



Select Committee on Food, Poverty, Health and the Environment

Corrected oral evidence: Food, Poverty, Health and the Environment

Tuesday 25 February 2020

10.35 am

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Members present: Lord Krebs (The Chair); Baroness Boycott; The Earl of Caithness; Lord Empey; Baroness Osamor; Baroness Parminter; Baroness Ritchie of Downpatrick; Baroness Sanderson of Welton; Baroness Sater; Lord Whitty.

Evidence Session No. 10

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Questions 74 - 79

Witnesses

I: Dr Tara Garnett, Food Climate Research Network Leader, University of Oxford; Professor Andrew Balmford, University of Cambridge; Dr Adrian Morley, Manchester Metropolitan University.

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Examination of witnesses

Dr Tara Garnett, Professor Andrew Balmford and Dr Adrian Morley.

Q74 **The Chair:** Good morning. Welcome to this evidence session of the Select Committee on Food, Poverty, Health and the Environment. The list of interests declared by members of the Committee is available for those who are watching the session in the audience. The meeting is being broadcast live on the parliamentary website. For the witnesses, a transcript of the session will be taken and published on the Committee website. You will have the opportunity to make any corrections that you wish to make to the evidence before it is published.

I invite each of you briefly to introduce yourselves for the record. We will then move to the questioning.

Dr Tara Garnett: I run the Food Climate Research Network at the University of Oxford.

Dr Adrian Morley: I am a research fellow in sustainable food systems at Manchester Met University. I am also chair of the food policy network Good Food Greater Manchester.

Professor Andrew Balmford: I am professor of conservation science at the University of Cambridge.

The Chair: Thank you very much. What are the key ways in which we see negative effects of food production on the environment? Do different kinds of food have different impacts?

Professor Andrew Balmford: It is important to acknowledge that food production has the greatest set of impacts on the planet of any human activity by a long way, across the piece and across different types of impact. Agriculture uses up a lot of space. It uses up and redirects water. It emits greenhouse gases. It emits other pollutants. It results in the loss and degradation of soils. Beyond farming, in fisheries, it also causes direct mortality of creatures. That means that it has impacts on biodiversity, on climate, on soils, on flooding, on eutrophication, on the acidity of the oceans, on water availability and even on sea-level rise.

In my understanding, those impacts vary widely within any food type. It is very important to understand that there is variation in impact within given food types. In my reading, broadly and consistently they are greater for certain types of food, particularly ruminant meats and dairy foods. Any systems that are relatively low yielding tend to have disproportionate impacts. In order to produce the same amount of food, you need a larger area, so the impacts tend to be greater. They are greater for wild-caught fish compared with aquaculture-produced fish.

The impacts I have been talking about are largely through the production of food. My understanding is that those impacts are much greater than any that are incurred through transport of food, for example. The notion that, because they are flown in, avocados are as damaging as some

higher-footprint foodstuffs or foodstuffs that are produced with greater impact on the ground is a myth. The production of the food is mostly what counts in these systems.

The Chair: Adrian, would you like to add anything?

Dr Adrian Morley: That was a very comprehensive account of the main impacts of the food production system on the environment. I would flag up the issue of food waste. Estimates vary, but between a third and perhaps a half of all food that is produced does not get to its end consumer. That is a physical manifestation of more deep-rooted problems within the food system. It is something that is being tackled, but it could be tackled a bit more strongly by politicians and the industry itself.

I reinforce the point that Andrew made about the complexity of the food system. It is very difficult to make absolute statements about certain product types and food types because it is contingent on the location of production, seasonality, production methods, transport, et cetera. We do not have data for a lot of the food system, so it is very difficult for us as academics and policymakers to do precise modelling of the food system and its impact on the environment. There have been some very good studies that have tried to understand and trade off different types of environmental impacts, but they are based on a lot of assumptions because we do not have the data. That is a point I would like to reinforce.

Dr Tara Garnett: I broadly echo what the others have said, but I will add a little bit of nuance. Facts have to exist within the dynamics of their socioeconomic context. When we are talking about things such as food miles or ruminants, we have to think about them within the context of the economy. I agree that ruminant production, for example, has higher impacts than pig and poultry production, on the one hand, and plant-based foods, on the other.

When we look at it in the context of growing demand, we find that growing demand for beef can lead to land use change, deforestation and all the rest of it, but if we assume a different trajectory of demand, where our consumption of animal products is substantially curtailed, arguably there could be a place for ruminant production, in so far as it makes use of land that is not suited to other forms of food production, although I recognise that it could be rewilded. It can also make use of crop and agricultural residues that pig and poultry, for example, cannot use. Things are bad or good within the context of the trajectories of demand.

I would make the same case for food miles. It is very simplistic to say that the problem is all about the distance that something has travelled, but it is also simplistic to say that transport is not an issue, in so far as a food system that is predicated on the existence of long-distance transport, rapid modes of transport and all the associated logistics and other infrastructure is a food system in which we assume that choice and variety 24 hours a day, 365 days a year is an inalienable right. You then get a systemic effect of the market supplying that demand. Arguably, a more localised system of production could be one in which choice is

constrained and you cut your suit to fit the cloth. When we are talking about the food system and its impacts, we have to think about all the possible alternative realities. We have to decide what we value and the extent to which we value choice and demand over other imperatives.

The Chair: We might come back to elaborate on that a bit more. Before I move on, can I ask each of you to comment very briefly on the flip-side? You have given very clear accounts of the impact of food production and food harvesting, in the case of wild fish, on the environment. Thinking about future climate change and its impact on food production, do you have any comments on whether it is projected that food will become more expensive and more difficult to grow, or is it uncertain what the effects will be, if we project forward to the mid-century?

Professor Andrew Balmford: I am not an expert on this at all. My understanding, from reading other people's work, is that the picture is a bit mixed and complicated. In some parts of the world, the potential yields that might be achieved might increase, but in quite a lot of the world, particularly in parts of the tropics, agriculture will become quite a lot tougher. I have worked in Africa, where it is very easy to see already that food production systems are stretched, and are going to be stretched further, under climate change.

The Chair: Do the others have anything to add?

Dr Tara Garnett: I am not an expert either, but the other day I was reading a paper that made the point that, as the climate changes, it may open up new areas to become suited to agricultural production. The danger there is that you clear wild land because it suddenly becomes potentially productive.

Dr Adrian Morley: A key factor will be an increase in disruptive weather-related events affecting harvests and the supply chains that arise from those. As a nation and internationally, we have to look at global food security and overreliance on certain areas. For example, in the UK we are particularly reliant on southern Spain and Mediterranean Europe for our vegetables at many times of the year. Inevitably, disruptions of that kind will have to be part of our thinking. This is a very dynamic system as well, with population growth and fairly fixed resources. We need to look ahead, as well as dealing with issues.

Lord Empey: Assuming that we are not going back to subsistence agriculture, we need to consider the effect of the increasing population, given that it is increasing not uniformly but in certain areas. What effects are you building into your thinking on that? We are told that we are looking at very substantial increases in certain geographical areas and more stable population in others.

Professor Andrew Balmford: That is a very important point. We do analyses regionally, globally and locally that look particularly at how we might meet future demand in different parts of the world at least cost to climate and biodiversity. That is the question that we try to tackle.

We do those analyses looking at future demand, not current demand. We look at different demand trajectories and how they might unfold. It is important in that to acknowledge not just a lot of variation in population growth rates around the world, which is key, but also changes in per capita demand, which are particularly concentrated in parts of the world that are getting wealthier more quickly. In particular, there is a shift away from plant-based diets towards more animal-based diets. That is absolutely critical in those numbers. The assumptions that you make about that have profound impacts on the outcomes and the option space that you have at the end of it. It is extremely important to factor those in. In my mind, it underscores the importance of thinking not just about population growth, but about changes in demand and what signals we in the richest parts of the world are sending to the rest of the world about what a good diet looks like.

Q75 Baroness Ritchie of Downpatrick: I have a three-part question. How can the agri-food industries contribute to improvements to environmental sustainability? What pressures and constraints are limiting their ability to do that at present? Various contributors have already spoken of a need for new technologies to optimise the efficiency of farming. Is that something we should be aiming for? How do we achieve it?

Dr Tara Garnett: I do not have a forensic understanding of the agricultural technologies industry. From what I have read and observed, there is a real focus on the concept of efficiency. Broadly understood, that means producing more with less, more with the same amount or more with only a little bit more. In itself, it is not a bad goal, but efficiency is a ratio and therefore has no boundary. We live in a world with limits—environmental limits of many kinds—so we have to think about these technologies partly in the context of limits and partly in the context of what our end goals are. If we are producing more food that is making more people fatter and sicker, that is not necessarily a result. We have to think about what we are producing, why and for whom, and what the consequences are for things such as power and justice within the food system: who profits and who loses from the technologies?

We also have to think about the implications for animal welfare. In a lot of the precision agriculture around animal welfare, there is a big focus on health. Of course, health is a good partial indicator of the well-being of an animal, but sometimes it props up systems that you might argue are inherently problematic, in the sense that they do not give animals the freedom to move around and roam, with access to the natural environment. That is a value judgment in itself, but it is arguably an important part of animal welfare.

Some of these technologies are amazing and interesting. They can deliver important improvements in reducing fertiliser use, water use, energy use, the use of medicines for livestock and so forth, but I still think that we need to keep the goals in mind and that they are never going to be the answer in themselves.

Dr Adrian Morley: I want to add a bit about the post-farm food system, the food industry as such. We are talking about environmental sustainability. As was alluded to in response to a previous question, the environmental impact is significant, but in many ways it is dwarfed by primary production when it comes to climate change, water, et cetera. The food industry certainly has a role to play in increasing its own efficiency, energy use and decarbonisation, and in tackling the issue of food waste.

The indirect impact of the food industry on food sustainability should not be overlooked, in that it drives a certain type of primary production. There is a bi-directional relationship with consumers, but the relationship that the food industry has with consumers, particularly at the retail end, encourages a certain element of overproduction and inefficiency in the food system as a whole. The food industry is an important contributor to environmental sustainability, largely through its indirect effects in driving a system that, for many people, is inherently unsustainable.

There are constraints in making changes in the food industry. It is important to make the point that, although food manufacturing is a very large sector—probably the largest sector in the UK—it is a very complex industry, with lots of businesses and lots of SMEs; around 80% of the businesses are SMEs. If we are looking to influence and support change in the food processing industry, we must recognise that it is not like automotive or aerospace, where there are a small number of very large players. That is something that creates a problem for policymakers. How do you influence thousands of food service companies, for example, in the high streets?

Professor Andrew Balmford: There are three broad types of initiatives. One is dietary shift, which we have talked about a little. A second is waste reduction and making better use of the food waste that we create. In particular, there is a window as we leave the European Union to think about reusing pig swill, which is one particularly efficient use of food waste.

The third is around strategic land use planning. This is what we have been working on in my group for 15 years, in eight different parts of the world. In trying to meet whatever food demand we are talking about at least cost to biodiversity and the climate, we find that the most promising solutions are not to try to keep wildlife on farms, often at the cost of needing more farmland to produce the same amount of food, but that wildlife and carbon storage would be much better off if instead we concentrated food production in particular areas. Then in other parts, perhaps within the same landscape, we could have large-scale areas set aside for the ecosystem services that we rely on for nature. That is a consistent pattern that we found in eight different parts of the world, over 40 person-years of work, involving lots of different farming systems and thousands of species.

What that says to me is that in strategic land use planning the most promising way forward would be bold efforts to retain and, where

possible, restore natural landscapes, in part through limiting the expansion of farmland and, potentially, retiring some land from production. It is key that we do that at the same time as encouraging yield growth—increase in production per unit area—from the remaining farmland that we need to produce the food. That frees up space for all the other things that we want from land.

It is interesting that when we talked with a wide range of crop and livestock experts in this country and other countries, but particularly in the UK, they told us that they believe that there is considerable scope for yield enhancements for crops and for livestock, through a whole range of different techniques. The question for us then to consider is, how do you know which of those are acceptable in other ways? The key is that you need to measure their impacts in other domains, such as animal welfare, nutrient run-off or soil loss, per unit of production. It is not often done in that way, but if you want to produce a tonne of milk, what is the way of doing it that is least costly to the rest of the planet?

When you look at things in that way, some myths around what sustainable food production looks like do not necessarily hold. Some of the highest-yielding systems can be benign in other ways, too. For example, we are doing work on the welfare of different pig production systems across the UK. The highest-yielding system that we have visited so far has the highest welfare standards and uses the lowest levels of antimicrobials, but it is the most efficient system out there. We would argue that when evaluating the alternatives, which we will have to do, we need to be very clear about what our metrics are and then collect robust data to parameterise them.

The Chair: What are the constraints on farmers at the moment in increasing production rates at the same time as reducing environmental impact? Are there certain bits of knowledge that they are not adopting, or is it just that there is not the knowledge?

Professor Andrew Balmford: It is a combination of things. There are bits of knowledge that are not being adopted. When I talk to colleagues at ADAS, for example, they say that there is huge variation in the system as regards how efficient different farmers are. That should not be overlooked. There is a failure to adopt best practice in quite a lot of cases. Equally, technologists would tell us that there has been a brake on R&D investment in agriculture over the past 20 or 30 years, which is playing through into a plateauing of yields in some areas. On top of that, there has been what some would argue is a regulatory environment that in some details is not very supportive of agricultural innovation. I would cite those three things: R&D, innovation and the spread of best practice.

Q76 **Baroness Boycott:** What do we need to do about our diet to make it more sustainable? Is it about changing the way industry works or the way the population works? What can Governments do about it? It is a three-part question.

Dr Adrian Morley: We certainly need to change our diets and to move as a society towards a more sustainable diet. I have mentioned the complexity of the system and the lack of data. We can be sure that there are certain principles that contribute to a sustainable diet, such as lower rates of red meat consumption than we currently have and higher levels of consumption of pulses, alternative forms of protein and vegetables. There is consensus around what a sustainable diet looks like. Fortunately, by and large, it is fairly aligned to what a healthy diet looks like, so there is an opportunity to transition towards healthier diets and more sustainable diets at the same time, which is an area of optimism.

You asked about the role of industry versus the role of consumers in bringing about the shifts in behaviour that are required. The food industry is essentially a consumer-driven sector. That is what it would tell you. It is regulated to a certain degree and could be regulated more strongly. If we are talking about working within the existing food system and existing trade relations, and the expectations of consumers in this country and globally, change will be achieved only by shifting consumer demand. That is my view. How we do that is a very complicated question to answer. Government can do a lot more around procurement as regards its own provision—catering services in schools and hospitals—to expose the general public to healthy and sustainable diets. A lot more could be done to give consumers the information they require, whether through industry, on packaging or at the point of sale in retailers, or through public health campaigns and general messaging from policy and NGOs.

The Chair: We have been told that the five-a-day campaign, for example, has had no effect in changing fruit and veg consumption, so it is questionable whether public information campaigns are of any value.

Dr Adrian Morley: It is. What I find interesting is the traction that has been achieved over recent years. For example, we are in the midst of a new interest in plant-based diets. We can see that in all the major retailers and food service companies, which are pushing them. Obviously, that is based on consumer interest in such diets. How that has emerged as an opportunity for industry and demand from consumers is a very interesting question.

Baroness Boycott: It has not actually reduced the amount of beef and meat that we are eating.

Dr Adrian Morley: No.

Baroness Boycott: It is a very small percentage. There is a lot of air time in the newspapers. It is easy to get sidetracked by that from the general trend in food, which is more processed and more meat-based across the world. What can we do? You seem to be pushing it back towards education and voluntary stuff, which has been business as usual and the policy so far.

Dr Adrian Morley: It depends on how ambitious we want to be. We can certainly consider regulating unsustainable foods.

Baroness Boycott: Like?

Dr Adrian Morley: Like providing disincentives for meat consumption.

Baroness Boycott: What about things such as palm oil?

Dr Adrian Morley: There are political realities that I am trying to take into account. I cannot imagine that we would be in a position to put a tax on red meat, for example, in this country. That is my personal opinion.

Baroness Boycott: Tara, do you agree?

Dr Tara Garnett: I am not in government, so I can have a wish list. The first part of your question was about what a sustainable, healthy diet is. Very broadly speaking, there is consensus: "Don't eat too much. Eat less meat. Eat more plants. Don't waste food. Don't eat junk". I think that it has become messier and more contested in the last couple of years, particularly around the ruminant versus monogastric pig and poultry meat question and the rise of the plant-based agenda, which comes with a great deal of puff but is nevertheless going on.

The dis-ease with the arguments to cut back on red meat is around the fact that pigs and poultry are very heavily dependent on food that, arguably, could be consumed directly by humans, such as soy, wheat and so forth. The driver of land use change in the Cerrado, for example, is soy for feed for pigs and poultry. There is an emergent debate around the methane issue, and whether methane is or is not a problem, that has been pulled and pushed in all sorts of polarised directions. Broadly speaking, yes, it is a problem, in so far as it distracts from a proper focus on fossil fuel-driven and dependent systems, which are intrinsic to pig and poultry farming. There is more of a balance between pig and poultry and the ruminants than is sometimes made out.

The sustainable diets thing has become contested, although the broad messaging is the same. As to what should be done, handy leaflets are not going to do the job. Governments actually need to govern. Public procurement gets wheeled out all the time because people are stuck and think, "What else can we suggest?" But it is really important. We need to look at hospitals, prisons, schools, public settings, workplaces and so forth.

Obviously, getting trade right is important. There is nothing I can say on that because it is so fantastically complex, but we cannot export or import the problem.

Government needs to hold industry to account. It should at least require mandatory reporting of the food industry across a range of environmental impacts and health outcomes. That would require Tesco, Sainsbury's and so forth to report every year, or every two years or whatever it might be, on the extent to which the typical basket of goods that they sell both complies with the Eatwell guide and shows improvements in absolute, not just relative, terms.

The role of labelling can be positive and negative. It can be negative in that it places the locus of moral responsibility on the consumer and is a get-out-of-jail-free card for industry and government. At the same time, no food industry wants terrible things all over the front of its packaging, so there is an argument that it may encourage a race to the top. Public information campaigns can help in so far as they can soften up the citizen to vote for a Government who are willing to take the lead on this.

Pricing and taxes are useful. I have not been following the sugar tax in massive detail, but my understanding is that, although sales of sugary drinks have declined, the food industry has made money out of it because the overall volume of soft carbonated drinks has increased. Is that a success or is it not a success? From an environmental point of view, I would say that it is not a success.

Baroness Boycott: Andrew, could I ask you to address one extra point? If we get a sustainable food system, rightly or wrongly, are we probably going to have to pay more for our food? Do you accept that?

Professor Andrew Balmford: Very briefly, we probably are, which is what we did when we were young. There are other adjustments possible in the economy. Maybe we would have less money for chasing houses or whatever and spend less money on some other things. In the long term, I suspect that is probably true if we are going to pay the real cost of food, which is partly what sustainability is about.

On what a sustainable diet looks like, I pretty much agree with what Adrian said. I would push back on the red meat methane thing, particularly the ruminant methane thing. The extent of controversy over the methane argument has been greatly overblown by vested interests. What it totally overlooks is that the majority of the emissions from livestock production come from land use, not from the methane that the animals produce. Pig and poultry use far fewer acres worldwide; 80% of all agricultural land is used for livestock production, a great majority of it for ruminants. That greatly restricts the space we have for other options, such as growing crops that we consume directly or restoring land so that we sequester carbon.

Baroness Boycott: That is very interesting. Some details on that would be great.

Professor Andrew Balmford: I can provide those. In broad terms, I am still very concerned about ruminant meat in particular. On policies, I totally agree that education and information may have a use in relation to softening up, as Tara put it, but I do not think they change people's behaviours directly. There is good evidence of that from the anti-drink campaigns, smoking and so forth. It is unfair to expect individuals to shoulder this in the absence of industry and government interventions. It is not fair and it is not going to change things very much.

Briefly, there are three things. One is to look carefully at whether meat industries, and others with higher footprints, have disproportionate

subsidies. My understanding is that to some degree they do, and those could be removed, saving the public money at the same time as levelling the playing field.

The real question is around pricing in supermarkets and the mark-up between vegetarian and vegan plant-based alternatives and meat. The mark-up is much greater on pulses, tofu and across-the-board protein sources that have a lower footprint. Supermarkets and the food industry as a whole—from farm gate to sale—make more money. Interesting things could be found by investigating that.

The last thing is the “MasterChef” effect. I do not know if this is true or not, but when we talk with chefs, as we do a lot in my workplace, about how to improve the vegetarian offer, which seems to be key to shifting people away not wholly but towards more sustainable diets, the quality of what is offered is very important. The great majority of chef training in this country is focused around meat and two veg, broadly speaking. When was the last time you saw a sustainable meal cooked on “MasterChef”? It pulls all the way through the training programmes and therefore what is available when you go to your workplace café or to a restaurant. There might be some interesting untapped leverage in that.

The Earl of Caithness: Adrian, you said there was consensus on what healthier and more sustainable diets look like. Has there been any work that you know of or have done on crops that can be grown in the UK, particularly looking 15 years ahead when we have a water and a soil degradation problem?

Dr Adrian Morley: How our agricultural sector could react to that is not really an area within my expertise. Certainly, if we are looking at the horticultural industries, we are very seasonal in outputs and areas that can conceivably produce in a commercial sense and yield enough to make a profit.

The industry can adjust to the sustainability/sustainable diet challenge, but the answer would involve importing, assuming that we have the current primacy in consumer choice. There is the issue about our industry being driven by what consumers ask for. If consumers still want their lettuce and cucumbers 365 days a year, there is only so much that UK horticulture can do.

The Chair: Andrew, have you done any modelling work on projections of how much food can be produced in the UK under different climate change scenarios?

Professor Andrew Balmford: We have not incorporated climate change fully into those, but we have looked at how much, based on the yield potential that experts tell us is in the system. They suggested that production per unit area could rise by as much as 50% over the next 50 years if we decided to lift what they would perceive as brakes of various sorts on the system. They are quite upbeat about what might be achieved, which I am quite surprised by, but we pushed hard on that.

The Chair: That is not taking into account the point that the Earl of Caithness made: the projections are that many areas of the UK, England in particular, will be short of both water and soil.

Professor Andrew Balmford: That is right. That means that you then evaluate the alternatives based on their impacts on those. For example, the per gram of protein footprint of pulses, which you can grow very well in my part of England, is vastly lower than the meats that they might to some degree replace in the average UK diet.

Lord Whitty: Listening to this, I am not sure whether you are all convinced that the objectives of a good diet and the objectives of a more positive, or less negative, environmental impact are actually congruent or in conflict. You have said that it is not right to assume that education of consumers is going to deal with this or that consumers themselves are going to deal with it, and the industry is unlikely to deal with it. So my second question is: are there any examples of positive government intervention around the world that you would like to draw to our attention in addressing either of those issues?

The Chair: Perhaps you could focus on the second one, because we are going to come to the point about trade-offs when Lord Empey puts his question. Are there examples that we should learn from?

Dr Tara Garnett: I have been out of action for a while writing a book, so I have not been following this in great detail. I cannot comment.

The Chair: Adrian, do you have anything to say?

Dr Adrian Morley: I was going to give a non-committal and non-distinct answer. There has been some work, for example in Nordic countries, on the Nordic diet. One of the recurring challenges is that food is very culturally embedded in all our lives, and in our socioeconomics and household economics. To shift any consumption across a diet, we need to take account of the starting point in our culture.

In Mediterranean areas there is a Mediterranean diet. There is a Nordic diet. They are essentially tweaks of existing dietary patterns in those areas. How we translate that to a UK or an English context is complicated. It is difficult to find good examples from overseas.

In limited areas such as procurement, there is, for example, the schools meals policy and using that as a driver.

The Chair: What about the North Karelia example in Finland? That was one that was always quoted 15 years ago. It was the high-fat, heart attack capital of Europe. There was a huge shift in diet towards the increased consumption of berries, which are grown readily in Finland, and away from saturated fat. Is that an example that we should still hold up as a case where there has been a significant population-level dietary shift?

Dr Tara Garnett: My understanding of that case study is that it was very impressive and very interesting, but it was a tiny population and very homogeneous culturally. We live in a much messier, more complex and noisier environment. There is also a Nordic collectivity that perhaps we do not have here. I am not saying that it could not work, but it might be a lot more difficult.

If we are talking about health, there are case studies going on in the Netherlands, trying to tackle childhood obesity and doing it in a very systematic, collective sort of way. There are pockets of interesting practice, but we have to take into account the kind of complexity of the UK food and cultural environment as well, and pay more attention to it.

Q77 **Lord Empey:** Do you think that a greater consideration of public health and social equality should be embedded in the design of the food system alongside sustainability? How could that be achieved? Are trade-offs between priorities inevitable, and how can they be managed? A 2019 *EAT-Lancet* report stated: "Food is the single strongest lever to optimize human health and environmental sustainability on Earth". Andrew, I think that was in your initial comments about significance. What do you think?

Professor Andrew Balmford: There are going to be trade-offs, undoubtedly. Speaking to the earlier question very briefly, the most thorough study I have seen on that recently looked at five different environmental impacts and five different health-related impacts, using all the data that was available across 15 different groups of foodstuffs. It found that, with one partial exception, the things that were the best in any one of those were also best in all of the others, consistently across the 15 different food types and across the different environmental outcomes. It was the same across the health outcomes as well. Things that were healthy for you in one way were healthy for you in other ways across the 15 foodstuffs.

Importantly—the bit of good news in the piece—the environmental and health outcomes co-varied as well. Foods that were good for the environment tended to be good for people as well. There were two particular exceptions. They are both partial. One is around nuts and the water that they use. They are good for you but they tend to be grown in water-stressed regions. They still have less water impact than—

Lord Empey: Almonds and things like that in California, for example.

Professor Andrew Balmford: Yes. That is an issue. The second, I think, is around wild-caught fish, which we would all agree are good for us health-wise but which at current levels of harvesting are not sustainable. There are some real trade-offs, but they are not as ubiquitous as they might be within those and other outcomes around animal welfare, antimicrobial use and so on, as I was saying earlier. We found relatively little evidence that those had been evaluated in a robust way, measuring per unit of production. When we do that, there are some trade-offs, but they are not ubiquitous. We should nail them with data and then realise, "Okay, if we are going to go for this, this and this outcome that we want,

it is going to come at this price. Is that the choice we want to make"? I do not think we should let the perfect be the enemy of the good. We should use data to inform those assessments, more than we do at the moment.

The Chair: Tara or Adrian, do you have anything to add?

Dr Tara Garnett: I would add a few things. One is that a healthy and low environmental impact diet is possible but not inevitable. It is an arranged marriage rather than a love match.

In the studies, what I find interesting are the aspects of health that people find it interesting to look at. Broadly speaking, there are studies that focus on the problems of excess, the non-communicable diseases such as heart disease and strokes. They generally find that a shift towards more plant-based eating can address those.

There are kickback studies that look at the problems of deficiencies, such as iron deficiency, bones, et cetera. They tend to argue for a greater role for animal-sourced foods. There is a clash of priorities and value systems. If you look at the sorts of studies that are done, there are studies that say, "Here are some ideal diets that we have jiggled to make sure they hit all the environmental and health targets", and there are studies that say, "This is what real-life healthy people eat; do they have higher or lower impact?" Again, it is quite mixed. Then there are the studies that say, "If you impose some restriction on high-impact foods, what are people likely to eat?" Then you get, "Everyone is going to eat doughnuts".

It depends on how the study is designed and what the questions are. It would be possible, if you waved a magic wand, to have diets that are good enough for health and have considerably lower environmental impacts.

Dr Adrian Morley: Another trade-off we should consider is the balance between our national responsibility and the international responsibility. It is very tempting to draw lines around things. We need to look at the UK for obvious reasons, but the solutions require international co-operation. This may be an area where the UK could lead, given Brexit and our renewed global outlook in trade. A lot of the issues we are tackling or looking at today need to be solved at international level. When we are talking about prioritising trade-offs, we need to prioritise international issues.

Q78 **Baroness Osamor:** What is your view of the "public money for public goods" model outlined in the Agriculture Bill?

Professor Andrew Balmford: It is very refreshing and exciting, and something that a lot of the environmental movement has been calling for, for over 30 years and more. It is very exciting, but there are two riders to that.

One is whether it is going to be delivered efficiently. That will be dependent on the detail and the scale at which it operates. Our work suggests that you need largish blocks of land under nature to store flood waters and carbon and be good for biodiversity. It is not going to be done around the edges of existing farms; it is going to be through much larger-scale thinking and incentives to think that way.

It is also going to depend on its distribution across the country. It is no good thinking, "We are going to retire the uplands from production and farm the hell out of the lowlands". That will not deliver any of the outcomes we want. It has to be finer grained than that, with interventions taking place within regions.

The last thing, which goes back to one of my earlier points, is that despite all of that, even if it is well designed in itself, it will have no benefits whatsoever for biodiversity and the climate unless it is tailored in some way and coupled with incentivising yield improvements and yield increases elsewhere within UK farmland. Otherwise we will produce less food by taking some land out of food production and putting it into the provision of ecosystem services, and there will be greater demand for imports that will displace our demand and its impacts to other countries.

The emissions and biodiversity loss will happen because of land use change in other countries. We have to wash our hands, if you like, and be honest. If we are to prioritise that in the UK, we also need to prioritise interventions in the food production system that make space for it to happen. Those are possible, but if we do not do both we will fail on all those outcomes.

Dr Adrian Morley: The principle is welcomed by a lot of people who are concerned with sustainability in food. In principle, public money for public goods is great. There is an opportunity, thinking about the remit of this Committee, to build in public health as a public good in the Agriculture Bill, not least to send the signal that the farming industry should have a responsibility to enhance the health of the nation.

We need to be careful about the relationship between our imports and trade agreements. There is a danger that any benefits that come through the Agriculture Bill and its principle are undercut by a lowering of standards through trade agreements.

Dr Tara Garnett: My points are broadly the same. Health is important. Another way of making sure that we do not import problems is addressing our consumption patterns at the same time. Part of health is reducing our consumption of animal products and getting trade right.

The Chair: In this session, and indeed in many of the earlier sessions, we have very often heard people talking about changes to the whole food system. Could each of you define what you mean by the food system and what you mean by changing the food system, just in a paragraph or so?

Dr Tara Garnett: The system is different from earlier conceptualisations of food, which were focused on a chain of activities. A system incorporates ideas about people and their relationships, and institutions and their relationships. A system is human as well as environmental and physical.

When we talk about changing the food system, it would be nice to think that there was one little thing that we could do that would suddenly reconfigure everything, but I do not think it is ever going to work like that. The changes are going to be in reassessing what the goals are for the food system, and to me that is delivering a system that feeds people fairly, nutritiously and humanely in the context of environmental limits. That is the change I would like to see.

Dr Adrian Morley: My feelings are similar to Tara's about what the food system encompasses and the challenges. An ultimate goal would be to move towards a circular model, so that the food system goes all the way from waste back to farm inputs in one way or another. One of the challenges of food systems thinking is setting the boundaries according to the change or the phenomena you are looking at. The answer to what a food system is depends on what you want to get out of it. That holds back the whole issue. It is a bit like sustainability. It is difficult to conceptualise and to get your head round it.

Professor Andrew Balmford: For me, the system encompasses everything from production at the farm through manufacture, retail, use in the home and the waste that goes on along the way. For me, there are three changes to the way we think about that.

One is considering the full range of outcomes that society cares about. We have already heard this Committee, the Agriculture Bill and various other things make clear that we are thinking about those much more broadly than we did even five years ago, which is encouraging.

The second thing is that any consideration of outcomes needs to be done on a large scale. That will avoid any of the risk of offshoring that we were just talking about, making our own house good but exporting the footprint elsewhere. It is about considering things at large scale and considering issues of leakage.

The third is that, in trying to navigate our way through the different outcomes and their impacts, it is absolutely key to bring robust data to bear on the issue rather than rhetoric, which has dominated it for too long. As a philosophical point, we must not let the perfect be the enemy of the good. We are in quite a bad place. There are a lot of ways of improving that without getting hung up on making perfect things.

Q79 **Baroness Sater:** You have all highlighted the complexities of producing a more sustainable food system. What would be your key policy ask to ensure a more sustainable food system in the future?

Professor Andrew Balmford: It would be introducing direct or more holistic support for the provision of ecosystem services and biodiversity.

Other things that we get from landscapes besides food, which the Agriculture Bill suggests, must be linked with imaginative ways of sustainably boosting yield in the remaining farmland, otherwise it will fail.

Dr Adrian Morley: The key thing that I would ask for, and which is nascent in the Agriculture Bill, is to recognise the importance of data and reporting it. That has been alluded to earlier.

The Earl of Caithness: I am sorry; I missed that.

Dr Adrian Morley: It was the importance of data and mandating reporting from the food system. If we had a lot more information, with information publicly available for NGOs and different stakeholders in the system, to understand the consequences of individual dietary and purchasing choices, and if we can mandate certain parts of the food system to report different sustainability metrics and incentivise other smaller businesses to do the same, it would go a long way towards identifying a route to manage the transition to a more sustainable food system. In a nutshell, it would be data.

The Chair: Tara, what is your ask?

Dr Tara Garnett: Be bold and do not assume that we can or should rely on the market to solve our problems. Linked to that, we need to talk about consumption. I am not just talking about food. We need to talk about consumption in all areas of our lives.

The Chair: Thank you very much indeed. As I mentioned at the beginning, there will be a transcript and you will have a chance to comment on it before it is published on the Committee's website. Thank you for your very helpful contributions to our inquiry.