HOUSE OF COMMONS

Science and Technology Committee

Oral evidence: GM foods and application of the precautionary principle in Europe, HC 328

Wednesday 29 October 2014

Ordered by the House of Commons to be published on 29 October 2014.

Written evidence from witnesses:

- Sense About Science
- STEPs Centre (with Professor Brian Wynne)
- Which?
- National Farmers' Union
- The Soil Association
- Agriculture and Horticulture Development Board

Watch the meeting

Members present: Mr Andrew Miller (Chair); Jim Dowd; Mr David Heath; Stephen Metcalfe; Stephen Mosley; Pamela Nash; Sarah Newton; Graham Stringer; David Tredinnick

Questions 57-140

Witnesses: **Síle Lane,** Director of Campaigns, Sense About Science, **Dr Jack Stilgoe**, Lecturer in Social Studies of Science, University College London, and **Professor Brian Wynne**, Professor of Science Studies, Lancaster University, gave evidence.

Q57 Chair: Can I welcome the first panel here this morning? We have three short, sharp evidence sessions this morning. Could I invite the three of you to introduce yourselves, please?

Síle Lane: I am Síle Lane, director of campaigns at Sense About Science, which is a UK-based charity that equips people to make sense of science and evidence. The subject of GMOs comes up regularly in our work with public and research bodies.

Dr Stilgoe: My name is Jack Stilgoe. I am a lecturer in social studies of science at University College London, where I work on the governance of new and controversial

technologies. I have a particular interest in whether that can be democratised through various forms of public engagement.

Professor Wynne: I am Brian Wynne, professor of science studies at Lancaster University. I should correct that. I am professor emeritus at Lancaster University as from 1 October.

Q58 Chair: Welcome to all three of you. I start by asking about public attitudes. The Government have said that "most people in the UK are open-minded or don't feel strongly about GM crops". Do you think that is what the evidence suggests?

Síle Lane: Yes, I think it is. GM is just not high on people's agenda. There have been a number of surveys and pieces of research into people's concern or unconcern about GM and their knowledge of it. As to some of the recent ones, a Populus poll in 2012 found that about one quarter of the public are unconcerned about it; about 17% are very concerned about it. A ComRes poll in 2013 found that about 40% were okay with GM and about 40% were against it, and everybody else did not know. It is just not high on people's agenda. Ipsos MORI's monthly polling, which asks about issues that are of concern to people, does not pick up GM or genetically modified food. Depending on the questions asked, surveys find that between 50% and 70% of people do not know much and do not seem to care much about GM. That will not surprise members of the Committee, I am sure. I am sure you do not have a lot of constituents coming to you every day with concerns about GM either. That is the way it is.

It is hard to find reliable attempts at dispassionate research into this though. A lot of research that has been done on public opinion on GM has been framed by researchers who are conducting their opinions, whether to emphasise the value of consulting or around personal objections to GM. In pieces of research, we go from having a group of subjects in it who are ambivalent about GM, to those who say, as one wag in Wales commented after taking part in one of these exercises, "And then they asked us just how worried we were about that thing they first told us about five minutes ago." That is the kind of situation we are in. Most people are ambivalent about it.

Dr Stilgoe: I would strongly agree that there is ambivalence within the general public, but survey work conceals as much as it reveals here. There is a danger in trying to capture public opinion in a simplistic sense because the public are not fixed, nor are they homogenous. There is a risk of complacency if we presume that we can understand the tenor and tone of public debate. When people are invited into more deliberative exercises, like my colleague mentioned, public concerns emerge as extremely multi-faceted, and the caricature that is often offered of the public being either unscientific or risk-averse emerges as much more complicated. We see layers of public concern around GM crops, and they are the same layers that emerged when GM crops became a controversial issue in the 1990s. There again, the caricature of the debate was about whether or not this technology would be risky. I think it is a mistake to focus on that, because we see that there are all sorts of other issues embedded within that.

Q59 Chair: Do you concur with that, Professor Wynne?

Professor Wynne: Yes. Certainly, the public are more open than they are often given credit for. At the same time, as Jack Stilgoe says, there are deep ambivalences in public attitudes. We often misunderstand those ambivalences. Ambivalences are often taken to mean that the public recognise that there are pluses as well as minuses—or potential pluses. The distinction between definite and potential benefits is very important. The public are often dwelling on the potential. The ambivalence is more about recognition of their own dependency, inevitably, on authorities and experts they often cannot trust. That is the key question, and that is what we need to attend to more. That really cannot be explored with survey research, as Jack Stilgoe says.

Q60 Stephen Metcalfe: On the idea that the public are ambivalent and we must not be complacent about that, going back to the 1990s, the screaming headlines published by newspapers framed and defined public opinion. The public were then told, "You must be concerned; you should be afraid." Is that not still a worry? It requires only one or two papers to publish headlines like that to misinform the public, and all this ambivalence will be lost and we will be back to where we started 20 years ago.

Professor Wynne: There has been far too much equation of media headlines with public attitudes. The research that I have read, some conducted by myself, not just in the UK but in Europe, has indicated that people are very sceptical about what they read in the newspapers, thank goodness. I notice that policy actors, and very often scientists also, seem to be assuming that what they read in the media is public attitudes. It is not. We need to look beyond that and understand the much more complex arena of public attitudes, which, as Jack says, are very diverse too.

Síle Lane: I absolutely agree with you, Mr Metcalfe, that framing of the subject is what forms people's opinions, and that is where we have got into the strange situation we are in around the GM debate. Something that has not been given that much attention is how GM is and was framed and presented, which has been out of context. We are missing parts of the context, by which I mean that GM is, as we know, a tool in plant breeding. It is potentially an answer to some of the challenges we are facing and is one of a suite of plant-breeding techniques being used, but in much of the research that has been done into public opinions on GM and the media reporting on it as well that part of the context has just been missing.

When it comes to framing, GM has often been framed as something that is unnatural. When someone starts to describe to you what GM is, it sounds really strange to hear about messing with genes and genetics, until it becomes clear that this is what is happening now anyway. That is how we get our Weetabix; we get it from genes that have been messed with so someone can grow it for us. It has been framed as something completely distinct and different from anything that has been going on already and, therefore, as somehow potentially hazardous. Describing the technique in isolation, not putting it in the context in which it has been used, and framing it as unnatural has not been helpful to public understanding of GM. But everyone did it. Newspapers did it; Monsanto did it with its ill-fated video which portrayed GM as some sort of miracle technique; the other side did it to

an equal extent. I think that is why we are here now having these discussions years and years later. That cut out the public.

Q61 Chair: Is the debate more complicated because people do not understand whether we are dealing with a single technology or series of products? I tested it out in my own constituency and found, with no surprise whatsoever, that when you asked people about GM most thought of the large American car company. That is hardly surprising given the area I represent, but, when you drilled down, there were seemingly mixed views about what it meant. Do you think that is a problem?

Síle Lane: That is part of it. I agree with the very first question that it is a bit more complicated than that. I agree that giving people more information is useful, but that is not the be-all and end-all of it. In dealing with the thousands of people who get in touch with Sense About Science every month, answering the thousands of public questions we have had about plant breeding and GM over the last few years, we have found it useful to help people to get to the bottom of assumptions they already had about GM, to cut through to the underlying implications and discussions about what is going on in the wider field, and placing GM in the context in which it belongs. People do not understand what mutagenesis is. They do not know what scientists do during other plant-breeding techniques either, but they understand what a plant-breeding technique is and where that fits in context. The trouble is that GM has been cut loose from that context.

Dr Stilgoe: I have a particular concern with the way the issue is being represented in that regard. My guess is that, if you spoke to a journalist, they would say that one of their roles was to help people make sense of this issue and put it in a public context at a time at which they would regard it as being framed entirely in scientific terms. There is a danger of treating GM as a scientific issue to be defined by science and whose bounds are set by science. If you ask your constituents, or anybody else, how they make sense of it, they would make sense of it in very different ways, because it is an open question. What will this mean for me? That goes well beyond just the public understanding of the particular science of GM. In that respect, I think the media play a far more complicated role than just the one characterised there. I would not accuse them of misinforming the public. I think they were trying to make sense of a particular issue being framed in particular ways and to reframe that.

Professor Wynne: It is certainly true that the framing issue is a very big and confused one. I have been involved in both public attitudes research and analysis of the way in which risk assessments of GM crops and, indeed, other agricultural technologies are framed. A big problem is that the framing is nearly always narrowed down. This includes the ill-fated Food Standards Agency public dialogue, in which I was involved and from which I resigned in 2010. The framing basically is always GM or nothing. That is not what we have got, and it is not what scientific research should be basically bolted down to either. Scientific research is far more versatile and potentially productive diversely than that. If we are talking about food security rather than GM, we have to frame the issue much more broadly. Typically, I think that most members of the public understand that instinctively, even if they cannot give you chapter and verse on all the different technologies and so on.

Q62 Stephen Mosley: Professor Wynne, I was interested to hear that you have done research across Europe into attitudes towards GM. GM crops are regulated at European level, so views across Europe are as important as views in the UK. During your research have you noticed any differences between attitudes in the UK and those in the rest of Europe?

Professor Wynne: It is a very good question. I led the biggest study of that kind—the five-countries study. They were the UK, Spain, Italy, Germany and France. They are the five central states of the European Union, if we can call the UK "central"—I hope we can—which are big economically and agriculturally. We began with the hypothesis in our research proposal that there would be differences to be expected between those five countries related to food cultures, the structures of the industries and a whole variety of other things. We put those hypotheses into our research proposal. When we came together at our first project meeting with the various partners in the research in those different countries, we were staggered to find how convergent our findings were. We found convergence particularly around the points we have been indicating here, which are basically that risk assessment does not alone cover the issues and concerns. There are big issues, for example, about the concentration in ownership and control of the global food chain.

Q63 Mr Heath: Professor Wynne, if I may follow that up without interrupting Stephen's train of thought, I am astonished by that research. When I was Minister of Agriculture I had a lot of discussions, as you might imagine, on this. I found nobody in Germany, from Ministers to members of the Bundestag, to academics, even the German farmers' union, the Deutscher Bauernverband, would give house room to GM. All of them were adamantly against it, whereas in Spain Ministers were very keen to find common cause with the UK Government. Are we saying that those are political decisions at a point above where the actual population are in terms of their instinctive views?

Professor Wynne: What we were trying to do with our research—I think we succeeded in doing it—was to explore the factors lying behind opinions and attitudes as you can measure them in opinion polls or attitude surveys. We were trying to dig deeper, and inevitably that meant using smaller populations and going deeper into their understandings of what we were dealing with when we talked about GM crops in agriculture and food systems. That is where I am talking about convergence. When one looks at the political systems and economies in play, of course they are very different. Spain has been about the only country in the European Union which has commercialised and grown GM maize, so it is very different from the state of play in Britain and Germany, as you say, and in Italy and France, actually.

Q64 Mr Heath: Germany's stance is almost theological—in fact possibly literally theological.

Professor Wynne: Yes, but Germany has approved GM crops at least for field trials, so it is not a blanket no. I am very interested to hear of your experience as a Minister, which is obviously very relevant, but I think it is more complex when one gets down to lower

levels. I think the same point applies. There is variability of attitude and openness in some respects.

Mr Heath: That is fascinating.

Q65 Stephen Mosley: Before we go on, have the other two panellists any comments to add?

Síle Lane: The discussion in Europe seems to us still to be around GM being presented as a corporate issue, which is a rather simplistic portrayal. I think things have moved on, or are different now in the UK. The discussion around public sector and public good GM is much more mature here among policy makers especially, but among the public and media as well, in a way that has not progressed in Europe.

Q66 Stephen Mosley: Would you agree that the issues both of you have highlighted tend to be more value-based than scientific ones across the continent?

Professor Wynne: If I have understood you correctly, I do not think so. The problem is that there is science and science in play here. Science as research is very different from science as advice to Ministers and decision makers. Science as advice is always selective. That is where framing goes on. Assumptions are made about what is and is not relevant, and then scientists do their best, within quite strict tramlines and their terms of reference, to be independent and answer the questions. But there are certain questions they cannot address, and we find those are often the ones the public are concerned about. There is a real problem and dislocation between scientific advisory processes, which are the best science that can be done under the conditions, and the sets of concerns which the public are raising about GM crops. There is also science as research, which is very different. Thankfully, it is more open; it can ask the questions that the scientific communities involved feel are the important ones to ask. That is not true of scientific advisory processes, sadly.

Q67 Stephen Mosley: That is probably an issue even larger than the one we are discussing at the moment.

Professor Wynne: All I want to emphasise here are the implications of public attitudes.

Síle Lane: It is about misrepresentation of the technology, but, perhaps more than that, it is about assumptions about the technology—about GM not being dealt with in research into public attitudes, for example. The assumptions we and researchers know people have about GM being a corporate issue have not been broken down that much in the research that has been done into public attitudes. For example, if it was set out next to a question about GM and corporate control over it that 80% of the global tractor market is controlled by six big companies, to put it into context, this is normal; this is the way things are in agriculture. That has never been done. That kind of critical self-analysis of the research being done into public opinions just has not happened.

Q68 Stephen Mosley: We have talked about the situation in different countries: Spain, Germany and, of course, the UK. Do you think a single European regulatory framework is the right way to handle issues across the entire continent, or do you think there should be more local or national control?

Professor Wynne: It is interesting to see the response to the World Trade Organisation's disputes panel on the disagreement between basically the US, but also Argentina and Canada, and Europe over the moratorium, as it is called, on GM crop approvals in Europe. The European Commission's evidence to the World Trade Organisation's disputes panel went against the public statements which are made about the need for a singular European environmental and health risk assessment through the GM panel at EFSA. That evidence was stating basically that there are differences in the environment. Maybe with human health it is a bit different, but in the environmental risk assessment there are differences between European states and regions of Europe, and between different agricultural systems, which affect the environmental risks. That is one of the disagreements that are now occurring, which I notice DEFRA refers to as a distinction between science through EFSA—singular—and politics as then done by the member states who opposed EFSA decisions. As to those member states, I have been involved in the Austrian analyses and responses. Those are based on objective conditions in Austria—for example, the proportion of organic farming and the viability, with a question mark, about co-existence. Can GM and organic co-exist peacefully, I mean, not by one contaminating the other through natural processes and human ones too?

On the question of a singular risk assessment or regulatory process for Europe, I think it needs multi-levels. This is a problem with existing risk assessment processes. Questions can be asked and addressed at European level, but there are others which cannot. We do need to be objective about those differences and then ask: how important are these in terms of public concerns, public interest and economic issues as well?

Q69 Sarah Newton: We have had a really interesting discussion about how people are thinking about these issues. From what you are saying about all the survey work, there seems to be a clear need among people for an independent, reliable source of information they can go to—for those who are interested. So who is meeting this need in the UK?

Síle Lane: When we worked with publicly funded researchers at Rothamsted Research a few years ago, we learned that the kind of local engagement they were doing was playing that role. They were talking to people in the local areas about issues they were tackling in their research, problems they were trying to solve, the challenges their research was aimed at and their status along the pathway towards things. It was interesting to us just how far that kind of engagement went among people. It reached people in the local area who were hostile towards big companies, for example, or suspicious about GM in some way or another, but who felt they could ask questions directly of the researchers at Rothamsted as to what they were doing and why, and confront them with their suspicions about proper control of the food system and get back direct answers from those scientists. It was extraordinary how wide that kind of engagement could go, and the kind of support the scientists got from people who may initially have been hostile towards GM or suspicious

about companies. The kinds of conversations the scientists ended up having with them were along the lines of, "Those people wanted their children and grandchildren to be able to choose GM in the future if they needed to." The conclusion that came out of it for us was that people now have a sense that the challenges future societies are going to be facing are different from those we have now. Those are the kinds of conversations they wanted to have.

Dr Stilgoe: I do not see a strong desire for a single one-stop shop for information, simply because I do not think this issue can be defined in a way such that there will be one relevant body. I can see that absolutely we want a situation in which scientists are themselves responsive to public questioning on the scientific issues, but I would not want scientists to feel that they were either required or able to define the whole scope of the issue that is essentially a political one. When issues are political ones, people need multiple sources of information; they want to be able to ask questions, not just about the science of GM but also the future of agriculture and sustainable food security over the next 20, 50 years, or however long. The idea that there is one scientific honest broker for those discussions is a mistake.

Professor Wynne: I agree with that. Síle was referring to opportunities for scientists involved in work, whether it is plant-breeding, field stations or lab work. It is great that there are opportunities for the public to get involved with that kind of lab science or specialist scientific work—it is fantastic—but it is a huge cost for all the scientists involved, and there are not many career incentives for those scientists to do that. BBSRC has attempted to provide room for that with Rothamsted and other places, but basically that is a long way from the focus of your question, which is a singular, independent source of scientific knowledge on these issues. I think Jack is absolutely right. There is no such thing, and there should not be. We should also realise that it is not just a matter of saying it is inadequate in terms of an unrealistic complete picture which is independent and available to the public at large. It is not that that is inadequate just for reasons of politics; it is also because the nature of scientific knowledge does not allow that. There are disciplines. Disciplines have paradigms within which they operate. That is a framing process which limits the scientific perspective of any given scientist. It does not mean to say they are dishonest or political; it is just the nature of the scientific knowledge.

I think we are on a bit of a wild goose chase if we seek that kind of source of authority, as if it will be some kind of balm for controversy, conflict and disagreement. We have to get used to it, and then understand better the reasons for disagreement. Sometimes it is lack of information and understanding, but in the majority of cases it is not; it is about different premises from which people are coming, and different understandings of what is salient when we talk about global food security.

Q70 Sarah Newton: We have moved on from scientific advice and the trusted voice of the scientist and their role in this to the politics and how politicians can be involved. Do you think there is value in any Government, once they have agreed their policy towards GM, being involved in public engagement? If you do think there is an argument for Government doing that, how could they go about doing it?

Dr Stilgoe: For a number of years I have been involved in Sciencewise, which is the Government's programme for public dialogue on science. As part of that, I chaired a group reviewing the public dialogues that had taken place. That was in the context of the Food Standards Agency public dialogue exercise that had fallen apart, in which both Brian and I were involved. The lesson one can take from it is that that form of public engagement is not going to work if it is framed disingenuously, because there was a lack of clarity of purpose. It was not clear whether that was designed to inform Government policy agendas and help Government set a trajectory for innovation and governance in this area, or if it was trying to make the case for a particular Government policy that had already been decided upon. What I would say—I gave similar advice to Rothamsted at the time it did its GM wheat trial—is that you need to have public engagement at a time when it is going to be constructive. If Government had made up their mind on a particular policy, that becomes a matter for regular political decision making, and it is probably not appropriate to ask members of the public what they think because it is not clear that their social intelligence will go anywhere.

Síle Lane: That is exactly the point. If you are asking for people's opinions and doing public engagement, you have to be clear as to why you are doing it. Why are we asking for this? Are we asking people's opinions as part of a survey or social science research, or is it genuinely to feed those opinions into policy? Are we genuinely asking people to vote on a new policy we are about to bring in? People will give different opinions in those two different situations, and you have to be clear about what the situation is. If you are asking people their opinions in order to feed into a policy, or vote on a new policy, you also have to ask them to vote on the status quo. If you are asking people to vote about a new plant-breeding policy, you also have to ask them to vote on the fact that mutagenesis is being used in plant-breeding now. If you are asking people to vote on a new policy to react to potato blight, you also have to ask them to vote on the fact that potatoes are now being sprayed with chemicals 25 times a summer. You cannot just ask people to have an opinion and not also ask them to take a bit of responsibility for what that opinion is if it is voting on a new policy. You also have to give people all the information. I would counsel that we do not at all think that giving people all the facts is the be-all and end-all of the story. That is not the way to victory, but you would not ask someone to vote for a candidate if you had just disclosed half of what his policies were going to be. We should not ask people to vote or have an opinion on something when all the information has not been put before them.

Q71 Sarah Newton: The former Secretary of State, Owen Paterson, absolutely said that the Government should make the case for GM to the public. Do you agree that that should be an objective of public engagement?

Dr Stilgoe: That is not what I understand by public engagement. I understand public engagement to be a constructive process of developing policy and allowing Government to rethink their own assumptions. Typically, it works best when it takes place way upstream, which means it is rather problematic when it comes to the particular controversy around GM crops because it has become very polarised. I would suggest that that was just the business of politics, and I would want to distance that from what I understand as being public engagement.

Q72 Sarah Newton: There are different sorts of public engagement. There is highly consultative public engagement in the sense of, "Help us to shape policies," but any Government is involved in public engagement once a policy has been agreed upon to get the public to support it—for example, giving blood donations. You have a public engagement programme to build support for the policy after you have decided you will do it. Given that explanation, do you think this is something we should be doing, going out there with the information and making the case to build public support for GM?

Professor Wynne: I am confused about exactly what the policy is and relating this to what I understand about public concerns. If you have made a policy through a democratic parliamentary process which says, "We want GM," then, okay, you should explain and justify it—of course you should—in all kinds of different ways, but you should also be listening to the concerns around the basis of that policy.

I hear from various authorities, although I am not sure I hear it from Ministers, the classic phrase "We should have all of the tools in the toolbox." There is the question of GM, but what else is there? A big question about GM when you look at it globally is: can it peacefully co-exist with all the other tools in the toolbox, or is it going to swallow them up, and maybe a lot of biodiversity as well as we go? Seed diversity is diminishing enormously at the present time and has done for the last few decades. That is a big issue in terms of global food security for the future. With regard to the extent to which GM is a part of that, of course you cannot say GM is the cause of that; there are all kinds of other causes for why that is going on, but GM is part of that trajectory. The question is: what part and how significant is that? Can GM be developed and implemented as a policy for Britain and elsewhere in a world where we can increase agricultural biodiversity from the seed diversity available for new conditions that we cannot predict, thanks to global climate change but a variety of other things as well? That is why I do not understand the basis of the policy. All I hear is, "GM, GM, GM," but we also hear, "But we need all the tools in the toolbox." So what is the policy to keep all the tools together in the toolbox in peaceful co-existence, and hopefully mutual support? I do not see it, so I have questions.

Going back to public engagement, if the policy has been decided—with a question mark as to what the policy is and where the contradictions are—that is the first question I would expect the public, NGOs and other parts of civil society to be asking about the policy, and then one has to have some decent answers.

To go back to the point about public engagement, the issue of timing, as Jack indicated, is absolutely crucial. Public engagement, as has been conducted by, for example, UK research councils, has often been done at the early stages—not always. The GM wheat at Rothamsted was a case where it was too late, but in other instances the research council has been very good at having public engagement and asking the public with whom it has engaged, "What are your questions about this?" It has acknowledged that it has had some very good questions from the public that it had not thought of. The ordinary public, often farmers as well and other parts of civil society, have asked the scientists good, relevant questions which have improved the science, and the science research council has

acknowledged that. An important dimension of public engagement is the questions people are asking, not just the opinions they are expressing.

Síle Lane: I would underline what I said earlier. If politicians are expecting people to engage with them on new policies, or form opinions about new policies, they will need to give people the context of the policy, information about the status quo and all the information about what the policy is trying to achieve and what the alternatives are. Ideally, all of the things I mentioned earlier are what politicians would be doing.

Q73 David Tredinnick: I was going to ask a general question on the need for further public dialogue, but I think that is superfluous having listened to the discussions over the last 10 minutes. From what you are saying, it does seem to me that there is a real need for the public to put forward their views, so it should not just be a lecture process from people in authority. Is that right?

Professor Wynne: Yes, definitely.

Dr Stilgoe: I think that is right.

Q74 David Tredinnick: Wearing the hat of someone who worked in the advertising industry many years ago and trying to boil things down to a very simple concept, if I am asked to present this, it seems to me you have a situation where GM to the general public means weird plants with funny things coming out of them which are potentially a threat, unfortunately. For tabloid newspapers, black top or red top, it makes a terrific headline—"Terror"; it is a good story, although it is definitely not true in the way it is presented, whereas food security has a very warm feeling. That is about saving lives and making more people happy across the world, and you can explain the difference between what is going on in Germany and Spain. In Germany you have very large food security and you can perhaps have the luxury of being not very keen on GM, whereas in Spain, which is an arid country and subject to more flood and famine, it is more open to the possibility of developing ways of avoiding that sort of thing. Do you have any resonance with what I have just said?

Professor Wynne: In terms of the specific factors and a comparison between Germany and Spain, I do not think I have any comment on that. The research we were doing and research I have seen since that time has not really dwelt on specific questions of that kind.

Dr Stilgoe: I would repeat a recommendation that came out of the Royal Society's report "Reaping the Benefits" on food security, which I think came out in 2008. The recommendation there was that public dialogue should start with the issue rather than presupposing any particular solution whether or not it is GM, which immediately forces people into a yes or no polarised discussion.

Q75 David Tredinnick: It is a means to an end, is it not? The end is food security; GM is potentially a means, but there is biodiversity and all the other issues, like seed pollination.

Dr Stilgoe: There is the potential for a constructive conversation if you frame it in those terms and start from that end. I would not necessarily agree with the reasons you identify for doing so. However, in terms of the potential for constructive public engagement, I would say yes.

Síle Lane: There is a lack of awareness about the challenges we are facing in agriculture, food security being one of them, but there are other challenges. Did you know, for instance, that the plum pox virus, which has now come into Europe a bit more after opening up trade borders in the east, is now prevalent in 16 member states? It is very hard to contain because it is carried by an aphid. Did you know that soil is being polluted by phosphorus because of the use of pig manure? It is making soil very polluted, and we need to find solutions to that. There are real challenges faced by agriculture, but there is a huge lack of awareness of them. Because of that, there is a lack of ownership. Right now it is nobody's problem that soil is being polluted by phosphorus from pig manure, but those challenges explain why certain research questions are being pursued. The way to do it is probably by more awareness and ownership of the huge problems that we are facing as a society in terms of food security and beyond.

Q76 Pamela Nash: I wanted to ask before you go about the difference between UK policy on GM foods as opposed to the Scottish Government's policy. The entirety of their policy statement on this is: "The cultivation of GM crops could damage Scotland's rich environment, and would threaten a reputation for producing high-quality natural foods. It would damage Scotland's image as a land of food and drink." This does not appear to me to be based on scientific evidence but opinion. Do you think that reflects any difference in opinion in Scotland as opposed to the UK population as a whole? Have you seen any evidence of that?

Dr Stilgoe: Brian will be able to say much more about this, but I think it reflects different political circumstances and understandings of what is essentially a political issue. The science will not tell you what to do in this regard, so we should not expect different Administrations with various degrees of devolution necessarily to agree.

Professor Wynne: I worked in New Zealand a bit more than 10 years ago. It was very interesting because New Zealand had exactly the same concerns about its clean, green, global image. It is also a big global exporter of food to Europe, the US and elsewhere. That had a lot of force in New Zealand for good reason. You could say it was only opinion, but you could also say it was opinion with a lot of economic consequences hanging on it. I happen to be a Scottish voter. I feel that that is a legitimate and valid understanding of Scotland's position. It would need to be developed if they wanted to make some mileage out of it, but it would also need to be questioned. That is the point. They should be monitoring and also funding research, which can be done, to check out whether that has a valid basis and could be built into something that was very significant in terms of the agricultural economy.

Q77 Pamela Nash: Just to be clear, they are not funding research, and they have a policy commitment not to fund any research into GM.

Professor Wynne: Yes.

Síle Lane: You can imagine a situation where ash dieback comes into the island of Britain. It could become a problem if Scotland has a different policy from England and the rest of the UK. You described Scotland's policy, setting out that it wants to reduce the risk of certain things. In a situation like that, there could come a point when they start to reduce their access to benefits and solutions.

Q78 Mr Heath: My criticism about policy is that the problem we fall into and you have fallen into today is to talk about GM as GM, as though it was a single entity, methodology or technique. It is not; it is lots of different applications, some of which may be very good and some of which may be appalling and, as you say, crowd out other alternatives. Do you accept that? My criticism of your evidence is that you have repeatedly talked about GM as though it was a single entity.

Dr Stilgoe: In reflecting back the way this particular inquiry is framed—I would agree with some of the written submissions you have—it is incredibly narrowly in exactly those terms. When I talk about GM, I am thinking as a social scientist about a particular controversy that has used the idea of genetic modification as a condensation point for a much wider set of concerns, but I would not pretend for a second that in technological terms, or even in the sense of the public's meaning of that term, GM is one thing. I am merely reflecting back some shorthand that has been used in the framing of this inquiry, which is problematic.

Mr Heath: Fair enough.

Síle Lane: Same here. That was what I was trying to get at when I said that maybe the way forward is to talk about individual, specific, real and tangible agricultural challenges, and GM being one route towards potential solutions to those. If there is one lesson that could be learned from the GM debate, it is that presenting a technique as a black box in isolation, without explaining what it is and what it is being used for, and then asking for people's opinions about it is not useful.

Mr Heath: So Scotland is not sending back the internet.

Chair: Can I thank the panel very much for their time this morning? It has been extremely helpful. We will move straight on to the second panel. Thanks very much for your attendance.

Examination of Witnesses

Witnesses: **Sue Davies**, Chief Policy Adviser, *Which?*, and **Jon Woolven**, Strategy and Innovation Director, Institute of Grocery Distribution, gave evidence.

Q79 Chair: Good morning, and thank you very much for joining us. Perhaps you would be kind enough to introduce yourselves for the record.

Sue Davies: Good morning. I am Sue Davies, chief policy adviser at *Which?*, the consumer organisation, where I am responsible for its food policy work. As EFSA is relevant to the inquiry, I also wanted to let you know that I am the chair of its management board in a personal capacity, but I am here representing *Which?* today.

Jon Woolven: I am Jon Woolven, strategy and innovation director at IGD. We are a charity that works with food companies to deliver public benefit across a wide variety of areas.

Q80 Chair: Thank you very much for coming. During the evidence we have collected we have had a very wide cross-section of views expressed, including one witness who argued that UK shoppers are "sophisticated consumers who have rejected GM food". Is that an accurate portrayal?

Sue Davies: From our experience of the research we have done over several years—we have done a mixture of survey work, focus group work and more deliberative-type research, as was discussed in the last session, to try to learn how people understand GM as well as new technologies more generally—it has shown that some people are opposed to GM and have a principled opposition to it, but, as another speaker said, a lot of people feel that they need more information and are not really clear as to what the issues are. Historically, the main issue has been that people have felt they have not had any choice and have not been clear about what the benefits are for themselves, so that is why they have not wanted to see GM in the supermarket.

Jon Woolven: We have been conducting consumer research in this area for 20 years now. The single most telling statistic is that, even now after all the publicity on this topic, only 20% of people feel they have a good understanding of GM. When you put that to the test and ask people to provide you with a definition, only about three quarters of those people give a definition that we feel comes anywhere close. Therefore, only around 15% of the population have a good understanding of this topic.

Q81 Chair: Have you done the opposite? You heard David Heath's last question to the previous panel who explained correctly that we are not dealing with a single process here. Have you started with information and then posed questions?

Jon Woolven: Yes. We have looked at this from a variety of directions. You clearly get different discussions depending on the information that you provide to people up front on

this topic. Whether you are talking vaguely about this very broad branch of science or specifically about particular products, real or hypothetical, the single biggest issue is still lack of public understanding. When people form an opinion, they do so fairly vaguely on the basis of the concept of high technology applied to food rather than specifically around what the science is about.

We find that the opinion has not moved very strongly since the turn of the century. There has been only a slight fall in the number of people strongly opposed to GM over that period. There has been a slight increase in the number of people who feel they have a good understanding of this topic, but it still reaches only one in five of the population. Still, 44% describe themselves as neutral on this, and only 17% feel they have a strong opinion on the topic; 14% are strongly against and 3% are strongly in favour. Therefore, the majority of people are still sitting on the fence or have an opinion that is not fully set.

Sue Davies: We conducted a series of deliberative workshops at the end of 2012 where we wanted to do exactly what you have said and explain to consumers from a range of backgrounds the different challenges facing the food system. We held workshops in London, Belfast, Cardiff and Glasgow and had a range of experts explaining food security, food sustainability and diet and health challenges, and also talking about the range of possible solutions, technological and non-technological—GM and other types of technologies—in order to understand how people responded to that. That was really valuable, in that it showed that many people were not aware of the challenges at all. They were obviously much more familiar with issues like diet and health, but when they talked about environmental impact and potential food shortages it just was not on their radar, but they became engaged with the issues and were very interested in the different solutions. Some people were wary of technology, but on the whole they felt they wanted much more information about it. They felt there was not one particular solution—that you needed to look at a range of solutions. What came out strongly was that people felt there needed to be strong independent oversight. They wanted to know much more about the risks and benefits and level of oversight in place. They were also saying they did not want false promises, in the sense that, when there have been technological developments in the past and different promises, often they have not been realised.

We are about to repeat that research and go into more detail. We are doing it jointly with the Government Office for Science, and it will be funded by Sciencewise. We want to take specific case studies of foods and explore the social issues and challenges in terms of food security, sustainability, health, food prices, whatever.

Q82 Chair: Are you pushing that research outside urban areas this time?

Sue Davies: Yes, definitely. Even when we did it in urban areas we made sure that we recruited people from rural areas as well, because previous research showed that that showed there was a difference. We will be doing that over the next few months and it should be ready in the spring. We want to put GM in that much wider context. Obviously, GM is not the starting point; it is about technologies and different solutions in general.

Q83 Chair: Have you set out a framework for how that is going to be conducted?

Sue Davies: We are in the process of agreeing that. We have an external advisory group and input from different Government Departments to make it as relevant to policy as possible. We wanted to take a series of case studies, looking at something like chicken or red meat production and some of people's priorities when they are buying that, and then what the different options are, whether it is about their own food choices, more traditional technologies, or about engineering or biological solutions, and going into much more detail about the technologies.

Q84 Chair: I think we would like to be kept abreast of that.

Sue Davies: Yes, definitely.

Q85 Jim Dowd: I want to come back briefly to what Mr Woolven said about the survey and that little had moved over the years. Could it not be the case that this is an issue where one set of so-called experts tell you one thing and another set of experts tell you the contrary? People's attitudes are not going to move; they will remain effectively don't knows, regardless of whatever information is put forward, particularly if there is a notion that on one side are the big corporates, for whom this is good, and on the other is "the environment lobby". Is there not going to be deadlock here, and most people will say, "I don't know"?

Jon Woolven: You are probably right when you are looking at something that is very broad. As David Heath said earlier, this technology can be applied in a broad variety of ways. When you probe people, they feel there is both potential for good and benefits from such a technology but also risks. Therefore, people are not likely to sign a blank cheque which says, "I'm in favour of all potential applications of this technology." They will be interested in the specifics of actual applications. Further down the track we will have some more interesting applications of GM which are likely to take the public discussion in different directions.

Sue Davies: From our research, it is very much about how people weigh up the risks and benefits—medical applications have never been as controversial as food applications—and whether or not people feel they have a choice in terms of both the individual products but the wider direction in which we have decided to produce food. I think it was that that caused the backlash. There were discussions about how GM would be introduced in the very early 1990s, and, when the commodity crops came on to the market and people suddenly realised they were eating something they had not known about, they felt very sceptical about somebody else making decisions about what was right for them.

Q86 Graham Stringer: Given the statistic you gave us that only 15% of the population have a reasonable understanding of what GM might mean, what mistakes were made in the debate when GM was first introduced as an issue? Is there any way of putting that right or avoiding those mistakes?

Jon Woolven: The very first launch of a GM product in the UK was a tomato paste. Through IGD, we facilitated a very broad discussion that included *Which?*, the relevant biotechnology company, the National Farmers Union, food retailers and manufacturers. The approach developed around that launch was, first, to offer it alongside the previous product; so the previous product was not withdrawn. It was a product that had a consumer benefit. It scored very highly in taste tests; it was also slightly cheaper to produce, and that cost saving was passed on; it was clearly labelled; information was provided at the point of sale so that people could be well informed; and it was a highly successful commercial launch that attracted very little controversy.

As Sue said, after that, the topic moved on to GM soya, which of course is a big global commodity crop that is highly pervasive across a variety of products. It was not possible for companies within the UK to control introduction in the same way that was done with the tomato puree. The concern was that this was going to be introduced suddenly without choice. Individual companies independently found non-GM sources of soya, so it did not turn out that way, but it looked as if it was going to be for a while. That triggered widespread consumer concern and created a bit of a tidal wave that happened much faster and on a bigger scale than anyone had anticipated.

Sue Davies: I agree. If products had been introduced in the same way as the tomato puree, where you had a very clear choice about whether or not to buy that product, people's attitudes might have been quite different. When the soya and maize came on to the market a lot of people had not even realised they were eating soya, because soya and soya derivatives were in so many products, so they felt they did not really have any control over what they were eating. The first commodity crops also caught the regulators on the back foot. We were in a situation where regulation was constantly trying to keep up with the market developments, and, as Jon said, retailers and manufacturers then stepped in to ensure there were segregated supplies which enabled people to have a choice while regulation was put in place. That sequence of events made people sceptical about it, particularly when the benefits claimed for the products were much further down the supply chain rather than consumer benefits.

Q87 Graham Stringer: That is interesting. Of the different crop traits that could potentially be engineered via biotechnology, which do you think would be most valued by UK consumers?

Sue Davies: It goes back to the point about putting these issues in the wider context and in a UK context. A lot of the discussion has been about GM or not GM, and the benefits claimed have often been about benefits for other countries rather than some of the specific UK challenges that we are facing and what potential solutions, traditional or novel, we should be looking at. From our research, people generally felt they wanted a lot more information about the different possibilities. There is potentially more scope when you look at people's priorities. Obviously, price is a key factor at the moment that drives people's choice, but issues such as nutrition, health and safety are very important to people. Other potential issues, such as the environmental impact, are ones people are not

very aware of at the moment. That is why we need to have a fuller discussion about what the challenges are and then what the opportunities might or might not be.

Q88 Mr Heath: Do you think British consumers are aware, taking soya as an example, that 316 million Americans, or however many there are, have been eating this stuff for the best part of 20 years? Do you think they understand that and, if they have ever been to Orlando, they have eaten GM food?

Sue Davies: We have not asked that specifically, but, given the debate often played out about what is grown in America and American imports, I think people have a strong sense that this is quite widespread in America and Europe is quite different.

Jon Woolven: We have asked that. We asked people to estimate whether they were eating more or less GM food when they were travelling outside Europe. Most people did not know, but the overall estimate was less rather than more.

Q89 David Tredinnick: Changing tack slightly, why do you think consumers choose to pay a premium to buy organic products?

Jon Woolven: People buy organic for a whole variety of different reasons. From our research, the top two drivers are "more natural", whatever that means exactly, and it is desirable for those consumers, and also "environmentally friendly". That is followed up by "tastes better", "healthier" and "better animal welfare standards". In terms of the GM aspect, one quarter of organic shoppers in our surveys mention GM-free as one of the reasons to purchase organic.

Q90 David Tredinnick: To what extent has the organic brand become linked with other attributes valued by consumers—for example, extensive farming and animal welfare?

Sue Davies: Our research shows similar findings in terms of why people buy organic, and it will vary for different people. Some people may be more focused on animal welfare. It is seen as something less intensive, and generally I do not think that GM is seen as compatible with that. People who opt for organic are going for a more extensive and natural form of farming. Given the traits of the first crops that have largely come on to the market, particularly herbicide-tolerant crops, in particular it has not been something people buying organic would associate with that.

Q91 David Tredinnick: If, as I think you have just said, consumers consider genetic modification and the organic movement to be mutually exclusive, do you think that one day GM foods could be successfully marketed as an environmentally-friendly alternative to conventionally grown crops?

Jon Woolven: It is conceivable. As we sit here today, it is very hypothetical. You would need to have products developed that had clear environmental advantages, and this would then be an interesting test.

Sue Davies: It goes back to the point about looking clearly at the specific challenges we are facing in the UK and the different options to address that. There could be environmental benefits from using GM crops. Whether or not that becomes compatible with organic, given that organic is also associated with a range of values, is probably quite different.

Q92 David Tredinnick: Are you happy with the current legal definitions of organic products? Do you think they are misleading?

Sue Davies: We have not had any concerns about it generally. We think that the regulation fits with people's expectations, but we have not done up-to-date research on that, to be honest.

Jon Woolven: I do not have an opinion on that. We are a non-lobbying body that does not focus on regulations.

Q93 Stephen Metcalfe: Following on from Mr Stringer's questioning about the consumer's attitude towards GM foods, I want to talk a little bit about retailers' attitudes. In your experience, do retailers generally lead the market or follow consumer opinion?

Sue Davies: They can do both depending on the issue. This has been interesting, in that, going back to the history, retailers were caught on the back foot. As Jon said, we were all talking about tomato puree and meanwhile all this soya and maize was about to hit the market. From that point, it was interesting to see the way retailers and manufacturers worked together to secure non-GM supplies. Given the way the debate has evolved, they have not felt there has been any consumer demand and, in some cases, it is a marketing opportunity to say they have non-GM policies. We need a much wider debate about the different options and role of different technologies, and obviously retailers have an important part to play within that.

Jon Woolven: A business would say it is helpful to be one step ahead of your customers, in that you have a feel for where they are heading and you can perhaps help to attract them in that direction, but not two steps ahead because then you are detached, you do not engage with your customers and you lose them.

Q94 Stephen Metcalfe: You mentioned some retailers adopting a non-GM policy. I understand that some retailers have relaxed that recently and have quoted global supply issues. Do you think those global supply issues are going to ease in the future?

Sue Davies: It is becoming more of a problem. What are being affected at the moment are the policies around non-GM feed. Some retailers adopted non-GM policies for certain product ranges, not necessarily all, and have relaxed those in some cases. That is an issue, but we need to be much more open and people need to understand exactly what the policies are and how far they extend.

Q95 Stephen Metcalfe: Do you have any comment on that?

Jon Woolven: I really do not know about the risks of supply conditions and the challenge of segregating those in future.

Sue Davies: We have to be careful not to give people a false choice by pretending we have non-GM policies and meanwhile we are setting thresholds that allow for accidental contamination, which mean people think they are buying non-GM when they actually are still buying GM. It is important to make sure the products are clearly labelled and people know exactly what they are getting.

Q96 Stephen Metcalfe: If there are issues about the global supply chain—we go back to the issue of food security—the question is whether the claim that something is GM-free, or that labelling issue, is sustainable, or whether we need to come up, as you have suggested, with new definitions of that.

Sue Davies: Right from the beginning people have been very wary about using "GM-free", haven't they? They have always used "non-GM", which is a distinction reflecting the fact that it is probably very difficult to be absolutely sure you do not have GM in your supply chain, and the labelling rules evolved to reflect that with a 0.9% threshold. We thought that was a practical solution that reflected the reality but still enabled people to have a choice.

Jon Woolven: We are certainly in a new world where scientific testing allows things to be investigated at much lower levels. For instance, DNA testing is going to put traceability through the chain under the microscope.

Q97 Stephen Metcalfe: That is interesting. One retailer states that it will stay GM-free as long as it can, but I suspect we will come back to that at some other point. Looking at what might persuade retailers, or major supermarkets in particular, to sell more GM, or GM-derived products, can you identify what the influences would be that would persuade them to do that?

Sue Davies: At the moment there are no products that offer consumer benefits and there is no consumer demand, so it is difficult to see how anybody would decide to put something on the shelf, particularly when people are not likely to choose it. It comes back to having a broader discussion to understand whether there are products people would see as having benefits that, given all the reassurances about regulation, independent assessment and all of that, they might be willing to accept in the future.

Q98 Stephen Metcalfe: Can you give us an example of a product?

Sue Davies: It is very difficult. Several people have said that it is about starting with the problems and looking at different solutions and where GM fits within that. What has come out of our research is that people say, "We want to know what we are already doing before we start to understand whether there is a role for these new technologies and GM." Quality

and nutritional aspects are important, so if it is something people feel cannot be delivered in another way maybe they would be open to some sort of benefit. It is very difficult to say without trying to test some specific and realistic scenarios.

Q99 Chair: It seems to me that some of those questions are worth exploring in your workshops. You could envisage a scenario where a retailer was marketing a product and driving down price because it was a very efficient way of producing it, and, at the same time, if we had not regulated to allow the same product to come from the UK, there would be a price difference. That would be an interesting one to explore.

Sue Davies: Yes. We definitely want to try to get into the different trade-offs that people would be making.

Q100 Sarah Newton: I would like to come back to what Sue said about labelling—I would also welcome Jon's comments—and the extent to which people know they are eating GM products. Do you think UK consumers are aware that they probably are consuming them, particularly animal products? Those animals will have been fed GM crops. Do you think people are aware of that, and do they really care about it?

Sue Davies: Some people will care a lot and others will be more ambivalent. Over the last year we have seen with the whole horsemeat debate that people think it is important they know what is in their food. Food can be a very personal issue and raise lots of ethical issues. The labelling legislation evolved over time. I think it was a pragmatic decision between what was scientifically possible and what was politically acceptable. Therefore, we had the 0.9% threshold. What is sometimes missed is that that is a threshold for accidental contamination. The requirement in the legislation is that you label GM unless you can show you have done everything you possibly can to eliminate it, and then you have a threshold for adventitious or accidental contamination. I think it is important that that is properly enforced, and people would expect it to be.

Q101 Sarah Newton: That is a very good point. Given the molecular similarities between GM and non-GM crops, how confident can retailers be that products labelled as non-GM do not breach the 0.9% threshold? Jon was talking about food testing, but how confident can they be?

Sue Davies: It comes down to the individual retailers and exactly how robust their traceability systems are, and how confident they can be about where the product comes from originally. It has become more difficult as more GM crops have been grown around the world, but it still is feasible to live up to the commitment that they have made if they have robust supply chains.

Q102 Sarah Newton: Jon, would you like to comment on that?

Jon Woolven: I would like to come back to your point about how much GM food people eat at the moment and the perception of that. When we tested that, we found a complete spectrum of views, from people estimating that they never eat GM all the way through to "eat GM almost all the time", with "sometimes" and "rarely", or whatever, in between. Interestingly, all of those answers are perhaps correct depending on exactly how you define this. Do you include food produced with a GM processing aid? Do you include livestock products with GM animal feed in that definition? I think it shows how difficult it is to put definite boundaries around this particular area.

Q103 Sarah Newton: It really comes back to the whole issue of food labelling. For someone who does the weekly food shopping, sometimes it feels like a complete nightmare when I go round the shops looking for the ethical side of my purchases for my family, from nutrition to calories and the traffic light system. I even hate to ask the question about what extra information we could put on food to give consumers more choice. Have you done any research or considered what more information we could have to reflect these nuances? It is not always a question of GM-free or non-GM but the percentages of exposure to GM products that, say, wheat products would have. Have you looked into how that might be better done?

Sue Davies: From our research—we have not asked this recently—people expect positive labelling where you have a new technology. People expect products to be labelled and then to have the choice whether to avoid those products. The issue we find with lots of other food-labelling issues is: what is realistically feasible, and how can you effectively enforce that? What sort of tolerances or thresholds do you allow? I think that is still the best approach. The issue is about minimising contamination. If we were ever to grow GM crops in the UK, a key issue would be how we would make sure that they are able to co-exist and people have a meaningful choice, rather than working up to the 0.9% threshold and assuming there will inevitably be a certain level of contamination. I think it is difficult, but it is better to try to keep the labels as simple as possible and give people additional information, if they need it.

We have considered the labelling of animal feed. It is quite difficult to label lots of issues around animal feed on the food product, because other issues come up about, for example, veterinary drugs. You could end up with a really complicated label if you started to put all of that on there. Some people may want that information, and the onus is then on retailers to be clear about how far their policies go and give that extra information, if they want it.

Q104 Sarah Newton: Maybe on a website or literature in the store rather than on the label for those consumers who want it. Inevitably, there are consumers who care passionately about particular aspects of what they are eating or consuming. That might be a better way of doing it perhaps.

Sue Davies: Yes. In terms of some of the broader issues around sustainability, we did research a couple of years ago looking at how to communicate some of the issues around environmental impact and other social and ethical aspects. That is an area that still needs to be developed, particularly as people become more aware of it, to make sure you have

consistency across different supermarkets and we do not go through the whole nutrition labelling experience where you end up with lots of schemes and have to try to narrow it down and get agreement.

Q105 Sarah Newton: Jon, did you want to say anything about that?

Jon Woolven: We are moving into an age when people are starting to use their smart phones as a way to scan barcodes and get extra information on products. The technology offers us various ways to provide information beyond the label. The label is already groaning under the strain as to how much we are trying to put on it.

Chair: Can I thank you both very much for your attendance this morning? It has been really interesting. We will move on to our third panel.

Examination of Witnesses

Witnesses: **Dr Helen Ferrier**, Chief Science and Regulatory Affairs Adviser, National Farmers Union, **Peter Melchett**, Policy Director, The Soil Association, and **Professor Ian Crute,** Non-executive Director, Agriculture and Horticulture Development Board, gave evidence.

Q106 Chair: Can I welcome you to this session? I notice that you have been listening in. For the record, I would be grateful if you would introduce yourselves.

Dr Ferrier: I am Helen Ferrier, the National Farmers Union's chief science and regulatory affairs adviser. The NFU represents about 55,000 farmer and grower members, and in addition about 40,000 countryside members with a wider interest in rural and countryside issues.

Peter Melchett: I am Peter Melchett, policy director at the Soil Association, which is the largest organic organisation in the UK, and I am an organic farmer in Norfolk.

Professor Crute: I am Ian Crute. I was until very recently the chief scientist of the AHDB, the organisation that raises a levy from about 75% of UK production and uses it in research, market intelligence and that sort of thing. I have now become a non-executive director of AHDB, so I am here representing that organisation. In a former life, I was director of Rothamsted, of which mention was made by previous people giving evidence, and professionally I am a plant scientist.

Q107 Chair: Welcome to all three of you. It is possible that GM seeds suitable for the UK climate could become available. Would there be a market for them among British farmers?

Dr Ferrier: If they present a value to an individual farmer, fit in with their farm business and address some of the production challenges they face, certainly. There would not be a seed coming on to the market unless there was a market. I understand that seed companies go through quite a process to ensure that there would be take-up of a new variety.

Peter Melchett: Barclays Bank did some interesting research with farmers and consumers last year, as Helen will know. More than half—about 61%—of farmers questioned said they would be willing to grow a GM crop. As Helen says, it would depend on whether there was a market for it, but it was interesting that fewer than half the farmers Barclays questioned thought GM crops were a good innovation. That particular research found that a very small proportion of consumers—I think it was 3%—was keen to eat GM foods. So the question you have talked about a lot this morning is whether there would be a market and need for it. For us, the secondary question would be the impact on other sectors of farming, non-GM and organic, the cost in the food chain and other issues—for example, exports from the UK—all of which would be put in jeopardy.

Professor Crute: The question is an important one because it draws attention to the fact, which has been influential in some of the other evidence you have been hearing, that, with the exception of the herbicide-tolerant sugar beet product which was available, none of the products being brought to the market globally has any relevance to UK or northern European agriculture. In one sense, the market has not been tested.

As both Peter and Helen have pointed out, farmers are acutely aware of markets. Unless they have a market for what they grow, they are not going to grow it. I would argue that in the specifics of particular traits or problems to be resolved—it came out in earlier evidence—that market could be very strong. We are not talking necessarily completely hypothetically here, but a no-spray potato would be a pretty big market, in my view, judging by how much money and time is spent spraying potatoes for blight. The same could be said of the apple crop. The quantity of fungicide used to control scab in apples is huge. These are potentially real markets. The technology is there to create the product. The issue is whether or not, globally, the market is sufficiently large to pull that product through in terms of costs and so on. What we have seen is that people have withdrawn from it because of the size of the market and the cost of entry is too high.

Q108 Chair: I want to explore this a bit further. The example of the potato was going through my mind. Indeed, your previous employer, Rothamsted, is heavily involved in developing potatoes. We have also had the example of BASF and Syngenta pulling out of Europe to produce products abroad. Presumably, those are relatively close to market in the scale of things. Mr Melchett, I offer you a choice in a sense. Your neighbour plants such a crop of potatoes or sprays his crop with herbicides. Which is better for you?

Peter Melchett: There is a third alternative. You do not need to narrow it down like that. Blight-resistant potato varieties are being developed, and they are widely used in organic farming. I agree with you that there is still a problem, and it is a significant problem; it is a problem for organic potato growers, but it is possible to develop blight-resistant varieties.

Going back to what the social scientists were saying to you earlier this morning, in asking an open question to the public, rather than trying to sell them a particular solution, you would say, "Look, we could put some money into developing potato varieties which don't involve GM and using all the sprays we have to use for blight because we can develop blight resistance, or we could do GM, or carry on spraying. Which would you prefer?" There might be other options.

Q109 Chair: The challenge we have, going back to Dr Ferrier's first response, is that farmers, not unreasonably, will be driven by the economics. You cannot blame them at all for that; they are in a business. It is a responsible business, and most farmers take a responsible view about husbandry affecting the land. If your neighbour has come up with a solution to growing his potatoes that economically is best for him, yes, you are absolutely right that there is a third way, but you cannot blame that farmer for going down that route—and you would not. Are you seeing it as a yes/no issue, or are there some maybes?

Peter Melchett: Whether you can have GM in organic, as you heard from earlier witnesses, is a yes/no question. Legally, you cannot. It is clear that that is strongly supported by the market and people who buy organic, so it is yes/no. If my neighbour was growing a GM crop, my first concern would not be that it is my neighbour just across the road or hedge growing GM, but what is going to happen to the supply chain of that particular crop. All the evidence from America and elsewhere in the world is that the major contamination problems arise in seed stocks. That is what happened with long grain rice and wheat, most recently this year in America. That has cost export markets for US farmers. There has been contamination in the supply chain. That is why I think Scotland's policy, which Pamela Nash was asking about earlier, is so sensible. It should not be up to individual farmers, or even different opinion polls of consumers, which can often come up with contrasting results. Governments have a responsibility to think about what is in the economic interests of the country. If you want to be an agricultural nation with agricultural exports, you would want to have a clean green image. That is why Scotland and Wales, incidentally, have both gone down that route, quite rightly I think. The English Government should be doing the same thing if they want a vibrant, healthy, successful and low-cost farming industry.

Q110 Chair: You have all got, in different forms, sister organisations elsewhere in Europe. How do the attitudes of UK farmers compare with those of our neighbouring countries?

Dr Ferrier: We are members of the European farming organisation Copa Cogeca. It is difficult for that organisation to have a view on this technology because there are very different views among the farming union members in different countries. For example, Coldiretti, the Italian farming organisation, is very much opposed to the technology, as came up in previous questions. The German farming organisation currently is not in favour of using this technology, particularly because currently in Germany there is apparently much consumer opposition. It is very much about the market, and they do not see why they should be considering something for which there is no market in their country.

Obviously, those countries where GM crops are being grown, such as France, Portugal and so on, are in favour of the technology. They would not want to lose it because they are seeing value. The Danish farming organisation is also very positive and concerned about the direction in which their Government is going in terms of restrictive policies. That is only a few. A lot of our equivalents do not have very much to say; they do not have very much of a policy. In some ways, it is understandable, in that, yes, for the southern states

there is a useful product. For a lot of countries such as the UK, there is nothing to buy. There are no GM varieties that would be of interest, so it is a bit of a leap of imagination. I think they are also acutely aware of the political issues surrounding it, so they do not feel necessarily free to voice their opinions very strongly.

Peter Melchett: Looking at the organic movement round the world, the US and UK are seen as slightly odd with this preoccupation and weird fascination with GM where most of the rest of the world appears to have moved on in two respects. First, there are newer and better technologies, like master-assisted selection, which are delivering the sorts of crops GM was promising back in the early 1990s and still has not delivered, so there is a good scientific and technical argument for saying, "Why obsess about GM? Why isn't this inquiry about master-assisted selection? Why is it about GM?" I think that would be a question you would get in many countries.

Secondly, the other difference in England certainly—I would not want to speak on behalf of the rest of the UK—compared with Europe, Latin America, certainly the east and west coasts of America, China, Russia and a number of other countries, is that all of them would see the organic food market as a significant growth area. The organic market in all of those countries grew during the recession. England was the exception to that. It is seen as a way of farmers making money, doing good business and meeting demands from consumers, and GM is, as we have said, not relevant to the growth in the general market, apart from being a threat to it.

Professor Crute: With regard to European colleagues, recently I worked with European academies and an organisation called ESAC. I think we made reference to its report in our submission. There is a clear distinction between the way the European scientific community involved in plant and crop genetic improvement looks at this question and the way in which different Governments look at it. I think there is a unity of approach from the perspective of the benefits of a range of technologies. Peter referred to something called master-assisted selection. It is marker-assisted selection. There is now a whole range of new technologies which to some extent will supersede GM, but for other traits you will still need GM in the sensu stricto approach. It is right that there is an advance in the technology, but the scientific community across Europe recognises the benefit of bringing into play in the genetic improvement of crops a range of technologies which will improve the sustainability, productivity and the environmental impact of farming.

As to the way that is interpreted at the moment, in European countries—this is not based on any survey data but just my own contacts with the farming community, or those who interface with it—there is quite a polarisation. I think it comes back to exactly what Peter said. Austria, France, interestingly enough, and Italy have what you might loosely refer to as a fortress Europe approach to the future and the notion that Europe will be a large enough market, effectively they can repel boarders in terms of imports and, if somehow they set out to their consumers this rather retro approach to the way agriculture is done, everything will be fine. What people forget—this is an important point to recognise in regard to the long-range sustainability of our production—is that Europe imports into Europe, in terms of agricultural products, not just food products, but in terms of biomass, fibres and timber, something equivalent to the land area of Germany. That demonstrates

that our agricultural policies are effectively transferring what you might call our environmental issues elsewhere, because ultimately we are being profligate. Our policies in terms of the way we support inefficiencies in agriculture are effectively not sustainable. That is where technologies that relate to genetic improvement and improved sustainable traits, as well as improved efficiency in yields, are really important from an environmental perspective.

Mention was made of the report "Reaping the Benefits" by the Royal Society, in which I was also involved. That was the message which came through in the phrase "sustainable intensification", which people regard as a bit of an oxymoron. It is all related to the way that land is used. Land use is fundamental, and GM and other technologies fit into the efficient use of land.

Q111 Mr Heath: Perhaps I may put a question to Peter Melchett. Forgive me; I speak out of ignorance. The original tenet of the Soil Association was not to accept herbicide and pesticide use. I fully understand that. You said that GM as a technology is not acceptable within the rules of the Soil Association. Is that the only technology that is not acceptable? Is any other form of plant breeding, or advanced technique, okay as far as the Soil Association is concerned but not GM? Irrespective of the traits that are being bred, the risk of contamination, or any of the other factors, it is the fact that it is called GM that is the difficulty.

Peter Melchett: No. First, the founding principle of the Soil Association, long before there was anything called organic standards, was to try to encourage recognition of how food is produced on the farms and animals are reared and fed, and human health. That was the founding principle. The key element of organic farming is not the avoidance of pesticides but the use of legumes to fix nitrogen. It is the lower levels of nitrogen which allow you to avoid the use of pesticides, just to get that clear.

There are other technologies or practices adopted by the Soil Association, and subsequently the European Union. It is now European Union law and is an international standard. You would find the same in the USDA or the Chinese or Indian Government. It is not a Soil Association standard; it is a global international standard. We stopped the feeding of cows' brains to other ruminants long before there was any scientific suggestion that that might be dangerous or undesirable—in other words, long before mad cow disease. We did it on grounds of philosophy. These are ruminants; they are grazing animals. You should maximise the amount that they graze. That is the natural and right thing, and good for the animal.

The other technology we have banned in the Soil Association standards is the use of nanotechnology in food. We did that several years ago. There has been a recent UN report on the risks of nanotechnology, which would suggest we took a reasonably good decision several years back. Then the scientific evidence was not clear but there was still a lot of uncertainty.

Q112 Mr Heath: But there are no other plant-breeding techniques that are taboo.

Peter Melchett: No, but there are things like radiation-induced mutagenesis, which we think is as undesirable as GM. A very small number, relatively, of plant varieties have been produced in that way, but it is minuscule compared with the total.

Q113 Mr Heath: You are worried about the technique rather than the outcome.

Peter Melchett: Yes. It is about the application of this particular technology to crop breeding and to something that will be released into the environment. We have never opposed GM medicine, for example.

Could I pick up your point about Americans? I was not sure whether you were suggesting that there was a connection between the huge increase in diet-related ill health in America over the last 15 years and the fact that they have had GM food during that time. It is important that we do not suggest that there is, because there has not been any research at all on American diets in relation to whether what people eat is or is not GM. The fact that in the last 15 years American health has declined drastically in terms of diet-related disease—

Q114 Mr Heath: As has ours, without GM.

Peter Melchett: As has ours, yes. What I am saying is that it should not be linked to GM, but, of course, there is no evidence either way, because there has been no research.

Q115 Stephen Mosley: The Government have attempted to estimate the financial benefits for the farming industry of adopting GM crops. I have seen figures that suggest that maize, rape and beet could add about £48 million a year to farmers' profits. New breeds of potatoes could add about £60 million. Both the NFU and the AHDB have said that not adopting GM crops puts us at a competitive disadvantage. What evidence have you seen on the impact on farmers of not adopting GM?

Dr Ferrier: I have seen similar analyses that are available and numbers that have been calculated. It is really difficult to know how accurate or real those are because these are not products that are actually being used and are available to address the challenges that British farmers and growers face. What we can look at is what makes production difficult and expensive, exposure to volatility and difficulties in planning from one season to the next. All of the kinds of challenges that farmers face make it more difficult to produce a crop. That has varying degrees of impact on their bottom line.

Obviously there are completely different issues between different sectors—livestock compared with crops and so on—but we would want all possible solutions to the challenges that businesses face to be looked at. It is a really useful exercise to think about what is the cost of not trying something. That has generally been missing, which is probably why people are starting to look at it.

The other source of evidence that we have is the experiences of farmers in other countries—farmers who have been growing crops using these technologies for a very long

time. We look at the kind of analyses that are done by various organisations such as PG Economics, for example, but also—and perhaps more usefully—at discussions with those farmers. Colleagues and our members visit the US—our chief arable adviser is there at the moment—to talk to soy bean growers, maize growers and so on, and to talk to the onward supply chains about how it works in practice; otherwise we are just guessing, because we have not been involved. Some in our membership were involved in the farm-scale evaluations 10 years ago and more, so they have a little bit of experience of what it means to grow the crops, but not at a commercial level. That is what you are looking at here—the question is about the economic loss, or the benefit that we are not receiving. Those discussions with US and South American farmers have been very interesting.

Peter Melchett: Our reading of it is slightly different, as you might expect. I would identify four areas of cost that are pretty clear from experience. First, from an organic perspective, you lose the ability to grow some crops. In Canada, organic farmers had to stop growing organic OSR within a couple of years of GM oilseed rape being introduced. Organic farmers in northern Spain, which is one of the few places in Europe where a GM crop is grown, cannot grow maize. That would pull in imports, which would be bad for the UK economy.

You have the obvious costs of testing GM and, once you have it in your country to a greater extent, segregation of supply chains, which adds to cost. The alternative is for everything to become GM. That is what happened to soya and other commodity crops in the US, because it was too expensive to segregate. Then you have no non-GM crops.

You lose exports. I mentioned that the Americans lost all of their long-grain rice exports. They have lost a lot of wheat, and this year they have been threatened with the loss of wheat exports. That happens when you get contamination—and you do get contamination, generally in the supply chain or in the seeds. That is where it has happened most often.

Helen mentioned the farm-scale evaluations. That reminded me of the final thing, which is that you would lose the wildlife. The Government are committed to trying to reverse the decline of wildlife, but the farm-scale evaluations showed that overall there was a slight decline in wildlife on farms with GM crops. Presumably you would have to use taxpayers' money to try to redress that loss, which is what we do with pillar 2 of the common agricultural policy at the moment.

It would be very expensive, it would be bad for business—and bad for exports—and it would pull in imports.

Professor Crute: I am not sure where to start in terms of challenging some of the things that Peter has just said, because I think most of it is absolute nonsense. However, that is by the bye.

Coming back to your particular question, I have just pulled out of my bag a document that I was reading on the train; I have not had a chance completely to assimilate the information. It is not related to GM, but it is related to the effects of the withdrawal of pesticides, as a consequence of pesticide regulation, on the agricultural economy of the UK. It is an extremely conservative view. I won't give you the numbers, but UK farming

spends somewhere in excess of £850 million on agricultural chemicals to control pests, disease and weeds in agricultural systems. We have been talking about alternative technologies. There is absolutely no reason, given the level of knowledge and the appropriate investment, that we could not reduce the scale of utilisation of agricultural chemicals through the use of genetic approaches such as more effort in conventional breeding for resistance and the use of GM technologies—a whole range of technologies. With a big number like that and the actual necessity, given the regulatory framework and the difficulty of bringing new agricultural chemicals to the marketplace, I cannot see how any industry can turn its back on alternative approaches when the losses are so great.

Coming back on one point that Peter made, as I said previously, the whole point of increasing the efficiency of agriculture and using less land to produce more sustainably, more productively and with less resource use efficiency is to save land for other purposes—i.e. all the other things we want land for, such as the landscape, wildlife and greenhouse gas emission reduction. What we are talking about is technologies and the use of technologies, through genetic improvement, not simply to remove pesticides but to remove the need for certain resource inputs that will not be available to us in the future and to ensure that we have farming systems that will have space for all of the other things that we want. That is as important in the UK as it is globally—more important globally in the UK. However, the UK is a very interesting country, because we urbanised a very long time ago. Here, we are in a very densely populated country, but with 70% of our land classified as agricultural land. That is very unusual. If we make a mess of it, the world will not go to hell in a handcart, but we have a real opportunity—I would say even an obligation—within Europe to demonstrate how we marry together these different demands: the need for landscapes, the need for environmental benefits and the need for food security to feed a population of 70 million people. These are really important questions. To throw out opportunities that exist through the application of technology, as Peter is suggesting, seems to me to be nonsensical.

Q116 Stephen Mosley: You have focused on herbicide and pesticide protection as a trait of GM crops. Do you see that as the most important trait that GM can offer UK farmers, or would it be something else?

Professor Crute: We heard Sue talking about consumers. This is something that is difficult to get through to the consumer, but the most important thing is resource use efficiency—the amount of inputs that go into agricultural production. It would not necessarily be driven by pesticides in any particular way. There are things like nitrogen use efficiency, water use efficiency and being able to have resistant crops.

People have made a lot of play of the consumer pull and giving the consumer a fruit or a vegetable that is in some way enhanced. Those things are all doable, but they will not be the market. Ultimately, the market will be for efficient, sustainable agricultural production, where the challenges are to be able to feed what we now know will be well over 9 billion people. The latest population projections indicate that when we get to 2050 the curve will still be going up; we will probably be at 11 or 12 billion well before the end of the century. These are real challenges. I do not want to be repetitive, but it comes down to agricultural

efficiency and the fact that this is one of the technologies that will improve the efficiency of agriculture globally.

Q117 Stephen Mosley: That sounds like a good thing, doesn't it, Mr Melchett?

Peter Melchett: It is a good thing if you oppose GM, because this has been the story for 25 years, since the early '90s. Monsanto took out ads promising various things back then. The focus is on what might happen—in theory, possibly—and on getting a solution for a problem before we have decided what the problem we need to solve is, as opposed to looking at what has actually happened.

If you go on the internet, which any consumer is capable of doing, you can see herbicide-resistant weeds from agricultural extension and advisory services in the mid-west of the US. There is giant ragwort, which is a horrific idea for a farmer who spends quite a lot of time and money pulling up ragwort every year. There are weeds that are considerably taller than the scientists who have identified them and that are now resistant to multiple herbicides. The total pesticide use on these crops in America since GM was introduced has now gone up, not down. Consumers are able to look at what has actually happened and at the facts, rather than the speculation. That is one of the reasons why we continue to have consumer concern about this technology.

Q118 Chair: I am somewhat confused at this point. With respect, you seem to be leaping about from example to example and not linking them together. It reminds me somewhat of the Soil Association letter about nanotechnology that was in *The Guardian* in September 2009. That dealt with a tragic issue around a paint factory in China and then leapt to issues around British soil. This is not the way in which to conduct good science. The case you had there was, what the heck are we doing in not demanding health and safety standards in industrial workplaces that are the same as those we have in the UK?

Peter Melchett: No, I did not mention industrial workplaces. I was talking about the reality of what has happened with pesticide use in the United States.

Q119 Chair: My point is that you are not linking things.

Peter Melchett: What do you want me to link up? I will happily link anything you want.

Q120 Chair: I am struggling to understand how your explanation comes to zero use of GM in the UK. You are using an example from the United States, where there is a different regulatory environment, and implying from that that there cannot be a regulatory environment in which you would accept the use of GM. Is that what you are saying? It is fine if you are saying that—we understand that.

Peter Melchett: No, I did not say that. I was simply picking up a point that Ian made about pesticide use and the importance of trying to reduce it. I was also pointing out that, although in theory GM crops have promised a reduction in pesticide use, if you look at the

reality, while there have been some ups and downs, the picture now, 20 or 25 years in, is that, according to the US Department of Agriculture, overall there is higher use of pesticides. They have not delivered. I was linking that not to any factory or regulatory process but to consumer perceptions of this debate. If people do not recognise reality and what has actually happened, consumers will continue to be distrustful, in my view.

Q121 Chair: Are you saying that under no circumstances would the Soil Association accept GM foods?

Peter Melchett: Yes, but I also made the point—

Chair: Okay.

Peter Melchett: Hang on a minute. It is not a decision for the Soil Association or even for the European Union, which lays down organic standards in Europe, but the US Department of Agriculture, which bans GM in organic food, and the Chinese Government, which ban GM in organic food. There is huge growth—of around 400%—in the organic market in China, for good reasons; we all know about the problems in the Chinese food market. If we want to export organic foods to China, we need to be able to meet the Chinese Government standards—as well as the Russian Government standards, the Indian standards and the American organic standards. We have a thriving export business in organic food to America, and we have to meet the organic standards that the US Department of Agriculture sets down. To try and pretend that this is one small NGO in the UK that is this huge barrier to GM getting into organic is simply not true. That is all.

Q122 Jim Dowd: You have said twice that the use of pesticides in the United States has increased in the period in which GM crops have been grown there. Has the level of food production been flat over that time or is the reason for the increase that production has increased, so that the use per hectare—or whatever it may be—is actually lower, compared with what it was before?

Peter Melchett: The level of production in most of the major commodity crops worldwide, such as wheat, soya and rice, has plateaued in recent years, as you know. I do not know the detail of the yield results in particular US states, but my guess would be that the yields have not increased significantly, no, because there has been an overall plateauing of commodity crop yields globally.

Q123 Pamela Nash: I am still not clear from your response to the Chair about whether the Soil Association's view on this is based solely on attitudes in the global export market. My concern is about the Scottish Government's attitude to this, to which you referred earlier. I can understand the view that it could affect our export market—we are known as a food and drink exporter—but my concern is that they are not funding any research to prove otherwise. I would be grateful if you could clarify whether, if the export market suddenly opened up and growing GM crops would not put our exports at risk, the Soil Association would reconsider its position.

Peter Melchett: No. You are quite right to say that I have not answered that question. The opposition to genetic engineering, as it was in the early '90s, from environmental groups all over the world—and certainly from the organic movement—was because of two or, maybe, three things, two of which are fundamental.

The first was inherent uncertainty in the technology, which, in our view, gave rise to risks to the environment and human health. That is still the case. I know that the science is controversial and that the majority of scientists think it is safe, but there are still a significant minority doing work and there is a relatively small amount of peer-reviewed, published science on long-term health effects of GM food that suggests grounds for concern. That issue remains. It is inherent in the technology, to take David Heath's point. It is not a crop-by-crop process—this is disruption of the genome, with unknown consequences. Although we know a lot, we do not know all there is to know about the genome, to put it mildly. In the early '90s, we knew even less—and the geneticists spoke with even greater certainty back then.

The second reason is because of values. Organic standards are not based simply on science. I gave the example of banning the feeding of cows' brains to other cows as something that had no scientific evidence whatsoever to support it when we did it. It was based on values and perceptions of how it was right to treat farm animals. The animal welfare approach in organic standards is informed by science but is based on values. It is clear that the values of the people who buy organic food would not accept GM in organic.

The third reason, just to complete the picture, is the fact that we agree with the boss of Waitrose and others who have said that it is a one in, all in technology. It is not one tool in the toolbox—it is a tool in the toolbox that, if you start to use it, destroys the other tools and becomes the only one you have available. That, we think, is wrong.

Q124 Pamela Nash: The UK Government have stated that, if GM crops are grown in England, they will "implement pragmatic and proportionate measures to segregate these from conventional and organic crops". This is a quote from policy. I would ask all the witnesses whether you can shed any light for us on what that means in practice.

Professor Crute: You have two different things here. It is important to understand what they are. On the one hand, there is the notion that a GM crop or a biotechnology crop can fertilise another crop and that, to some extent, when that crop is harvested it in some way no longer has an organic status. That is one side of it. The other is to do with the propagating material, whether you are talking about fruit trees, seed potatoes or seed. Is there any level of contamination so that you end up with a mixture of the variety that you are trying to grow? There are two somewhat different things.

The latter has always been the case. I will give you an example. If you were trying to plant an orchard and you suddenly realised that the supplier of your fruit trees had given you 10% of the wrong variety, you would be pretty annoyed and would go back and make a claim. However, if you had a crop of wheat and, for the sake of argument, 5% of the seed was of a different variety, you would probably never notice. Nevertheless, there is regulation on the purity of the species, the variety and so on. All of those things are

regulated and have been managed for decades, so there is no reason at all why you could not have the same situation.

Moving to the former example of contamination of the crop that might go for sale, if you have a product that has been approved and has gone through a regulatory process, this is a self-imposed quality standard that the organic movement, for example, is putting on itself. There is nothing dangerous about the product. If I grow some carrots and cannot get them into Waitrose as class 1 carrots, I can still sell them in Asda or at the local market as grade 2 or whatever it might be. At the end of the day, these are self-imposed quality standards which people are putting on. There is nothing here about environmental risk or safety; there is nothing here about that at all. It is simply the co-existence of two different ways of farming and the standards that are set in law for the quality of propagating material. To be honest with you, I think we are making a meal of something that is not necessary.

Q125 Pamela Nash: To be clear, is it your view that proportionate measures to segregate GM crops from non-GM crops would be the same as the measures to segregate other different material?

Professor Crute: Absolutely. That is what we have. If, by chance, somebody has some material tested, sure, they may have to sell it on the market at a lower grade, but that is their problem. It is not the problem of the person who grew the crop. It is a self-imposed issue.

Q126 Pamela Nash: I understand. Dr Ferrier, do you have anything to add?

Dr Ferrier: The NFU's position is that any arrangements and adoption of the technology must enable our members to retain their chosen markets, because obviously there is a variety and range both of views within our membership and of markets that they supply. We are comfortable with the technology in that context because we know that British farmers do co-existence already, as Ian was saying; it is just part of what you do in order to supply particular specifications for your customers.

Even within a particular crop type, you will have feed grade and food grade. With oilseed rape crops, you have industrial grade and industrial varieties, with HEAR rape varieties, for example. Those are not to go into the food chain and are kept separate through processes within the supply chain—through cleaning machinery, different processing equipment, dedicated systems and the sampling and testing that goes on through the chain. We do not see that this would be anything different—it is just supplying a market. That is what co-existence is about.

Q127 Pamela Nash: You will be aware of SCIMAC's co-existence guidelines. I have been looking at the figures that it has published for separation distances in other EU states, which vary wildly. In the NFU's view, would its guidelines be sufficient at the moment to safeguard customer choice?

Dr Ferrier: Yes. We are members of SCIMAC, and we certainly support the guidelines that it has put in place and that it developed in 2006, when the Government consulted on co-existence arrangements. That is a good place to start. The basis of its guidelines is that it is a market issue and it should, therefore, be dealt with through market arrangements. However, at the start of any adoption of GM varieties in this country, there would be some statutory backing to things like separation distances and, perhaps, notification arrangements, so that everybody had confidence that what they were doing was supported by that.

Peter Melchett: I agree with Ian that there are two different things. I do not agree with him that this is nothing to do with the environment and safety; for organic farmers, food businesses and retailers, that is exactly what it is to do with. I find the term "self-imposed" a bit weird when it applies to something that the US Department of Agriculture, among others, has decided and that our customers have decided. Is that self-imposed? I do not think that is right.

There is one other thing that I want to say in relation to SCIMAC. In the earlier evidence today, people referred to 0.9% as a threshold for GM. That is wrong. It was a widely held view about 15 years ago, but there have now been court cases in Europe to settle this matter. The 0.9% is an allowable threshold before a product has to be labelled as GM, if the GM contamination has got there by accident or in a way that was technically unavoidable. If not, under European labelling law you would have to label the product as GM if it had 0.5%, 0.4%, 0.6% or whatever percentage of GM material in it. The organic regulation follows the labelling law, so we are bound by that.

In order to meet the labelling requirements, you have to aim for zero GM and to test down to the lowest acceptable level of testing, which is generally accepted as 0.1% contamination. If you do not try to avoid GM, you should label your product as GM. There have been a couple of court cases in Germany that have now settled that issue, so 0.9% is not a general threshold. It applies only if something happens by accident—to a one-off, in other words.

Q128 Pamela Nash: Finally, is it likely in the future that GM crops might be increasingly more difficult to distinguish between other crops? Do you agree with that, and how will we continue to be able to segregate these crops and label them as such?

Professor Crute: There are some specific traits where it will always be possible to identify the so-called transgene in the trait. It will always be possible to do that. Presumably you are looking at DNA rather than a derived product such as oil or sugar. If it is oil or sugar, it is oil or sugar; it has no DNA in it anyway.

Q129 Pamela Nash: That will be by laboratory testing—

Professor Crute: You cannot do it with certain products anyway, but there are technologies—and they are becoming more and more sophisticated—where it won't be possible at all to determine how the product was produced because, ultimately, there is no

signature there in broad terms. You could have produced it in a variety of different ways and you cannot say whether it was produced by some biotechnology or some other approach. I think that is going to be the case. There is going to be a bit of a regulatory minefield in there.

But I did want to come back to Peter's challenge on the self-imposed. What I was driving at there, for clarity, is this. If I am an organic farmer and I end up with a product for whatever reason that is above the threshold, it does not stop me selling it. I can sell it on the market because it is not a deregulated product. I will have to put a label on it of some sort but, at the end of the day, I am not going to lose money; I can still sell it somewhere else. It won't be organic by their definition. It is not something that is going to mean I have to throw it in the bin or dispose of it. I can sell it.

Peter Melchett: You might lose your organic certification and all the money you had invested as a business in converting to organic. But on the question you asked, which is a good one, I think, and an interesting one, there is a countervailing pressure which is clear and has come up in evidence this morning. It is the one from "horsegate". There is increasing demand from consumers and retailers that there is full traceability and clarity about where food products have come from and what has been done to them on the farm and from the farm until they get to the shelves. That is going to increase the investigation, the clarity and the light that is shone on what goes on, and that is what consumers are expecting. So that is going to increase pressure, I think.

The other pressure is shorter supply chains. The Government, I think quite rightly, are strongly advocating more local food and more local food purchases, partly because of shorter supply chains, greater trust and greater clarity. That will work against the idea that somebody can snip a bit of DNA in somewhere miles away and never tell you about it. I just don't think that is what the future of food looks like.

Dr Ferrier: It demonstrates that it is the trait that is important, and the process and the breeding technology will have to become immaterial. Obviously, the European regulatory system is based on the process and it just looks at conventional and more traditional GM techniques, and you will know from the evidence you have received that the science is moving on from that. There is the amount that we know about the genomes of key food crops but also the actual techniques and technologies that scientists can use to find out what is in them and improve crops accordingly. The EU system is going to break—I mean, it is already broken—but it is going to have to be addressed at some point in the future. I suppose, if we continue in the current situation, there might not be a reason to do that because companies are not going to be investing in Europe. It is just a terrible shame that our farmers, our society and the wider environment is missing out on the potential that we see coming through from the scientists and missing out on that being applied to our own crops and our own challenges.

Pamela Nash: Thank you.

Q130 Graham Stringer: What percentage of English agriculture is organic?

Peter Melchett: I would need to check. I think the latest figure is about 2.8% of the farmland.

Q131 Graham Stringer: In terms of the products sold, you have talked a lot about the market. Is the amount of organic food being sold increasing or decreasing at the moment in England?

Peter Melchett: It is increasing, from the latest quarterly figures we have, by 3.8% growth against a decline in overall food sales, which I think is about 1.8%. So, net, it is quite a healthy growth. We had a steep decline in the UK from 2008, but, as I said earlier in my evidence, we were unique in that respect. All the other major organic markets in the world grew during the recession quite strongly.

Q132 Graham Stringer: You made a recovery from a decline.

Peter Melchett: A decline, yes.

Q133 Graham Stringer: You have previously said that you are against GM and it is inconsistent with the principles of organic farming. What principle is that?

Peter Melchett: I said, actually, the values rather than the principles, but you can take either word. One of the things that organic farming has tried to do is work as closely as is possible in a system that disrupts nature to work as closely as possible with natural processes. In pest control, for example, rather than using chemicals, you use—

Q134 Graham Stringer: I understand that. I am looking for a principle.

Peter Melchett: Okay—well, to work as closely as possible with natural processes in agriculture. I am not suggesting it is natural, before that canard is raised. I know agriculture involves interfering with nature, obviously.

Q135 Graham Stringer: I was not going to ask the question quite in that form, but I was going to make that point. Why is it better to breed or hybridise for particular characteristics rather than doing it precisely using genetic techniques? What is the principal difference between those two, when you are trying to get a better trait?

Peter Melchett: As I said earlier, one of the key objections that environmentalists and the organic movement had to GM was that it was not precise; that we were doing things to DNA that we did not fully understand, which could have unpredictable effects and therefore introduce new risks. To our mind, that did not pose a significant problem for medicines, because they are contained; when you are given a medicine you are told what the risks might be, you know what you are suffering and you can weigh that risk. When you release something alive into the environment which can replicate and which you

cannot recall, you are into a different risk assessment—a risk balance of risk and benefit. It is quite different.

Q136 Graham Stringer: That really does not answer the question. There are problems if you produce new plants by hybridisation of some sort. You get different traits, which may be beneficial or damaging to the environment. What is the fundamental difference between disrupting the genome randomly and doing it in a way that a distinguished scientist told us in this room last week is getting more and more precise? What is the difference in that, apart from the fact that one is controllable and the other one is more random?

Peter Melchett: I am not sure which one you are referring to as controllable and which one as random. GM is not controllable.

Q137 Graham Stringer: The techniques of genetic modification are getting more and more precise about how you alter the genome, whereas if you are crossbreeding then there is a certain random element—

Peter Melchett: Gene splicing and things like that, which do not apply to any of the GM crops currently available or close to commercial production. We are now into the realms, as we were 25 years ago, of speculating about possibilities in the future. There are different scientific views, and maybe the Committee should at least acknowledge that possibility, but the scientists who are concerned about this say that the newer techniques to which you refer can also lead to disruptions in the genome and, therefore, still carry with them the risks that were inherent in the shotgun approach to firing new genes into the DNA, which was the early form of genetic engineering. The scientific advice we get from scientists, who, on the whole, have been proved right over the last 25 years, we would say, still suggests that this is a risk, and an unacceptable and unnecessary risk, given that our job is not to find a role for GM. We are looking at the problems and saying what is the best solution out of a whole range of things available—

Q138 Chair: I do not come from a background in this field. Perhaps Professor Crute can clear up this point. Surely you can sequence the genome in the product that you have made and be pretty certain about it, can't you?

Professor Crute: I will try and draw an example, in fact, from something that Peter himself said, talking about the breeding of potatoes. You can breed potatoes conventionally by taking a primitive Andean species of potato with some traits you are interested in, such as nematode resistance or blight resistance. You can hybridise it with your cultivated potato, and, after many, many years, you may transfer the desirable trait from one to the other. It has taken a long time.

For example, the Sarpo Mira potato, which Peter was referring to, which is promoted as an organic, blight-resistant potato, is, broadly speaking, the process that went on with some very clever breeders, and it is still going on. When you do that process, and I will give you an example from my own work of how certain it can be, you have no idea really what you

are doing. You have two very different sorts of genomes, and you have selected very hard for one trait and obviously something that is edible. There are quite a lot of examples in plant breeding where some very undesirable outcomes have come about.

I was involved with lettuce breeding in my early years. A very good example in lettuce breeding was where selection of a trait from a wide cross to introduce disease resistance to a disease called downy mildew in California, because we now know the way the genomes are organised and genes are linked together, resulted in the production of a variety that was resistant to downy mildew but was extremely susceptible to turnip mosaic virus, a disease which they had never even seen in the lettuce crop before. These things happen.

If you understand gene order and gene organisation in genomes, which we now do and indeed have done for a long time, if you use the marker-assisted approach, you are still only able to delineate that genome in a relatively—you are going to have a large number of genomes in that genome. You have got to link genes together. You are still going to be moving blocks of genes. So you do not really know what you are doing. You are doing better than just doing it randomly; it is an advance. Taking the point, if you know the gene sequence that you want and you know how to control that gene with the appropriate regulator sequences, then these days you can position it into the genome exactly where you need it to be, in broad terms. So, actually, it is precise and it has always been more precise because we have known the protein that is being produced; we have known the expression of the gene; and it is random only in so far as the fact that different genotypes into which you place the gene will respond somewhat differently. But that is a hell of a lot more precise, you might say, than the random hybridisation of scrambling genomes and coming up with combinations over which you have no control.

Q139 Graham Stringer: That is very helpful. Let me finish with one final question. Foresight's 2011 "Future of Food and Farming" report concluded that organic farming was unlikely to satisfy future global demand for food. How then, in your view, should global food security be achieved?

Peter Melchett: Along the lines of the international scientific consensus on how we feed the world in the face of climate change and the other challenges. Four hundred international scientists produced a report called "IAASTD"—International Assessment of Agricultural Knowledge, Science and Technology for Development, I think—which said we need agri-ecological systems like organic, and that is the only way we can do it, because we have to make 80% cuts in greenhouse gas emissions from farming, which means that it will be hard to envisage much of a role for manufactured nitrogen fertiliser because that delivers about half the greenhouse gas emissions from farming.

So you take into account the changes we have to make for climate change reasons—the radical revolution, as a previous Government Chief Scientist described what we are going to have to go through in farming—between 2020 and 2050, and then you look at the sorts of radical changes in diets we need to make. Just recently we heard that, if we don't achieve a dramatic turnaround in diet-related ill health, we may not be able to afford a health service free at the point of delivery any more. So we have those two forces bearing on what sort of farming we have to feed not just this country but the rest of the world, and

low input systems with much healthier diets are clearly what we are going to have to do if we want to remain healthy and save the planet.

Q140 Graham Stringer: Are there any other views?

Professor Crute: I was involved in that particular report to which you made reference. From my perspective, this is not an all-or-nothing thing. It is many of the things that Peter said about the need to have agricultural systems that are less demanding in a variety of ways. I mentioned previously in my evidence about resource use efficiency and greenhouse gas emissions reduction. All of these things are going to be important, and, as I say, it comes ultimately down to land use because one of the best ways of reducing greenhouse gas emissions from agriculture is to farm efficiently in spare land. The only way that we know how to capture carbon storage at the moment is through forests, basically, and so it would be good if there was a bit more space for forests.

Peter Melchett: And grassland.

Professor Crute: Not really, no. I do not think the evidence backs that up. Grassland is also important for a whole variety of other reasons. It is not an all-or-nothing thing. There are many things that are implicit in what you might call low input production systems which people might refer to as organic, which are important to have in our minds as we construct sustainable organic systems going forward, but I suppose my position would always be to have all the tools in the box. That is a good analogy; it is not a flawed analogy. The notion that just because you've got a lot of tools in the box you will only start to use one is a nonsense; of course you won't. You will use all the tools in the box for particular jobs to meet particular challenges.

I think this polarised position of organic good, GM good, organic bad, is just not where we need to be. We should be thinking about the coherence of systems, how agricultural systems are constructed and what we want from those systems of production looking forward in terms of the challenges that we are talking about. The notion that anything should be ruled out of court is an anathema from my perspective, but, equally, the notion that one should look at systems and somehow disregard them because of some rules and regulations that they put in place—quite clearly not. I look at work that has been done in organic systems and can applaud parts of the output of that as being very relevant to conventional production, not least the way in which soils are managed and organic manures are used in appropriate ways and so on for soil conditioning and all those sorts of things. We have to be much less dogmatic. It is actually data rather than dogma that will get us where we need to be.

Chair: Professor Crute, Mr Melchett and Dr Ferrier, thank you very much for your attendance this morning.