculture given wider food and trade conditions.**

This brief report starts with a look ahead to the period of the 7<sup>th</sup> Carbon Budget, identifying that the world is likely to be very different. In particular, trade and market drivers, which are to some extent determined by politics and current events, and indeed climate change adaptation, may drive significant change in UK agriculture and wider food systems. We then go on to examine the grounds for the assumption that UK dietary change will map onto structural change in UK

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<sup>1</sup> The group was chaired by Tim Benton, and included Sean Woolfrey, Chris West, Dustin Benton, Nick von Westenholz, Pete Smith, David Swales, Balwinder Dhoot, Hubertus Gay, and Julia Bogнар.

farming, rather than, for example, resulting in greater exports. Finally, we address what sorts of policy levers can be used to influence demand whilst minimising the risk of carbon leakage from imports, before drawing some wider conclusions.

## 2. The UK food system in 2038-42 will be different from today.

Pragmatically, modelling UK agriculture in 2038, assuming the underlying structure of the sector is the same as today, avoids having to model a range of plausible alternative scenarios, or having to make assumptions about the state of the future. However, of course, the market drivers, trade relationships, and climatic conditions within which UK agriculture operates will not be the same as today. We identified three key drivers of change:

- **Climate change and its impacts.** By CB7, it is possible that the world will have passed 1.5°C<sup>2</sup> of warming and heading for a 2°C scenario. As a result, globally impactful extreme weather may become more unstable, and the widespread extremes of 2023/4 might be a foretaste of this. This is likely to create disruptions in supply chains, especially from overseas. These disruptions could be in imported food supplies, agricultural inputs or packaging arising directly from climate impacts on production processes or indirectly from transport infrastructure disruptions. These disruptions could also be acute in response to extreme weather, or slower-onset changes as production of materials changes in response to climate adaptation and mitigation. Both will dynamically influence markets. At home, UK agriculture has been significantly hit by heat, drought and floods in 2023/24 and harvest yields have been reduced<sup>3</sup>, as have planting patterns. It is likely that in 15 years' time, changing weather patterns will create significant structural change in the UK food system – particularly through changing trade, prices and adaptation within the UK agricultural sector. Adaptive change in UK agriculture – in responding to the absolute and relative impacts of climate - may drive structural change in the sector (which may or may not also mitigate emissions).
- **Non-climate changes in global markets.** The end of the CB7 period is as far ahead as the second Iraq war - or the release of the first iPhone – is behind us. GW Bush was in his 2<sup>nd</sup> term as President, Tony Blair was UK Prime Minister. Since 2006, the world has changed significantly – through events such as the financial crash, food price spikes, the Arab Spring, swine flu/SARS/MERS, COVID-19, Trump as US President, the UK's exit from the EU, Afghanistan, Ukraine, Gaza and the recent inflationary crisis. Looking ahead, the last decade before mid-century is as likely to see a more fragmented and volatile world as it is a globalised and cooperative world. Trade and market prices, as well as demand and supply, are inevitably going to change, perhaps radically. The UK food system will need to adapt, and food security – as a component of national security – may require more deliberative action.
- **Changing consumption patterns.** Diet is an important determinant of public health, worker productivity, social and health care costs. Dietary ill-health is both preventable and a significant determinant of health and social care costs. Thus, the political

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<sup>2</sup> <https://wmo.int/news/media-centre/global-temperature-likely-exceed-15degc-above-pre-industrial-level-temporarily-next-5-years>

<sup>3</sup> [https://projectblue.blob.core.windows.net/media/Default/Market%20Intelligence/cereals-oilseeds/survey-results/Harvest%20Progress%20Reports/2024/AHDB%20Harvest%20report%202024\\_we%2028%20August%202024%20FINAL.pdf](https://projectblue.blob.core.windows.net/media/Default/Market%20Intelligence/cereals-oilseeds/survey-results/Harvest%20Progress%20Reports/2024/AHDB%20Harvest%20report%202024_we%2028%20August%202024%20FINAL.pdf)

imperative for, and space to, incentivise pro-health dietary change – as preventative healthcare - may emerge in the decades ahead.

These three drivers will likely drive significant change in the UK food system – in consumption patterns, food prices, import and export, and in what is grown, and how, within the UK. It is uncertain if the *status quo* – in what is currently produced and traded and the prices paid – is likely to be the case by the 2040s.

As the future unfolds, it is inevitable that the policy environment will change in response. This includes **agricultural policy and support** (“subsidies”, environmental schemes, like the Environmental Land Management Scheme (ELMS), and the regulatory framework – for fertilisers, manure management and pesticides), **trade policy** and agreements (such as the potential for a US trade deal), the UK’s **food and climate security strategies**, **UK health policy** and the potential for a more dietary-focussed “preventative health care” approach. These potential policy areas are discussed further in Section 4 below. How best to achieve Net Zero will change as circumstances change in the decades ahead.

Given the above, it is worth considering alternative futures, outside our normal “business as usual” thinking. The UKRI-funded AgriFood Network Plus recently developed Scenarios that imagine futures described by three variables; whether the world becomes:

- more or less volatile, unstable and contested,
- more or less globalised, and
- more radical in its action to tackle environmental issues<sup>4</sup>.

Clearly, if climate volatility and geo-political tensions rise, and the world becomes more unstable, and if we trade more with close allies than on an open market, where food security is a more immediate concern, it is likely that the market basis of the UK food system will shift, and with it, what is grown, how and where, and how much it costs. Policy is an important shaper of UK agriculture, but the drivers that may shape markets are likely to be more immediate and powerful.

We want to emphasise that *what may be politically, economically or socially difficult (or easy) today may be more (or less) possible in the decades ahead*. From today’s political, social or cultural perspective certain actions may (or may not) seem plausible, but the space for change may arise as the world changes.

### 3. Does UK consumption map to UK agriculture?

The production of animal sourced foods is a significant footprint on both arable land and pasture. In the UK, the utilisable agricultural area (UAA) is 17 million hectares<sup>5</sup>, accounting for 70% of the total land area. Of this, the total crop-able area accounts for about 36% of the UAA, and permanent and temporary grassland, which is largely used for grazing, accounts for an additional 65%. WWF estimates that about 40% of UK arable land area is used for livestock feed.<sup>6</sup> The livestock sector accounted for about 62% of the UK’s agricultural output of £31bn in 2023, and the sector is an intermediate consumer of approximately £23bn of feed, fuel and other inputs and services.<sup>5</sup> Thus, in principle, because of its land footprint, and its emission

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<sup>4</sup> <https://www.agrifood4netzero.net/our-work/scenarios/>

<sup>5</sup> <https://www.gov.uk/government/statistical-data-sets/agriculture-in-the-united-kingdom>

<sup>6</sup> [https://www.wwf.org.uk/sites/default/files/2022-06/future\\_of\\_feed\\_summary.pdf](https://www.wwf.org.uk/sites/default/files/2022-06/future_of_feed_summary.pdf)

profile, a reduction in demand for livestock products, feeding through to a reduction in supply, would have a big effect on both emissions, land use, and the agricultural economy.

However, the UK currently sits within an open trading environment; about 60% of UK food stuffs are produced locally, the rest is imported. Thus, depending on market access, it could be that, even if the UK population radically changes diets and reduces demand for livestock products, UK agriculture refocuses from selling domestically to export, and as a result, emissions and land use might be little affected. This is the core consideration in modelling future carbon budgets: whether, changing UK consumption patterns *will* result in changing the structure of UK agriculture.

*Both demand and supply are important.*

Whilst the focus in CB6 and CB7 has been to assume changing UK diets would map onto changing UK production, it is possible for supply-side policies to drive structural change in UK agriculture. For example, through changing subsidies, nutrient pollution regulations or even a carbon tax on methane emissions (as those being introduced in Denmark<sup>7</sup>). In an open trading environment, such supply-side policy changes in the absence of diet change may change the price and availability of UK-produced food stuffs and it is likely that consumption would simply switch from UK-sourced to imported food stuffs, which may be cheaper and more carbon intensive. The end result would be to undercut the UK agricultural economy and increase consumption-based emissions. Protectionist trade policy, or carbon-border adjustment mechanisms (CBAMS) might mitigate *some* of these risks. Therefore, supply-side interventions alone are likely to be inefficient relative to jointly considering supply- and demand-side effects. Ultimately, reducing demand potentially has the greater impact on reducing consumption-based emissions.

*Would reducing UK demand lead to more exports from the same production?*

In the event of a significant shift in UK demand through dietary change there are certainly opportunities for UK agriculture to switch supply from domestic markets to increased exports under today's market conditions. The actual size of opportunity would clearly depend on the markets, trade deals and UK competitiveness with respect to other major producers at the time.

In the short term, with some exception for lamb which – being out of season for New Zealand – is more competitive than elsewhere in the EU and can sell into that market<sup>8</sup>, most livestock exports for beef and pigs are for smaller, premium markets (examples given by the Advisory group included outdoor-bred, hormone-free pork exported to the US as a premium product). Such markets are by their nature small relative to more “mass markets” and may saturate and be unable to absorb significant growth in exports, if the UK went from domestic-sales orientated to export-orientated.

In the longer term, depending on future conditions (particularly the degree of access to international markets, which countries, and whether climate change enhances or erodes our competitiveness) there is certainly a *plausible* – but perhaps unlikely – scenario that the UK

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<sup>7</sup> <https://www.carbonbrief.org/qa-how-denmark-plans-to-tax-agriculture-emissions-to-meet-climate-goals/>

<sup>8</sup> Since about 1980, there has been a fall in consumption of lamb by around 75% (on a per capita basis) (see <https://ahdb.org.uk/news/consumer-insight-long-term-protein-trends-explored>) yet sheep numbers are broadly comparable (see <https://researchbriefings.files.parliament.uk/documents/CDP-2024-0114/CDP-2024-0114.pdf>) as we have exported more.

livestock sector consolidates to increase efficiencies of scale and competitiveness and becomes much more export market orientated. In such a scenario, reduction in UK demand might not realise significant GHG emissions savings and might even have an increased environmental footprint through consolidation further increasing the intensity of the sector (with also implications for imports that support it from overseas, such as fertiliser and feed production).

Evolving the policy regime (subsidies, tax breaks, land zoning, regulation etc) to reward less production of livestock is feasible, if conducted in a “just way” to ensure the maintenance of farmer livelihoods. There would need to be guardrails to prevent the consolidation of livestock production into export-oriented large-scale businesses – as happened in New Zealand when they removed their subsidies in the 1980s. Such consolidation would be made more likely, for example, if carbon credits from afforestation are somehow prevented from being accessed by these landowners. This dynamic is especially true of lamb production but also applies, to a lesser extent, with beef cattle.

#### *Changing UK demand is likely to affect UK supply*

More generally, it is likely that changing UK demand will broadly map onto structural change in UK agriculture, because the UK livestock industry is currently primarily orientated at domestic consumption. However, this is also assuming broadly “business as usual” conditions and the relative competitiveness of UK animal agriculture doesn’t change, especially in response to climate change. Changing UK diets mapping through to changing UK livestock agriculture will not be close to an exact relationship, and will vary across different species (beef, dairy, pig, lamb, chicken), and different geographies. It may result in land use change that spans intensification (indoor housing, concentrate feed, increased herds) **and** extensification (grass-fed livestock, perhaps in mixed farming systems) as different farmers respond in different ways to access a smaller home market and/or increase exports. In contrast, changing UK supply alone, unless accompanied by policy to avoid risks of carbon leakage and demand changes – could result in increased imports, a less competitive farming sector and potentially a significant growth in consumption-based emissions.

## 4. What policy levers can be pulled that may lead to reduction in livestock?

The headline result from CB6 was that changing UK demand for food is necessary to achieve net zero<sup>9</sup>. What policy approaches can be used to incentivise such changes? And would they work?

First, as we have experienced in the last 5 years, what is politically, socially or economically possible is hugely dependent on circumstances. With COVID-19, we accepted unprecedented social restrictions that under normal circumstances would be impossible to imagine. If the world becomes more fragmented, more contested and less stable, and trade less reliable, perhaps the political space might open for an agricultural policy designed around population health, and an increase in consumption of domestically produced food. It is not impossible to think of fairly radical changes in diet under extreme circumstances, and ones being broadly

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<sup>9</sup> This result arises from both reduction of livestock emissions and repurposing land from animal agriculture. Simply reducing emissions intensity (e.g. through ruminant feed additives) is insufficient, reduction in absolute UK herd size is needed.

acceptable to farmers and citizens alike. What might be possible, pragmatically and politically, will depend on circumstances in the future.

Some possible policy levers may more naturally align with evolving future conditions. For example, in a more volatile and contested world, UK domestic supply might be more important for food security (as was the case during World War Two). In that case, UK agricultural resilience becomes central to national security. Given that climate and weather will be changing rapidly, farming itself will also be having to adapt, and this will not be solely about new technology within the same production systems (e.g. beef, wheat). Adaptation to build resilience might, in itself, incentivise farms to diversify – or they may be encouraged to diversify in a planned way – perhaps moving towards more mixed farming, with complex rotations and heterogeneous farming landscapes. The proportion of highly specialised, monocultural farms might decline, purely from a bet-hedging perspective. Under such circumstances, structural change in the UK agricultural sector might inherently align with a reduction in supply, that would, through price signals and public recognition of the changing role of farming, likely change into a reduction in demand.

The IPCC Special Report on Climate Change and Land, in the food systems chapter, reviewed a range of policy levers that could be used broadly to disrupt supply or demand to drive environmental outcomes<sup>10</sup>. These include changing (a) subsidies, taxes or regulation, (b) research and innovation investment, and knowledge capacity building/advice, (c) trade interventions – tariffs (e.g. CBAMs) and non-tariff barriers (e.g. standards), (d) regulations – on production, manufacture/processing, retail and marketing, including stimulating market transparency, whether for investors or consumers. These broad classes of interventions can be targeted at the supply or demand side). As emphasised above, it is the view of the Group that in a food system dominated by trade, targeting only supply-side interventions to reduce emissions are likely to be ineffective or counter-productive without simultaneously reducing demand and/or disincentivising the offshoring of emissions through trade.

It is the view of the Group (and not the view of the Climate Change Committee), that with regard to disrupting demand, immediate consideration should be given to the efficacy of:

- Investing in technical innovation and scaling up the supply of “alternative proteins”. Alternative proteins could disrupt the food system in two plausible ways: plant and precision-fermentation derived products that displace dairy and processed meat, and cellular meat that displaces complex cuts. The former is much more likely to be cheap and displace the volume end of the market.
- Raising awareness of citizens in order to “take them along” with changing their dietary composition or changing food prices. Both will be contested and citizens would need to be engaged and prepared. Previous research<sup>11</sup> has indicated that unless governments signal the need for change in the long term – whether through education, awareness campaigns, or various forms of dialogue – the need to change will be ignored when it becomes urgent.
- Increasing the price of animal sourced foods via various means (e.g. carbon taxes applied to foods, instituting and regulating higher agricultural standards to gain environmental outcomes), whilst ensuring the reduction in price and increase in

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<sup>10</sup> Table 5.6, p 509, in <https://www.ipcc.ch/srccl/download/>

<sup>11</sup> <https://www.chathamhouse.org/2015/11/changing-climate-changing-diets-pathways-lower-meat-consumption>

availability of plant-based alternatives. For this not to adversely affect farmer livelihoods, it implies a more regulated import policy (e.g. through raising trade standards such as the UK Forest Risk Commodities regulation) or an overtly protectionist trade policy. In the absence of the trade barriers and acceptance of higher costs, raising domestic standards may simply mean citizens switch to cheaper imported goods, farmer livelihoods are affected, with the political costs associated.

- Reducing demand by through waste reduction and enhancing circularity. For example, higher costs levied on food thrown away, particularly food with high environmental costs. Reducing portion size in hospitality to better match nutritional requirements in order to reduce waste might also reduce demand significantly.
- Subsidising citizens – particularly vulnerable ones – to eat in new ways by, for example, changing food environments and food marketing, changing planning regulations (e.g. siting of burger bars near schools), food prescriptions or money transfers. Such approaches may be more efficacious if deliberately linked to healthier diets and a switch from curative to preventative healthcare to reduce health costs and increase workforce productivity. There is potential for incentives – whether workplace or insurance - or pensions-based – to reward people with lowering costs or increasing benefits in response to better dietary health.
- Using public procurement of food better to target dietary change, and thus provide income flows to farmers growing more sustainable produce. In 2010, UK public procurement was £2.4bn and it has been acknowledged as a potential tool in scaling up dietary change to the population level.<sup>12</sup>

In short, there are many potential regulatory levers that can be applied to changing the demand side: it is the view of the Group (and not of the Climate Change Committee) that this could include taxes and subsidies to change prices; various ways to change availability by changing trade or food environments; education, awareness and capacity building to take citizens along and ensure they have the capacity (perhaps including culinary skills) to eat in new ways. However, many potential approaches are politically or socially highly contested. They are mostly also “wicked” issues in that there are always politically important “losers”. Navigating trade-offs – whether ensuring farmers have livelihoods if demand for what they currently produce is eroded, or ensuring vulnerable citizens have better access to affordable, and more sustainable, and healthier diets – will be complex. How to navigate these trade-offs (the actions and their sequencing) is likely to be highly contingent on wider (geo-)political and economic development in years ahead. Perhaps especially including, the economic reality of having to adapt our agriculture and food systems to increasingly disruptive climate. Today’s politics and social attitudes will not be those of a decade ahead.

Of course, a government could simply focus on supply side regulations to disincentivise animal agriculture (more stringent regulation of manure, or emissions, using planning law to zone animal agriculture, carbon or other taxes on animal agriculture, (this reflects the view of the Group and not the Climate Change Committee). But, apart from the political costs associated with undermining animal farming livelihoods, it is likely to be counter-productive, through carbon leakage, without also and simultaneously reducing demand.

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<sup>12</sup> <https://commonslibrary.parliament.uk/research-briefings/cdp-2023-0210/>

## Conclusions

Mitigation of emissions from the land sector is one challenge, alongside adaptation to climate change to build food system resilience. The market drivers, and the UK demand for what the land sector can provide – whether in preservation of nature or increasing public health through diets – are inevitably going to change, and perhaps change fast, especially in an increasingly volatile and contested world. Farming systems **will** change as market, institutional, policy and climate drivers evolve. Whilst we can, in theory, plan for this evolution to be smooth, the direction of travel is unlikely to be smooth, as it will be jolted by events, whether climatic shocks, or the emergence of new pests and diseases or wider economic or political ones.

Whilst CB7 is focussing on mitigating emissions, the time period is likely to be one where farming will also have had to embark on a strong adaptation programme. This will require change in how farming is conducted to cope with changing weather conditions, but also likely change in input and price volatility. In the round, the typical farm in 2040 might be growing different things in different ways relative to today. The regulatory framework and public investments in agriculture will also surely change as the world changes. There are many ways that public policy could be used to restructure the UK food system and intervene in the market to “internalise the externalities”: research, investment, taxes, subsidies, regulation – from environmental to marketing to planning, education and public debates, public procurement to name a few areas. The examples given represent the views of the Group and not of the Climate Change Committee.

In a sense, if the world continues on the current track towards being more volatile, a conceptually simple way of increasing both food self-sufficiency and enabling resilience would be for the UK population to eat a more plant-based diet. ‘Food security’ can be achieved through a much smaller land footprint if the UK has lower meat and dairy consumption. Whether such a policy driven solution to incentivise structural change to this end clearly depends on future conditions.

Hence, it is difficult to define what might be possible in future: what might be impossible to imagine today, might be politically, economically or socially possible, or even necessary, in the decades ahead. Agricultural holdings, in the name of resilience-building, may evolve in such ways that make it easier, or harder, to mitigate – which would endogenously affect the supply and thus price of their production. Similarly, people’s attitudes to what they want to eat and what they can afford are also likely to evolve. Attitudes to tackling health or climate change may change as ill-health rises up the political agenda, and people get exposed to more and more unprecedented, costly and frightening weather.

So, in conclusion: changing diets as a means of changing UK agriculture, to free up land and reduce its emissions, is certainly feasible. And vice versa: the necessary changes in UK agriculture to adapt to climate change and change in market and trade environments in the years ahead, might necessitate a change in diets as price and availability of foods change. Climate change is also likely to contribute to significant issues to do with supply chains, human displacement, economic damage, contestation and conflict. Food security – as part of national security – is likely to become a more pressing issue in future. Such dynamic change in the system drivers is also likely to change attitudes and the politics of climate change. This means it would be unwise to say “it is impossible” to change diets in order to restructure UK agriculture from the demand side, even if, with today’s politics, it might feel that way.

Independent report by the Food & Trade Advisory group

But, food is highly political; and for every single potential intervention, there will be winners and losers. Ultimately, though, without tackling climate change, everyone becomes a loser.