HOUSE OF COMMONS

Science, Innovation and Technology Committee

Oral evidence: Insect decline and UK food security, HC 1239

Wednesday 18 October 2023

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Watch the meeting

Members present: Greg Clark (Chair); Aaron Bell; Chris Clarkson; Tracey Crouch; Katherine Fletcher; Rebecca Long Bailey; Stephen Metcalfe; Graham Stringer.

Questions 187 - 259

Witnesses

I: Professor Linda Field, Professor Emerita, University of Nottingham and Rothamsted Research; and Professor Toby Bruce, Professor of Insect Chemical Ecology, Keele University.

II: Vicki Hird, Former Head of Sustainable Farming, Sustain; and Henry Edmunds, Estate Owner, Cholderton Estate.

III: Minette Batters, President, National Farmers Union.

Written evidence from witnesses:

Professor Toby Bruce

Minette Batters

Examination of witnesses

Witnesses: Professor Field and Professor Bruce.

Q187 **Chair:** The Science, Innovation and Technology Committee is in session, and we continue our inquiry into insect decline and UK food security. We are pleased to have here this morning to help us with our inquiry Professor Lin Field, joining us virtually. Professor Field is professor emerita at the University of Nottingham and the Rothamsted institute. She is an insect molecular biologist whose research is focused on insecticides and how they operate, and resistance to them. She is a member of DEFRA's science advisory council. Joining us in person in the Committee Room we have Professor Toby Bruce, who is professor of insect chemical ecology at Keele University. His work focuses on improving food security by reducing crop losses to pests. I am grateful to both of you for helping us today.

Perhaps I can start with a question to Professor Field. In the field of insecticides, why do some pesticides, such as neonicotinoids, receive more criticism of their ecological impact than others? Is it because they are particularly bad, or have they acquired a prominence that others ought to have as well?

Professor Field: Neonics do have something special about them. We have to accept that all insecticides can potentially do damage to non-targets, but that is usually mitigated. When neonics first came on the market they were hailed as a really good insecticide because they are what we call systemic. You can treat the seed and it goes up through the plant. This was thought to be a really good thing, at the time, because it meant you did not spray, so the risk of hitting non-targets with sprays was reduced. Of course, it eventually kind of came back to bite us, because the problem was that some of these neonics can hang around in the nectar and pollen. It was in very trace amounts, but there began to be evidence that insects that feed on nectar and pollen—specifically bees—were being affected with sub-lethal effects. I do not think anyone was claiming lethal effects. There is an inherent special property about how neonics work that makes them slightly different from most other insecticides on the market.

Q188 **Chair:** I see; thank you. In this country the use of neonics has been reserved, for example, for the sugar beet crop, which I understand is a non-flowering crop and therefore is thought not to affect pollinators, especially bees, in quite the same way.

Professor Field: That is correct.

Q189 **Chair:** Is the systemic quality of neonics contained by restricting it to crops like those, or can it find other ways to affect bees?

Professor Field: It will be constrained hugely by that. Most neonics are used as seed treatments, as I said, so they go up into the plant as it grows. They are at their highest concentration in the plant tissues when the plant is young, which is good for preventing crop pests because they

often feed on young plants. In a plant that does not flower, bees are probably not going to be in that crop. They will not have any sources of nectar and pollen to forage. They are probably not going to be affected by the fact that there will still be small amounts in the large sugar beet. The same will be true for other crops that do not flower. There has been some discussion of whether they can leach into soil and be picked up by weeds that flower, and there is some evidence for that, but if you do not have weeds in the crop that would be hugely reduced, too.

Chair: Thank you very much. I am going to turn to my colleagues, starting with Graham Stringer and then Chris Clarkson.

Q190 **Graham Stringer:** About six or seven years ago, I think, I served on a secondary legislation Committee in the House of Commons, about the restriction, or lack of restriction, of neonicotinoids. The argument seemed to be that the experimental evidence that they were harmful to insects had been done in artificial environments, and the evidence from the field—literally from the field—was different. Was that the basis of the discussion, and has that argument been resolved?

Professor Field: No, I suspect it has not been resolved very well. It is very easy to look at the effects of neonics in laboratory conditions, or even contained environment or glasshouse conditions, because you can control for other factors. You can certainly show that low levels of neonics will affect bees, in terms of behaviour, for instance. It is very much harder to do experiments in the field, because insects are not very predictable—both pest and bee. So in the field we often rely on looking at what is going on in the field—whether bees seem to be affected or are not coming to the crop.

Then, of course, the effect of the neonic gets confused with all the other things that are affecting bees. In the early days of the neonic ban, when we were discussing it, varroa mites were a particular problem for bees and there were all sorts of other issues around other agricultural practices and changes in climate. It is a really difficult thing. Even if you can show that you might get an effect on individual bees, extending that to whole populations is really difficult, so no, I do not think it has really been resolved.

I am not sure that, when the neonic ban was introduced in crops that flowered, we did enough monitoring of the effects of that and what it did—whether it actually made an improvement. One of the consequences was that we started to grow less oilseed rape, so it would have been quite hard to see the effect. It is very difficult to show whole-population effects in the field.

Graham Stringer: That is really interesting. When this came to public attention there was a lot of talk, and books were written, about colony collapse in bees—you smile. At the bottom of the road that I lived on then was a very large park, with beekeepers in it. I went to talk to them and asked their opinion about colony collapse and—I hope you will forgive me for this, Greg—they said that rather than varroa mites or

insecticides it was PPB, which stood for piss-poor beekeeping.

Chair: I gather that that is a scientific term, Mr Stringer!

Q191 **Graham Stringer:** Do you think that was a major part of the problem—that there was an increase in beekeeping by beekeepers who were less good at it than they could have been?

Professor Field: Yes, I have certainly heard that story. Colony collapse is a slightly difficult term because it does not really specify the cause. It probably is a complex mix. I went around a lot, at the time, talking to beekeeper groups about neonics and what was going on and, certainly, I heard the same thing you did—that sometimes people were coming into beekeeping as a bit of a hobby and not doing it very well, whereas professional beekeepers were keeping their colonies much healthier. I do not think that colony collapse was ever as bad in the UK as it was in the US, where it had a lot of headlines. We do not hear a lot about it now. Varroa mites are better controlled now. Ironically, pesticides sometimes get involved in controlling varroa mites, and we did quite a lot of work on that area. I have heard the same story as you, and I do not really want to blame beekeepers for bee decline, but there is probably a factor there.

Q192 **Graham Stringer:** Thanks. You said that our information base is not as good as it should be. What do we need to do to increase our understanding?

Professor Field: Of neonics in particular, or pesticides?

Graham Stringer: Yes, of the impact of neonics on pollinators.

Professor Field: I think we might be shutting the stable door after the horse has bolted, if you will excuse the phrase, because neonics are much less commonly used now. You cannot use them as seed treatments on crops that flower. There has been a derogation with sugar beet, as you mentioned, and they are still used in cereals, which do not flower.

I would say this as a scientist, but of course the more research you do, the more you find out; but for some of that research I would emphasise again that we can do all we like in the lab. We know exactly how neonics work and how they bind to the targets. My own group did a lot of work on why some are more selective and less of a risk to bees because they get metabolised differently or the target proteins vary. We know more and more about that with the advent of new genomics in insects.

The problem is that doing something in the field is really hard. We should be looking at the research that tries to put what we know in labs out into the field. Someone has already mentioned that I sit on the DEFRA science advisory council. I also sit on the steering group for its farming innovation programme. I think it is trying quite hard to look at research, in general, going out into the field. Certainly, pesticides should be in that category. There is a lot more we could do to make safer pesticides.

I am not sure that neonics themselves will ever come back in a big way. I think that scientifically you could design neonics that would be much

more benign to bees, but they now have such a bad reputation that I cannot see someone ever legislating to allow them back into wide use.

Q193 **Graham Stringer:** Is the regulatory framework for insecticides, and particularly the potential impact on the non-target insects, fit for purpose?

Professor Field: I think it has tried really hard. If you want to register a compound you have to do tox data. With insecticides, obviously the first concern was that the really old-style insecticides were very toxic to everything, including mammals. We brought in lots of regulation that said we had to have specificity for insects and not mammals, and that is tested for before compounds can be registered. The system can also allow restricted use, such as "Don't use on crops that flower," or, "Don't use near to harvest," if you are worried about it being in the fruit. So there is quite a lot in the legislation.

It is, in my view, a possibility that we might encourage chemical companies to make more selective chemistry—that is, chemistry that kills one insect and not another. As I said, we have genomic data that will allow that now. So the legislation needs to make sure that those sorts of compounds are encouraged in some way. I think companies are doing this, from my experience with them. The framework is fit for purpose, but it can always be tweaked. It is always difficult to test every non-target. You cannot test every insect. You have to make some rational decision about what non-targets might be around in agricultural-growing systems.

Graham Stringer: Thank you.

Q194 **Chair:** Thank you. Professor Bruce wanted to come in.

Professor Bruce: One of the things that the neonicotinoid story has revealed is that the regulatory system is geared around hazard rather than risk. I think that is a critical flaw.

Chair: Just explain the difference.

Professor Bruce: Risk is hazard times exposure. The compounds were prophylactically applied. They were systemic, so insects had a lot of exposure to them. Of course, these are molecules designed to kill insects. If you look at it from an integrated pest management angle, you want to minimise it in time and space so that you are putting on the insecticide only when and where it is needed. The story has revealed that we need to consider the exposure as well as just the hazard, so that we understand the real risk.

Chair: Thank you very much.

Professor Field: Absolutely, Toby. I agree entirely with what Toby said.

Chair: Thank you. Let me to go to Chris Clarkson, and then Rebecca Long Bailey.

Q195 **Chris Clarkson:** Thank you, Chair. Can I come back to you, Professor

Bruce? Is there a place for pesticide use in insect-friendly farming, and if so, how can that be done? I am thinking specifically of the challenges that farmers will face in implementing it.

Professor Bruce: Yes, I would say that there is a role for that, because even wild plants produce toxins to defend themselves, and it is a question of finding the right balance. We need to find some ways of protecting the crops, to protect food security while at the same time avoiding the off-target effects. We need to make the approaches that are used as targeted as possible, killing only the pests, without off-target effects on beneficial insects.

We need a range of measures, so that, hopefully, insecticides can be kept as a last resort. The first line of defence would be preventive measures, but you would need monitoring. If there was an outbreak you would still need something to come in with, for firefighting. Otherwise, it is wasteful and you would waste a lot of land producing crops that would be lost to insect pest damage.

That is not good for the environment, either, because another big driver of biodiversity loss is habitat loss. Globally, the biggest source of habitat loss is land conversion to agriculture, so it is a very challenging thing to find the right balance. We need productive farming without a lot of loss to pests, but at the same time we need to minimise the off-target effects of whatever measures we use to control those pests. It is quite a complicated, multidimensional thing. We need productive farming and biodiversity conservation. We need somehow to find ways and means to achieve both those things, so there is a real need for innovation.

We need something better—an innovation system for plant health where we can join everything together: the regulatory system, science, industry and the farming community—everyone. We need a much more co-ordinated strategic approach, because there is an urgent need to give farmers new tools that they can use to protect their crops. Their businesses and livelihoods, and food security and production, are affected, on the one hand. On the other hand, we still have huge problems and concerns with insect decline. Insecticides have been implicated as one of the causes of that, so we need to find a way to get better solutions. There is a really urgent need for that.

Q196 **Chris Clarkson:** Would you say there is a role for Government to incentivise those kinds of innovation? Is there something they could do to encourage farming in a slightly different way—as you say, with a "pesticide last" approach?

Professor Bruce: Yes, I think there certainly is. It would need more help for farming communities, with training and information being made available. The Government could play a role in co-ordinating those things, because at the moment a lot of them are quite disjointed. There is more curiosity-driven scientific research, which it is very important to do, but there is a lack of strategic research geared towards the key pest problems. We need a plant health strategy for the key pests, to find out

how we can manage them in an environmentally friendly way to minimise off-target effects, and how we can make the solutions as user-friendly as possible. One of the problems with integrated pest management is that it is too complicated and difficult for farmers to use. Some of the alternative approaches depend on the weather or need to be done at a particular time.

We need to find robust, reliable solutions for farmers to use. One example is wheat that is resistant to orange wheat blossom midge. In my years of working on approaches to crop protection, that has been the most successful. It has provided a solution that is easier to use than insecticides. All you need to do is grow a resistant wheat variety and then you do not have a problem with the pest. It is fortunate that we have orange wheat blossom midge-resistant wheat, because the main insecticide that used to be used to control it is a very broad-spectrum one called chlorpyrifos, which was marketed as Dursban. That has now been banned. Fortunately, there are midge-resistant wheat varieties. That is a very nice example, but we need more things like that, more of the research that will generate those new solutions, and a regulatory system where we can get the new solutions put on the market and made available to farmers.

Q197 **Chris Clarkson:** You talk about integrated pest management, which is complicated for farmers to implement. Presumably it is not achieving what it is intended to because of the complexities. You talk about a plant health strategy, which is an interesting idea. Where is the fine balance for you? What can the Government do to streamline integrated pest management in a way that would make it accessible, or at least implementable, for farmers? Where would a plant health strategy fit into that?

Professor Bruce: What we need are the interventions. Integrated pest management is just a term for combining a number of different approaches. How well that will work will depend on the approaches that are available. We need better interventions—better things that farmers can do that can be put together in the integrated pest management packages. At the moment there are not enough robust, field-applicable solutions that can be used, so we need research geared towards generating practical solutions. We also need training to make the farmers aware of them.

Most critical, I think, is a regulatory system where innovations can get through and be put on the market. The regulatory system is very much geared towards conventional broad-spectrum insecticides. It is not really looking at biopesticides, semiochemicals or plant defence activators—some of the other approaches that can be used. Thinking of the future, once there are better delivery systems, with RNAi and things like that, we will need a regulatory system with the expertise and capacity to deal with that. We need it to have more staff and more ability to go through some of those complicated things, understanding things that are not just conventional pesticides, and making timely decisions about them.

The regulatory system at the moment is a big bottleneck on innovation. It is important to have the regulation, because we need to avoid the off-target effects of the insecticides or other approaches being used—but we need decisions to be timely. There is an opportunity cost if the regulatory system is so precautionary that it does not let anything through. We are then stuck with the status quo of current broad-spectrum insecticides and unable to move beyond it. There is an urgent need to move beyond it, and get better, more selective solutions that kill only target pests and do not have off-target effects on biodiversity.

As part of the innovation strategy for plant health I would recommend investment in the regulatory system as well, joining things up together. We need more people and expertise in the regulatory system to understand some of the alternative approaches. More and more of those will be coming over the horizon, because we have so much good science being done that could generate new solutions. We need to avoid a situation—

Chair: We have lots of other questions, so could you keep your answers concise?

Professor Bruce: Certainly, yes.

Q198 **Rebecca Long Bailey:** Professor Bruce, you have mentioned already that you think the current regulatory system creates a bit of a bottleneck to innovation. What impact do you think further restriction of pesticides would have on UK food security?

Professor Bruce: If pesticides are just banned, without enough new solutions being made available, there will be intense selection pressure for resistance, given the limited number of pesticides that are considered less harmful that are still available. Without a range of options, those interventions will be over-used and insects will evolve resistance. We will lose those more benign products as well.

Q199 **Rebecca Long Bailey:** Thank you. Professor Field, is there anything you would like to add?

Professor Field: I agree with what Toby is saying. When we look at legislation we need to think about the fact that a compound in its own right can be toxic, as I said earlier, but it is about how it is used. The whole advice system to farmers needs to be looked at. There are agronomists who advise farmers, but they are mostly paid to do it, so they are likely to come up with the quick option, which is usually a pesticide. A lot more needs to be done. We need to monitor more for resistance, for example, so that people are not using chemistry that will not work. That goes on all the time, because people do not know that they have resistance. We need to work on thresholds. Do you really need to spray if you have only two beetles per plant? This is all doable—Toby is probably referring to some of this when he talks about good research going on—but it is not going into the market.

The problem with the system of registration and looking at it is that it is easy to do for a single compound, but harder for a system such as IPM. It needs more thought and more expertise on what the whole system looks like and what is possible. Be careful what you wish for—the possible off-target effects. I am going to be a bit controversial. We can talk about conserving biodiversity and reaching net zero. These are amazing goals, but we have to think about them alongside food production. With climate change making it harder to grow food around the world, the UK has to be more self-sufficient in sustainable food. The whole thing has to be looked at in a much bigger scenario than a single crop and what you might want to put on it.

Q200 **Rebecca Long Bailey:** Thank you. What are the most promising alternatives to chemical pesticides for managing crop pests in the UK, and how effective are they in comparison to traditional pesticides?

Professor Field: There are lots of alternatives, and Toby is quite an expert in many of them. There are agronomy measures to make sure of growing robust, healthy crops that will naturally resist pests. There are biopesticides and semiochemicals, on which, again, I think Toby would be better. There are also resistant varieties; Toby mentioned one earlier. We should be looking more at those. Of course, we now have the tools to make varieties resistant. We did work many years ago on making wheat give off an alarm pheromone that might have deterred aphids. It did not work too well but it was pioneering. That relied on GM, which was not very popular, but with gene editing becoming more acceptable, especially in the UK, we should be looking at how we make a crop unattractive. If we understand what attracts an insect to a crop, maybe we can just deter them and will not need to kill the insects.

There are quite a lot of opportunities around, but they are quite a long way down the line. It worries me, slightly, that people talk about gene editing crops to make them resistant to pests, as if it is going to happen tomorrow. It will not happen tomorrow because it needs a lot of work to know what to edit to do it, but in some cases it will be difficult to do, because gene editing can make only quite simple changes. Some traits will be quite intractable. So conventional breeding still has to play a part as well.

Rebecca Long Bailey: Thank you. Professor Bruce?

Professor Bruce: It depends on what intervention is being used. Some of them are more successful than others. The orange wheat blossom midge-resistant wheat is wonderful. It gives complete control of the pest. Other things—some biopesticides—might be more susceptible to weather conditions. If you were using an entomopathogenic fungus, or something like that, it would need the right levels of moisture and might not be usable in dry conditions. You might need to put it on at the right time. It is more complicated to use, so it might need more training of the farmers or spray operators, or whoever is putting it on. It would need some training to help with implementation, so it depends on what intervention is being used.

Minimising pesticide use will also help to conserve the populations of the beneficial insects. Over the last few months, I had a project where we evaluated some plant defence activators. The farmers who were hosting the trials were not using pesticides. It was quite interesting to see that very early in the season there were parasitic wasps, and a lot of the natural enemies—the predatory beetles—were eating the aphids. The aphid numbers were actually quite low, because there were good populations of the beneficial insects, so it is also conserving those beneficial insects.

Q201 **Rebecca Long Bailey:** Very briefly, what is your view on the use of technology either as a way to reduce the use of pesticides or as an alternative? One example is a visit that I went on years ago to look at new technological developments in the creation of what I called the moth radar. I am sure it has a scientific name. It could track the path of swarms of moths from particular parts of the country so that a farmer could predict when it was likely to affect his or her crop, and then target the pesticide use for that specific incident.

Professor Bruce: I am are very optimistic about the use of technology for better surveillance of things. You are going to have much better information about when and where the pests are present. That improves the prospects for better targeting. That is what precision agriculture is all about. We want to use interventions when and where they are needed and avoid applying blanket treatment without knowing whether a pest is there. I am optimistic that technology could help to improve the situation because we need some improvement.

Q202 **Rebecca Long Bailey:** Professor Field, is there anything you would like to add to that point?

Professor Field: I think Toby is right. Monitoring is really important if we understand, at a large-scale level, as you say, when pests are on the move—but also at within-field scale. Often a farmer will spray a whole field and perhaps only a patch of insects need controlling. I am sure that there are now lots of sophisticated ways of looking at damage to crops.

The problem with aphids in particular is that not many of them are needed to cause a problem, because they transmit viral pathogens. With insects that eat crops it is slightly easier, because quite a lot of damage is needed before there is a loss of yield. That is what I meant earlier when I talked about thresholds. Do you really need to spray a whole crop, or can it be targeted better? There is a lot of technology being developed for that. I am not sure how much is getting into the field. There still seems to be an issue around technology and actually getting it into use. That is always a problem in research and has been throughout my career.

Rebecca Long Bailey: Thank you.

Q203 **Aaron Bell:** Thank you both. It is always good to have someone from Keele here at Westminster. I want to touch on something that you have already mentioned in answers to some of my colleagues and talk a bit more about gene editing. How significant a role will it play in future, what

is the realistic timeframe for practical implementation, and is there a potential for the scientific community to expedite that? If so, what Government policy initiatives would be necessary? I will start with you, Professor Field.

Professor Field: I have watched the gene-editing debate. I think we have done a good job in the UK. I confess my allegiance to DEFRA on this because it has worked quite hard to make gene editing available. At Rothamsted we are now doing quite a lot of field trials with gene-edited crops. I think it has an enormous potential, but we have to be aware that the crops we are testing now in the field are coming along because of years of background research to know how to change a trait. What you are saying is that you want to change what the plant does, which means you have to understand the proteins and genes and what is involved in that to know the change. I think we should now be investing a lot more in understanding what we want to change and how we might change it, because it will not get into the field overnight; it has quite a long run-in. I do worry that the people who speak against gene editing will start to say, "You said it would do all this and it hasn't done it," because the timescale is quite long.

Q204 **Aaron Bell:** You mentioned your role in DEFRA. We recently passed an Act on genetic technology and have diverged from Europe on that. How do you see the international picture on this? We say that gene editing is not genetic modification; it is, but it is a different kind of modification from what has been banned through GM. Where do you see the international regulatory system? Do we have a potential competitive advantage for our agricultural sector?

Professor Field: Lots of countries do allow gene editing and GM, but within Europe, for instance, the fact that we have been able to have different regulations from Europe means—I will put it tactfully—that we now have gone ahead. I am already sensing in the research world that people see the UK now as a place where we can test crops in the field, whether it is a research field as at Rothamsted and other places such as Toby's Keele, or on farmers' farms. When I talk to farmers, they are quite keen to have a go at this: they see it as a way of doing things and it can answer a lot of their worries about off-target effects.

I think the regulations around food produced from gene-edited plants need careful thought, because even though we are allowing things in the UK, it is not universally accepted. It is probably accepted by most scientists and probably even a lot of farmers, but the general public still see something like gene editing as worrying. I can understand that, because seeing the difference between gene editing and gene manipulation is quite complicated. I think there is a big job to do on the acceptance of the food product. Will it have to be labelled? All of these decisions still have to be taken. That needs to start coming through to give people confidence that it will happen.

Q205 **Aaron Bell:** In terms of expedition, what could the Government do? You said it is a longer timeframe than perhaps people commonly think. Can

you put a rough number on that? Are we talking about 10 years?

Professor Field: Some things might take 10 years. All scientists say they need more research and I am not going to cover that up. We do need more research into what we want to manipulate. That can be done at quite a basic research level, but we also need more research into how that is going out into the field, how these crops will behave and farm sites where people can do trials and farmers can come and see them. The support and finance for research is really important.

I am also very concerned that we do not want to get gene-edited crops near to market and find they do not have a market, because farmers will not take up something they do not think they can sell at the end, if the restrictions are there in a way that deters people or we have labelled something as gene edited as if it is Frankenstein food again. I lived through the GM scare so I know what happens if people get hold of the wrong end of the stick. We need to think a lot more about that now before we get to the point where we have to consider it. Gene editing is amazing technology, but it has to be done carefully.

Q206 **Aaron Bell:** Who should be leading that essential PR campaign to the public? Does that need to come from science or from Government primarily?

Professor Field: I think it could come from both. I hesitate to say that the public trust science perhaps a bit more than Government. I should not say that on record. I think it has to come from both. Government has to show it is working with scientists. I think that was how gene editing got through our system, because it was shown that science had been taken into account and this was based on science. The public, or most of the public, do not want to not take up opportunities. There will always be a hard core. I think it is an education thing and it has to be a combination of scientists prepared to stand up and say things, which they are getting better at, and Government being willing to stand up and support things.

Q207 **Aaron Bell:** Professor Bruce, do you have further thoughts on gene editing and its role in addressing these challenges?

Professor Bruce: There are two things that Lin said there. It is about which genes to edit and the need for more research, because we want to have things that will show a benefit and provide practical interventions. That needs to be done. It is important to have dialogue as well, but conventional breeding uses random mutagenesis of crops as well, so in some ways this gene editing is less invasive than some of the things which are considered to be conventional breeding, so hopefully we can get that explained. Even some anti-GM campaigners I have been in touch with, once they realised that random mutagenesis was part of conventional breeding, did not see gene editing as being quite such a big deal any more compared with what is happening as part of conventional breeding, which has been done for almost 100 years. But we do need to know which genes to edit so we can get these interventions.

One of the key messages I would like to get across is that we need to develop new interventions, technologies, solutions and innovations that can be brought to farmers and are better than what we have now with broad-spectrum insecticides which are killing too many other things. We need new solutions.

Q208 **Aaron Bell:** What are your thoughts on a realistic timetable for gene editing, given that you have said there are lots of challenges, for it to be a practical implementation? Are we talking about over a decade or more?

Professor Bruce: We probably are, because if we are having insect resistance we need to know which genes to edit and how to go about this. We need to be realistic about that, but for all of these things, with time, it depends on how much investment there is and how much seriousness there is about joining things together and co-ordination. If there is a serious strategy for trying to develop these new technologies and solutions, that could help to grease the wheels and get things moving faster.

Q209 **Aaron Bell:** That goes hand in hand with what you said in your written evidence about the current regulatory system being a barrier to innovation for plant protection products in general. I know that you addressed this slightly in reply to Chris Clarkson earlier, but how can the Government change those regulatory barriers? What should we be advising the Government to do to encourage more innovation, whether it is gene editing or anything else?

Professor Bruce: The regulatory system is an important part of this. We need to have regulation to avoid these off-target effects, but we also need to make sure that that regulatory process is not so slow, time-consuming, expensive and cumbersome that we cannot get things through that step. A lot of wonderful research is being done, but if you cannot get it through the regulatory system and put it into practice, there is a lost opportunity. We need to find solutions that are better than those currently available; otherwise we are just stuck with the status quo.

Q210 **Aaron Bell:** Your issue is basically about traditional efficiency and the speed of it. It is not that the regulatory system is actively pursuing the wrong targets; it is more about having all these delays in it.

Professor Bruce: It is very important to have a regulatory system to avoid unintended consequences and investigate them. It is very important to do that, but we also need to find the right balance to make sure that we are managing to innovate and get new things through that system. It probably needs more investment in the regulatory system itself, with more expertise and capacity so we can get these things done more quickly.

This is an opportunity for the UK to lead the world here. There is an opportunity now for the UK to be a place of innovation where we can put science into practice and try to generate some of these new solutions; otherwise we are stuck with the same old pesticides and we do not have any new interventions that can be used. Often, you see well-intended

campaigns that say they will reduce pesticide use by 50%. I think France did something like that, but over the period of time when the Ecophyto programme was in place there was an increase in pesticide use because the alternative approaches that could be used were not available.

Q211 **Katherine Fletcher:** Professor Field, you were talking about the loss of pest control from neonicotinoids and systemic neonicotinoids. I wondered whether you had made any analysis of additional alternative, perhaps more generic, pesticide use to compensate for their loss, and whether there are untended consequences from that decision.

Professor Field: I have not done analysis of the data myself. People have looked at the data. The first unintended consequence when we stopped growing as much oilseed rape was that we imported more palm oil, which meant they were knocking down more rain forest to produce palm oil. I think that was the first thing that could have been predicted.

People did try to move back to some of the other chemistries, because people had moved on to neonics. For instance, the pyrethroids were definitely used more. We had a huge problem because pyrethroids were being used to control a particular pest of oilseed rape, which had huge resistance to it. We knew that and tried to publicise that, but it was quite hard. People were throwing on pyrethroids that were never going to work and just killed off the beneficials. There were definite unintended consequences in having the ban come in quite so quickly and without enough thought about what farmers would try to do. If your crop is just growing and it is being eaten by a cabbage stem flea beetle, you do something. Even if you use a pesticide that does not work very well because of resistance, you might get some increase.

So we didn't think it through. As Toby said, we need more thought about registration, but we also need more thought about the unintended consequences of taking pesticides and particular compounds out of the market, and also the ones we introduce. It is a time issue for many farmers. They have to react to something that comes up in the field. This could get worse. As pests move around with climate change and so on, we have to have very flexible systems that can respond to what is going on and support the farming community. As was said earlier, sustainable farming has to be in amongst this.

Q212 **Katherine Fletcher:** To summarise it, given the understandable desire to avoid non-lethal effects on Hymenoptera populations—bees—potentially what we have ended up with is habitat loss on the other side of the world and potentially the use of more wide-ranging pesticides that are perhaps less effective. Thank you so much, Professor Field.

I have one more very quick question for Professor Bruce. When I was listening to you talking about the need for an integrated pest management system, it struck me that there is quite a change going on in agricultural support and engagement with Government with the environmental land management schemes and incentivisation for farmers. I wondered to what extent integrated pest management could or

should be inserted into that system not only to incentivise but to increase the knowledge base of farming systems and practices.

Professor Bruce: There is certainly an opportunity for that and it should be part of it. I think this engagement with the farming community is vital for the empowerment of farmers with new techniques and approaches that they can use. What we inherited from the EU was the sustainable use directive, which is quite a complicated legal framework, but you can simplify it by thinking of it as a seesaw. On the one hand, it had the banning of conventional pesticides and, on the other hand, the promotion of the IPM and alternatives. That was what was supposed to happen, but in reality there was a lot of banning of conventional pesticides, so that side of the seesaw was going down, but the other side was not going back up. What we need to address is not just banning pesticides but how to provide the alternatives and other interventions, so if that can be integrated into these environmental land management schemes what other approaches must be used.

Q213 **Katherine Fletcher:** What would the three things be? Would that be planting cover crops? You are the experts and I do not want to put words in your mouth. What are the top three? I know it is not a comprehensive list.

Professor Bruce: Having some resistant crop varieties, having some of these cultural control practices to conserve the beneficial populations, and also how to use more biological approaches rather than just toxic chemicals.

Chair: Can I thank Professor Bruce and Professor Field for their evidence this morning? It is extremely expert and very helpful to our inquiry.

Examination of witnesses

Witnesses: Vicki Hird and Henry Edmunds.

Q214 **Chair:** Can I invite our next pair of witnesses to join us at the table? As they take their seats I will introduce them. I am very pleased to welcome Vicki Hird. Ms Hird is the recent head of sustainable farming at the charity Sustain. Her academic background is in pest management. She is a fellow of the Royal Entomological Society and has published a book entitled "Rebugging the Planet". Thank you very much indeed, Ms Hird. We are also very pleased to welcome Henry Edmunds, who is the owner of the Cholderton Estate, which has been certified organic for over 50 years. In addition to arable crops, the farm has around 500 head of sheep and 600 cattle. Thank you very much indeed for joining us today.

Perhaps I can start with a question to Mr Edmunds. You are probably aware that you have been built up in advance by another witness to the inquiry, Chris Packham, who, sitting where you are, told this Committee in his evidence: "I have been visiting Henry's farm for many years. Every time I leave his farm, I feel euphoric. It is a farmed landscape. It is not a pristine wilderness. It is not rewilded. It is a functional farm producing a profit in a modern world, and yet its biodiversity is better than the

SSSI"—site of special scientific interest—"next door." That is quite an achievement that Mr Packham brought to our attention, so we are very grateful to you for coming to tell us how you did it.

In particular, you know that this is an inquiry into insect diversity. Perhaps you can tell us a bit about your practices and what makes a difference for you compared perhaps with some of your other neighbours in farming.

Henry Edmunds: Thank you very much for asking me. Having listened to the professors earlier, one of the key points that has been missed is providing incentives for beneficial insects. I can give you a demonstration of that now. Many years ago, before I became organic, I remember being phoned up by somebody who wanted to sell me an insecticide called Aphox for the reason that there was a nationwide plague of aphids. If the aphids exceeded more than six per ear in wheat, the wheat yield would drop by 20%. They could have a helicopter with me within 24 hours to spray 400 acres of wheat, which was very kind of them.

I thought I would first check it out because I am an entomologist. I checked some of my wheat and indeed they were quite correct. I had six, seven, eight, even 10 aphids on every ear of wheat, but, if I checked enough ears of wheat, I found that on every 10th ear on average there was a hoverfly larva, and on every sixth or seventh ear of wheat there was a ladybird larva. I phoned the person back and said I would give it a few days to see what happened, which was exactly what I did. I returned to the crop a week later and there was not a single aphid to be seen—not one. They had been completely eaten by the beneficial insects, which was quite remarkable.

A few weeks later I had crops that had a lot of charlock flowering and there were swarms of what is known as the marmalade hoverfly. It was the marmalade hoverfly which had cleared out all my wheat for nothing. That was one of the key reasons I became organic, because it was obvious that nature could provide the solutions in every case, I believe.

Over the years I have developed systems. We have wide hedgerows, which obviously encourage insects, and we have floral-rich field margins. I think floral-rich field margins are the key to the future, because if you have them, obviously you will look after large numbers of beneficial insects, including bumblebees and everything else.

Another key example would be Carabid beetles. I have never ever used slug pellets on any of my fields. All my neighbours use slug pellets everywhere. They routinely cover their fields with slug pellets, which are highly toxic. They kill song thrushes. This is part of the reason for the decline in wildlife. Because I have never used slug pellets and have good field margins, I have high populations of small, black Carabid beetle. I cannot quote the exact Latin name for it, but there are two species involved. What happens is that they retreat to the field margins in the winter and in the spring they come into the crops and clear out the slugs. I never have any problem with slugs, none whatsoever.

The Game & Wildlife Conservation Trust drew this to my attention many years ago. It visited 25 farms in the area around Fordingbridge, where it is centred, and was unable to find any of these beetles because they had been wiped out by pesticides, whereas when it came to me it found an abundance of them.

Q215 **Chair:** You have described your wide margins that contribute to insects that predate on some of the harmful insects, but surely that is not enough. You are not saying that if every farm did that there would be no problem of crop predation by insects. Is that one element of a system that you use, but do you have a plan that brings together other things that in combination give you the robustness that you need to be commercial?

Henry Edmunds: Not only that; it is about having a proper rotation as well. The problem with British farms today, certainly in the south, is that a lot of them are continuously arable. That means they may have a rotation, as they term it—in other words, they have oilseed rape or peas—but basically everything is combinable and everything has been sprayed. Professor Goulson worked out a couple of years ago that, on average, every arable crop in Britain is sprayed 16 times over the year. Therefore, it is hardly surprising that we have seen an extraordinary lessening in the amount of wildlife on farms.

I must give you another example of this. I monitor moth populations at home. I am very interested in moths. In the summer it is not unusual for us to get over 200 species in one night, whereas in the New Forest, which is a prime SSSI, on the same night you might get only 40 to 45 species.

We do not spray anything; no sprays are used at all. I grow about 400 to 500 acres of arable crops. A lot of it is sown in the late autumn and go through the winter. All of them have lots of weeds—for instance, red dead-nettle, speedwells and plants like that. All of these flower in the early spring—March, April, May—which means that when the insects come out of hibernation they have nectar sources. You can see bumblebees flocking into my oat fields on the red dead-nettle. Often, you have a job to see the oats because there are so many red dead-nettles, speedwells, fumitory and everything else all flowering. Yet, extraordinarily, after they flower, they die down naturally and the crop that you wish to grow comes up.

We now grow magnificent crops of winter oats. This year I sold 200 tonnes to Morning Foods, a very big oat-milling company. They were some of the best quality oats it had had. We had yields in excess of 2 tonnes to the acre without any fertiliser, spray or any intervention. Once the crop was sown we never went into the field again.

Q216 **Chair:** That you have been able to produce this sounds like a fantastic achievement. Have you faced challenges in this? Have you had times when you have had an infestation that has overwhelmed other crops?

Henry Edmunds: I have never experienced that sort of thing. The trouble is that the emphasis on too much arable has created the correct

conditions for some of these pests to take off, but because I have mixed farming I have proper rotation. We use leguminous leys that are put around the farm; they move around the farm. They might be down for five years. We are accumulating fertility in the soil. We have generated really healthy soils with high organic matter. This is another key point. One of the professors has alluded to this: if you have healthy soil, the plants are more resistant to disease. This is a critical point. You must maintain organic matter in the soil. Nationally, our organic matter levels are down to 4% in arable crops, but because I have proper rotation mine are approaching 10%, sometimes more. That means that if we have a drought the crops are more resistant.

This year, looking at diseases like mildew on my spring barley and things like that, there was not any. I found no mildew on my crops. We achieved barley yields with a bushel weight of 70, which is extraordinarily high for barley. These were thick grains of barley like peas. This is what can be done if you look after the soil. Not only that, but in terms of climate change, surely at this most important time we must improve our soil quality. Soil quality is degenerating throughout the country. We are losing the organic matter and we must build organic matter, because if you have droughts, floods or deluges and your soil is depleted of organic matter, the water goes straight off. If you have a drought and soil is depleted of organic matter, the moisture has been lost. If you have decent levels of organic matter, you maintain the soil moisture, which we have demonstrated for several years because we have had very dry springs yet the crops have thrived.

Chair: There is a lot to delve into and my colleagues have lots of questions to you as well as Ms Hird. I am going to start with Rebecca Long Bailey and then go to Tracey Crouch.

Q217 **Rebecca Long Bailey:** Mr Edmunds, just a very brief question from me. You have already mentioned that nutrient-rich soil makes crops more resistant and potentially increases crop yields, but if every farmer in the UK farmed and managed their land in the same way that you do, how would that affect the availability and affordability of food for the UK consumer?

Henry Edmunds: It is an interesting question and a very difficult one to know the answer to. One thing I can say is that if we do not look after our soils better, we will not be able to grow enough food anyhow. So a prime objective must be to improve organic matter in the soil, which means returning proper rotations back on to farms.

The way I do it is by using legumes, red clover, white clover, lucerne and, above all, sainfoin. We do a mixture of those with long-lasting grasses like meadow fescue, cocksfoot, perennial ryegrass and timothy. Therefore, we have a compounded mixture. The joy of this is that not only does it build soil fertility; it also means that all the pernicious weeds farmers get, like blackgrass and things like that, just disappear. We have no blackgrass, no barren brome or anything else. When I started doing it, I thought I was going to be infested with cleavers. I never see a cleaver

in my crops. The extraordinary thing is that at the end of the day, the only weeds we have are not damaging to the crops in which they grow. I think it is fascinating and it never ceases to interest me.

We exploit the leys, as one would call them, by grazing them with cattle and sheep on an extensive basis. On the use of sainfoin, of course the current thing everyone says is that cattle produce methane and everything else, but I had a long-term study done on the farm over the years and we are carbon-positive. We tie up far more carbon in our farming operation than we emit as an enterprise. I think about 120 tonnes of carbon per acre are being tied up on our land, so there are global implications in farming in a proper rotational way. It would make the nation far more reliable in the future, particularly with climate change coming along far faster than was ever predicted, I'm afraid.

Q218 **Tracey Crouch:** Ms Hird, I will come to you with some questions, but I just want to follow up very briefly on some of the things Mr Edmunds mentioned. Would you describe yourself as an entomologist first who farms, or are you a farmer with a deep knowledge of insects?

Henry Edmunds: I think it is the second. I would not say I have a deep knowledge of insects—it is a vast subject—but I have certainly always been interested in insects.

Q219 **Tracey Crouch:** Following on from what Rebecca said, you did not answer the question about affordability. It is very noticeable that organic products in our supermarkets are much more expensive than the alternative. I have an allotment—a much smaller-scale mini-farm. It is much more expensive for us to grow our own food than it is go to the supermarket and purchase it. Is this something that you are deeply conscious of? You are doing this wonderful thing in terms of insect preservation, but it is very expensive. It is a bit of a preserve for the wealthy to eat the product that you grow.

Henry Edmunds: It is an interesting point. As for our beef and lamb, we do not get a noticeable premium for organic beef and lamb—we really don't. Currently, my beef is normally sold as store cattle, so we are not finishing them, for cash-flow reasons. As for lamb, we get only about £5 an animal as a premium for being organic. That is all; it is very little. I think that demonstrates it does not need to be overly expensive.

The point is that the total cost of the production of conventional food is not really in the equation, is it? We are not even touching the cost to the atmosphere, the soil and the long-term consequences of industrial agriculture. Sooner or later, if they are not taken into account, we will be in serious trouble. I think it is obvious that we are in serious trouble already because of the decline in biodiversity on farms. It is all about industrial agriculture and climate change.

Q220 **Tracey Crouch:** I do not necessarily disagree with that, but I also represent a constituency which has high levels of deprivation. While my constituents will certainly have an environmental conscience, at the end of the day they just want to be able to feed their families. As much as

they would love to be purchasing organic food in order to satisfy that long-term commitment to their own children and grandchildren, ultimately it is still a very expensive product to buy. With your experience, how can we deal with the dilemma that people want to do the right thing but cannot afford to do so?

Henry Edmunds: I have every sympathy with what you say. Food should not be more expensive, so we have to have a mechanism to encourage people to go down the organic road that does not affect the price of food. That means support in other ways. I would not say that that necessarily means the Government have to put their hand in their pocket, but surely we can be looking at realistic payments for carbon sequestration. Who pays that at the end of the day I do not know, but companies are currently buying carbon credits and things like that, aren't they? This might be a way of incentivising and even allowing more organic production to occur throughout the country.

Q221 **Tracey Crouch:** Mr Edmunds, I have one last question. I am sorry to base this question on Jeremy Clarkson's "Clarkson's Farm" programme, but he tried to do the right thing in terms of the perimeter fields to encourage bees and to reduce his own requirement for pesticides. He lost 10 acres of crop as a consequence. You told the Chair that you had not had that same experience; did he simply do it wrong, or is that just an occupational hazard?

Henry Edmunds: He had been doing it for only just a short time, hadn't he? I did not see that programme, but it takes time for these systems to develop. You cannot suddenly have masses of beneficial insects overnight; it takes time for populations to build up and to get the habitat right. It does not happen overnight.

Q222 **Tracey Crouch:** What do you say is the timeframe?

Henry Edmunds: To put in a decent, thick hedgerow could take a decade, but a field margin can be put in and up and running in a year. Decent floriferous field margins could be established very quickly. As to the quality of the work he did, I do not know because I did not see it. As I said, you cannot expect miracles overnight, but it builds and it does work.

Q223 **Tracey Crouch:** Ms Hird, obviously the use of chemicals is just one aspect of insect decline. Can you tell the Committee how you think that the main agricultural-related drivers of insect decline can be practically removed from the agriculture industry while still ensuring UK food security?

Vicki Hird: I am glad you mentioned that last one because I do want to talk about Rebecca's question. I handed in evidence from some modelling done in the UK about how we could transition to agroecological farming and farming as a whole—all the kinds of things Henry is talking about. It is not just about chemicals. As you say, agroecological farming could absolutely feed us—it absolutely could—but we do have to change what we eat and what we waste. That goes without saying, because there is a

huge, embodied water, climate, energy effort involved in the food which is wasted, which is about 30% of the crops and meat we produce.

We have to look at any system that we want to promote, such as Henry's system, which I think is fabulous and well worth looking at, in the context of the wider food system. When you ask me about other things, we need to have diversity in farming. Henry has done that; organic farmers have been doing this for decades. As to other farmers, I work a lot with the Nature Friendly Farming Network, which is a relatively new grouping. It is a fantastic group of farmers. A lot of them have eliminated insecticides entirely. They are doing different and longer rotations, and they are building in flower-rich margins and looking after hedgerows and the messy bits—all those kinds of things.

Climate change is another big threat. I do not know whether you have seen the State of Nature report which came out a few weeks ago. The evidence is that 34% of our pest predators and 18% of our pollinators have been lost over the past decade. That will be due to agriculture and climate change. We need to tackle fossil fuel and all those other related issues that are creating the climate change that is already upon us.

We also have other pollution factors such as fertilisers and water pollution, which can be extremely damaging to pest predators like dragon flies, beetles and hoverflies which emerge from the aquatic environment. Water pollution is critical and something to tackle. Above all, I would probably say that diversity is the one thing that will help you as a farmer and us as a nation to get a better diet, sort out our insect loss and provide farmers with a future which is less risky. The problem with all that is that the food industry wants very cheap raw materials for its highly-processed food, which makes up 54% of our diet. We have to look at the whole food system. If there is one thing I stress you should be saying in your final report, it is that this cannot be just about what farmers do.

We are really pleased to see the IPM standard being developed from the ELMS—the environmental land management scheme—in England. I hope they get that in the other nations, but that has four measures, which I can go through. That is very welcome. It is not enough—it is too piecemeal and pick and mix—but it is great to see that DEFRA has grasped this nettle and is going to be paying farmers for implementing IPM, which is fantastic.

Tracey Crouch: You have actually answered my second question.

Vicki Hird: Sorry.

Q224 **Tracey Crouch:** No, no, it is really helpful given the time. Turning to IPM, Mr Edmunds, does the Cholderton Estate implement IPM strategies?

Henry Edmunds: I suppose I do it all the time.

Tracey Crouch: I mean consciously do it.

Henry Edmunds: Not really, but obviously one does think about it. I would also like to applaud DEFRA for the ELMS countryside stewardship. These are excellent schemes. I am and have been a participant in stewardship for many years. I could not do what I do without the support I have had through stewardship, so I have a lot to be grateful for there.

Q225 **Stephen Metcalfe:** Continuing on the theme of the IPM, first, do you both think it is a positive, sustainable way forward? Secondly, do the agricultural policies currently in place support the adoption of IPM, or are there barriers to its adoption that could be removed and we could hear about?

Chair: For those people tuning in, IPM means integrated pest management.

Vicki Hird: I think there are huge barriers. I have named one already: the industry, which demands uniformity, very low prices and perfection in things like carrots. All of those kinds of specifications are big barriers. Policy barriers will be the general direction of the common agricultural policy. Happily, it did have the rural development strand and agroenvironmental strand, which supported and funded stewardship schemes. Those have been really good for a proportion of farmers who got it, understood it and had the advice available, or already knew about these things. One of the biggest barriers is the large proportion of farmers who are under this cosh of a food industry farm gate prices squeeze that is really difficult. I would point you to our "Unpicking food prices" report, which shows that writ large.

The problem for them is having the advice. Previous witnesses talked about the lack of independent advice. We have said that there should be an independent, affordable or free advisory network available for all farmers to access. I think some of the best advisers would be people like Henry. You could pay farmers who are already doing it to provide that advice and demonstration to all farmers so they can understand what IPM really means. It is not just cutting out insecticides or herbicides; it is about a whole-farm approach with chemicals as a very last resort. That is absolutely what it should be. Henry's farm and many other farms demonstrate that you can do it without a massive loss of yield.

That new IPM standard—I think it is now called "action" and not "standard"—has already been announced and farmers can apply to it. It would be brilliant if every single farmer in the UK took that up. The first thing they have to do is produce a plan, assess what they have and what their assets are on the farm, and they will get £968 for producing that. There are three other measures. It needs to be bigger, stronger and more ambitious, but that kind of policy approach is great.

Q226 **Stephen Metcalfe:** Henry, do you have anything to add?

Henry Edmunds: Yes, a little bit. The professors were talking about gene editing and things like that. I may not be particularly up to date on this, but I remember the NIAB, which did projects and tested all the new varieties of cereals to see which gave the highest yield under certain

circumstances. They used to assess how resistant they were to fungal diseases and gave a list—mildew was this; rust was that—so you could choose a variety that suited your system and which showed disease resistance.

A few years after I joined, they suddenly dropped that. Suddenly, they were producing cereals but not judging new varieties of cereal; they were not judging what disease resistance they had. I phoned them up and said, "Why aren't you doing that any more?" I was told, "Oh well, farmers all use fungicides or pesticides now, so it is irrelevant. We're not interested. All we're worried about is maximising yield." I said, "How wrong you are," and I stopped my membership at that point.

It demonstrated that there was a good programme for selecting disease-resistant varieties. So why aren't we doing it now? Perhaps we are doing it now; I don't know. I am not sure whether NIAB are doing it now, but they certainly used to do it. If not, that should happen again, definitely. It is perfectly possible to introduce resistant varieties quite quickly, particularly cereals, without going into this gene-editing business. I think that is very important.

Q227 **Stephen Metcalfe:** Vicki, you touched on how you would like farmers to receive information or advice on changing their practices. Where do they get that advice at the moment? Is it readily available, and are there ways we can improve the dissemination of that information?

Vicki Hird: There is information and advice, and there is advice on farms. There is a whole range of options there. Most farmers get their advice from either their father or mother who was farming before, and the agronomists who come to the farm. Often, those agronomists are part of a community that is connected to the industry that is selling the fertilisers, pesticides or herbicides, so independence is critical and it is not available. There are some wonderful advisory bodies out there, like FWAG, the Farming and Wildlife Advisory Group. It would be worth you talking to them because they have been around a long time and they provide independent advice, but it is not available to all.

Farmers will struggle. As I said, they are struggling with their farm gate prices, so to pay for that advice is quite a big problem. I think we should bring back a free advisory service, which they have in Wales, and also link that to the research that needs to be done which is about reducing the need for inputs. The inputs cost money and they have a cost to society. It is about linking that advice with demonstration.

I do not know whether you have heard of the Innovative Farmers network, which does farmer-led trials. It is a brilliant initiative that was started by the Soil Association but is now separate. It would be worth looking at what they are doing because they do farm-based trials of new techniques, such as using leguminous crops in rotation to bring in fertility and those kinds of cropping systems which can reduce insect loads and things like that. Having innovative farmers do far more would be great, because advice would then be available that is farmer-led and farmer-

focused. The farming culture of farmers is beginning to change, but I think it will take a lot to change it quickly in the ways that we need to protect it.

Henry Edmunds: One of the great problems, of course, is that agricultural colleges are not teaching young farmers about conservation, organic or anything else. They are just going straight through maximum yield—use this, use these fertilisers, use these pesticides. They are not going into the broader environmental approach that I would support. That must change. Agricultural colleges have to tell their students more about conservation and looking after soil—just the basics.

Basically, pesticides, fertilisers and everything else have turned us into a nation of, I would say, very bad farmers. It is bad husbandry. What we are seeing all over the country is bad husbandry—just continuous arable cropping. This sort of system would never have happened 50 years ago. It is totally wrong, and it is destroying the countryside and everything. Basically, it is turning our countryside into a sterile prairie.

Chair: Thank you very much indeed.

Q228 **Katherine Fletcher:** It is very interesting. I have a mate who is an arable farmer in the middle of Northamptonshire, and he will regularly come out with the nine most expensive words in farming, which are, "This is the way we have always done it." I want to try to transition into: why is everybody not farming like you, Mr Edmunds? What are the barriers there? You have already touched on the education of young farmers, but we know that the statistics are that farmers are predominantly of a more experienced vintage—if I can put it like that. What do you hear about people's appetite or interest in taking up some of the techniques that you have talked about?

Henry Edmunds: When they say, "This is the way we have always done it," of course it is a complete myth. This is only the way that they have been doing it since the last war. There is absolutely nothing new about what I am doing at all. It is exactly what the Victorians were doing. If my great-grandfather could come back to our farm, he would recognise it; he would recognise a lot of the crops. The point is that those people knew how to farm. They understood the way of building fertility naturally.

Q229 **Katherine Fletcher:** I am trying to understand what we can do to engage further support for more insect-friendly farming practices within your peer group. I do not want you to be ostracised at the pub, but could you share some insights as to why perhaps others are not picking up your approach?

Henry Edmunds: I think they are just basically not interested. Why bother? You can just go along and squirt these chemicals on all over the place. Does it really matter? It does the job. They get the corn at the end of the day. They are not thinking that far ahead. When it comes to basics like declining organic matter, currently they are okay. They are still producing a crop every year. If the organic matter breaks down more, if we lose yet more organic matter, and then we have prolonged periods of

drought and everything else with climate change, we are going to see crop failures on a big scale.

Q230 **Katherine Fletcher:** To make sure I understand you, your argument is that there is a certain short-termism that we are all right today and we are all right tomorrow, and perhaps a lack of understanding of potential problems, as you see them, for the future, and a certain—I don't want to put words in your mouth—lack of intellectual curiosity about alternative approaches. Is that fair?

Henry Edmunds: Yes, I think that is fair.

Q231 **Katherine Fletcher:** Ms Hird, would you add anything to that? I am trying to understand why everybody is not running around saying, "I'm not spending a fortune on fertiliser and insecticides," which have both shot up in price since Putin's war. Why is everybody just not going, "Whee! We don't need to spray any more"?

Vicki Hird: I think some are. I have seen that there has been a drop in fertiliser use. As I said, the Nature Friendly Farming Network is growing almost exponentially and is excitedly using no insecticides and finding it works, as Henry has found. There is a big risk issue. There is a risk of changing, and farmers are very reluctant to risk it because they are already on a knife edge in what they get from the marketplace.

The Government, the research base and the advisory base must help them to see the risks differently and take those risks. De-risking that transition is what needs to happen. Ideally, that is what the industry will be doing as well. A lot of the industry is talking a lot about regenerative techniques. I don't know if you have seen the McCain chips advert that is talking about it, but it is not necessarily paying the farmers enough to make those transitions. I would say that that has to be part of it as well as Government support.

Q232 **Katherine Fletcher:** It is great to hear your positive assessment of the ELM scheme and integrated pest management within that. Other than more money, what would you want to see from Government to help support a transition? As you say, people are feeling it at the moment.

Vicki Hird: I would not have made the scheme pick-and-mix. I would have made it much more integrated and coherent so that farmers would need to do something and then need to do something else, so it is a logical step. At the moment, they can just pick and do things and not go to the next step, and that is not going to give us what we need. I would do it differently, but I think it is a great first step that DEFRA has done. We should be calling on industry to support farmers to do the right thing.

The food data transparency partnership, which was announced after the national food strategy, seems to be being developed just with industry in mind. There are no independent NGOs on the board.

Q233 **Katherine Fletcher:** Give us a "for instance" or an example to make it tangible. I have a huge carrot grower in the South Ribble constituency; one of the high street supermarkets is their customer.

Vicki Hird: One of the brilliant things Waitrose did during the crisis in supply chains when we were not getting tomatoes from Morocco about a year ago was that they dropped their specifications. They did not say, "We're going to do an ugly fruit promotion," which does not really help the vegetable growers and horticulture. They said, "We're going to drop our specifications for perfect produce, for carrots to be the right size, to be not blemished and to be not wonky." That is what they should be doing more of and get their customers to understand why all the produce looks different, not just a wonky fruit promotion one-off thing. That is something they could really do.

Q234 **Katherine Fletcher:** Effectively, the Government need to either become statist, which is telling farmers what to do with their land, which has some challenges within itself—I know we will hear from the NFU in the next panel, and maybe we can bring that to them—or get out of the way and encourage—

Vicki Hird: It will not come from the market. The market will not deliver the kinds of funds for non-market goods like protecting insects and protecting the soil, unfortunately. The Government need to be supporting that transition.

Katherine Fletcher: Sorry, but in terms of the food specifications there is no role for Government there.

Vicki Hird: I see.

Katherine Fletcher: It is kind of "encourage and suggest". Thank you, Chair.

Chair: Thank you very much. There are two quick questions from Aaron Bell and Tracey Crouch.

Q235 **Aaron Bell:** Briefly on pesticides and the national action plan, we have one, but it is now 10 years old. It was supposed to be reviewed after about five years, so we are obviously waiting for that. In your opinion, Ms Hird, has the delay had any negative effects on ecological conservation generally?

Vicki Hird: I think it is disastrous. I cannot believe we do not have the national action plan now. It would give farmers the signal they need. It would give the industry the signals it needs for what needs to happen for that transition to an era when we are using IPM as the norm, ideally far more organic production but all farmers using chemicals as a last resort. The national action plan, in a way, is about all the opportunities that should be presented to farmers: the diversification, producing flower-rich margins, protecting hedgerows and woodlands—all the things that would provide refuge and corridors for the beneficial invertebrates. Not having it is scandalous.

You can see from the State of Nature report, which is every five years, that the situation is not better now. The State of Nature report shows that we are actually seeing more declines in insects in the UK, which is a disaster. You could say we should have had the review and the new plan

reflecting also the fact that climate change is threatening these insects, so we need more of other things to stop the disastrous effect of climate change.

Q236 **Aaron Bell:** What would be your single biggest wish in a revised plan? Would it be overall levels of pesticide use reduction, or would it be something more basic?

Vicki Hird: There is no single bullet. I definitely think we should have a target for the reduction of pesticides, but it is a bit crude. We should have that, but alongside that should be targets for building the corridors for the invertebrates and the habitats for them, showing that 100% of farmers should be doing IPM. That would be a target. Genuine IPM across the whole of the farmed estate in the UK would be a great target, plus a reinstatement of hedgerows, woodlands and other habitats.

Q237 **Aaron Bell:** We are going to hear from the NFU shortly. A previous report it did in 2018 warned that likely restrictions on plant protection products brought in would reduce farmers' yields by up to 50% in some cases depending on the crop, and that would obviously raise prices, reduce profits and reduce the financial sustainability of farms. How concerned are you about that?

Vicki Hird: This is a bit of a myth and such a problematic argument because, as I said earlier, we throw away 30% of the food we produce. A lot is in the domestic bin, but that is a lot to do with what is marketed to them, buying the wrong kinds of things and buying things that do not last. There is so much to say about that.

We can produce enough food to feed 11 billion people on the planet. We do not need to produce more. A lot of food poverty is about poverty; it is not about food prices. We have had the lowest food prices almost in the whole of Europe for many years. Obviously, the last two years have been a different situation, but we have very low food prices, which is a big problem for farmers wanting to do things differently. Our "Unpicking food prices" report showed that they get 0.09p profit for a loaf of bread. We covered other products as well.

The actual system is broken in terms of money. It has been extracted from the whole system. Even retailers are not making a huge profit per item, but because they are large they can make a profit. They make a lot of profit on things like luxury goods, which they now identify as organic, which is why organic is so expensive, and it is totally destructive. Organic should be cheaper because it is better for the environment, but that is a longer-term problem to solve.

We should be seeing a vision for farming that is providing the food we need. It is nutritional food security, not just food security, because food security means us eating what we eat now, which is killing us and causing the NHS billions in health and other diet-related disease problems. That should absolutely be triggering a change in the Government's food policy. It is not. It is extraordinary that it is not. The

evidence is absolutely overwhelming that we do not eat what is good for us.

Having nutritional food security would help you to eliminate that kind of push for yields which produce cheap food for produce that we do not actually eat or we throw away. There is also a huge question here about how much grain and crops we should be feeding to animals and to cars, but that is a whole other debate.

Aaron Bell: We have to leave it there. Thank you.

Q238 **Tracey Crouch:** Hear, hear, by the way, on ultra-processed foods. In response to my question, you did not mention the importance and impact of habitat loss. The Chair and I both represent Kent constituencies. Kent was once known as "the garden of England"; it is now "the car park of England". We have heard from previous witnesses about insects going north, although that has been related to climate change. How important is habitat loss in terms of insect population? Picking up something that Mr Edmunds said, do you think that sustainability ought to be a large part of the conversation, particularly with younger farmers?

Vicki Hird: Yes, to the second question, absolutely. I know that the Royal Agricultural University is doing work to get agroecological systems embedded into agricultural colleges. I was at a meeting that it held a few weeks ago with many of the colleges. So there is hope there.

With regard to habitat loss, absolutely. When I wrote my book, it was amazing: I went down lots of rabbit holes and there was fantastic research. The loss of habitat—the hedgerows, the messy bits, the single trees, and the small woodlands on farms and in urban areas—is absolutely critical. When you lose those, you lose the ability of insects to spread, to populate, to move, to find nests and to find mates. That loss of those corridors is very well established as one of the biggest problems, and it is to do with intensification of farming.

When I say it is climate change and intensification of farming, that is the habitat loss as well as the pollution and the insecticides. Now I work for the Wildlife Trusts, and it was responsible with others for the State of Nature report. Habitat loss is right up there. I have hope that we can do something about that, but we need to change what we eat and we need to change the food industry.

Chair: Thank you very much indeed, Ms Hird and Mr Edmunds, for your very helpful evidence to us today. It is great, in the case of Mr Edmunds, to hear about your practice to inform our inquiry, so thank you very much indeed, and thanks for coming after milking the cows, I gather, this morning.

Examination of witness

Witness: Minette Batters.

Q239 **Chair:** I invite our final witness this morning to join us at the table. As

she does, I will introduce her. Minette Batters is president of the National Farmers Union of England and Wales. She is also a farmer with a 300-acre mixed farm in Wiltshire. The National Farmers Union represents over 45,000 members across England and Wales and has 20,000 countryside members of the public with an interest in farming and rural life.

Thank you very much indeed for coming and thank you for helping us with our inquiry, and your staff, who have submitted extensive written evidence. This is obviously a very important subject for you and for your members, as it is for us in Parliament. Perhaps, Ms Batters, you could reflect on how you regard the importance of insects for UK food production.

Minette Batters: First, thank you very much to the Committee for inviting us today. It is incredibly important. It absolutely underpins our food production. They are in every way pest regulators, pollinators and decomposers but, conversely, they can also cause significant damage, so it is always riding, effectively, that fine balance.

I have never known our members more enthused and excited about change. One of the challenges of farming under the CAP was that people had just got into a cycle of, "This is how it is." When you have ripped up all the old rulebooks—we committed to net zero by 2040—farmers are looking at their businesses in a different way now. They are recognising the importance of soil health and skyrocketing input costs. They want to lower those costs. They want to farm ever better. I see this as an enormous time of change.

Q240 **Chair:** One of the changes that we have seen, sadly, over recent years and decades in fact, is a decline in the prevalence of many insects. How is that affecting your members?

Minette Batters: Although the research is there—we have more biological records data than probably anyone else in the world—it is still lacking in certain areas. There is always more that can be done and should be done. It is difficult to quantify at the moment with the research that is available.

Q241 **Chair:** You have seen in this session and others the debate about chemical insecticides. We started off talking about neonicotinoids earlier this morning. In the written evidence from the NFU, you sound a note of caution. Your evidence was that there is still no clear or compelling weight of evidence showing that neonics are a cause of widespread declines in pollinators. Just explain what the basis of that assessment is.

Minette Batters: There is not a one-size-fits-all. There are obviously differing neonicotinoids. If we look at Cruiser SB for the non-flowering crop that is sugar beet, it is only ever used when you have sophisticated forecasting models that only come into play when it is predicting very high levels of disease. Obviously, neonicotinoids in flowering crops have been banned. The danger is that there are trade-offs. We have half the oilseed rape grown in this country now, but we are importing it from other countries where neonicotinoids are being used.

The science is variable in this area. We have taken in this country the actions that we have. Sugar beet is an example of probably the most sustainable sugar beet in the world being produced here under extremely tight measures of control. If we did not have access to that, we would be importing beet that would be produced to much lower standards without any of that modelling in place. That is the same for many different levels of food production. We could produce none of it here. There are trade-offs.

What we are showing here, and what we are really keen to show, is that we can be world leading in this area and, through new research and development, we can continue to lighten the impact. It is in no farmer's interest to want to use highly expensive chemicals and seed treatments. The more we can work with innovation and lighten that footprint, the better.

Q242 **Chair:** In terms of yields, the NFU's written evidence to the Committee was that there would be a threat to yields to have a more comprehensive—one might say draconian—approach to pesticides. You heard at the end of the last session that Ms Hird thought that it was a myth that reductions in yields of the scale that was pointed out were inevitable. You have heard from Mr Edmunds—I do not know whether he is one of your members—who described in some detail how he has been successful in avoiding a loss of yields. What is your reaction to what you have heard from both of those witnesses?

Minette Batters: What both of them articulated extremely well is that there is not a one-size-fits-all. We represent many organic farmers across the country. Also, looking at the data that we have, we see 26% to 40% of crop yield lost annually due to disease outbreaks. Different areas with different soil types have different requirements. We now have precision farming. It is in every farmer's interest only to be treating a problem where there is a problem. If we have access to those opportunities, that is going to allow us, as I say, to farm with a lighter touch.

Q243 **Chair:** Mr Edmunds's evidence was that over time you can build up robustness of the crop yields and things cannot be done overnight. Therefore, there may be some initial experience of the catastrophic reductions in yields you point to, but you can attain a higher level of robustness. There is a need to get over those initial stages. Do you recognise that characterisation?

Minette Batters: Without doubt. I thought Mr Edmunds articulated extremely well that the more we can be investing in our soil health and our organic matter the better. You only have to look at the comparisons between this harvest and last harvest to see the impacts of climate change and weather events. They could not have been two more different harvests. We faced drought last year. We faced huge levels of rainfall. That had huge impact on quality and yield at the end of it. Within a 24-month period you saw two totally different outcomes.

A lot of the challenge is being agile to these events. No doubt, climate change is having a massive impact on a farm's resilience. It is certainly having an impact on yield and quality. It is about being able to marry up what we have done in the past that Mr Edmunds is very much referring to with what we can do in the future to build ever greater levels of resilience.

Q244 **Chair:** Is there not a sense in which agility, in the sense that that implies a short-term response to changes that affect farms, is not what is needed so much as a long-term approach to build farms that have a resistance to some of the predation by insects in this case? You need the long term rather than the short term.

Minette Batters: That is absolutely right. A focus of ours in the run-up to a general election will be very much trying to focus on a long-term budget approach, effectively, to climate-smart, sustainable food production. I completely agree with Mr Edmunds about measuring the baseline. We should be at scale measuring the baseline of our soil health, organic matter and sequestered carbon. Indeed, if we fail to start off by measuring the baseline, how do we know what is working, how do we know what is not, and how do we incentivise those to get what good looks like?

We have some of the best scientific research stations in the world here. Rothamsted Research, as an example, underpins maize crop insurance in the US. We really should be using those. We really should be using the scientific community to build effectively what that baseline needs to look like and how we measure it and, ideally, the one or two tools that we would be using to measure it with.

Chair: Okay. I am going to turn to my colleagues, starting with Aaron Bell and Tracey Crouch.

Q245 **Aaron Bell:** Thank you, Chair. Thank you very much for coming, Ms Batters. If I could just repeat the question I put to Ms Hird about the national action plan for the sustainable use of pesticides, are you and your members worried that the next draft, when we finally get it, might go too far and might actually put the financial sustainability of your farms at risk?

Minette Batters: We are worried, as Ms Hird pointed out, about the timing. We have been waiting and waiting and waiting. We have a real opportunity here to make sure that we are really following a robust science and evidence-based risk approach to all of this, but it is continually being held up and delayed. I can remember talking to George Eustice about this three years ago, and it was due to be coming out then. It is frustrating to have so much delay at this time.

Q246 **Aaron Bell:** What is your perception as to the reasons for the delay? Is it just Government being Government, or are there genuine issues that have not been resolved as to how we should proceed?

Minette Batters: You are probably better placed to answer that.

Aaron Bell: I assure you I am not. You presumably are pushing back for exactly the reasons you put in your 2018 report. I assume the NFU still stands by that. You must have some concerns that the academic evidence—we heard from Professor Bruce earlier—might not be fully taken into account in this strategy, and it might be seen as, essentially, an environmental charter rather than a farming charter.

Minette Batters: That is always the challenge, isn't it? Delivering for the environment and delivering for food production are two sides of the same coin. If you create a world whereby you are not focusing on the food that you are producing and you are purely focusing on your environmental delivery, obviously there will be a trade-off and you potentially will be producing less food, so you have to give them both equal ambition and deliver for both of them. That is incredibly important.

The first role, effectively, of my members is producing food, fibre, fuel and, in many cases now, flowers, but being able to deliver for the environment alongside that, not separately. We very much believe in land sharing—that we can actually spread biodiversity everywhere. Biodiversity is often deemed to be in corners of fields, in woods and in hedges. Biodiversity needs to be everywhere and appreciated for the fact that it can go everywhere.

Aaron Bell: The other thing I wanted to ask was about the narrative and how that affects—

Q247 **Chair:** Before we go there, in terms of this delay to the action plan, it is over five years now. You are someone who is talking to Ministers; you are in the Department talking to officials very frequently. What is your assessment? There is no one with a better calibrated sense than you as to what is really going on there. For something that is delayed five years, is this incompetence? Or does it reflect some deep disagreement that continues to take place?

Minette Batters: I have spent the last six years of my time as president of the NFU wondering whether it is cock-up or conspiracy, and I do not know the answer.

Chair: What is your hunch? Again, you are a pretty shrewd judge of these things.

Minette Batters: We have had three Prime Ministers in 12 months. They have had very different approaches to what they want to achieve. In that time, we have had different Secretaries of State who have had very different approaches to what they want to achieve. The difference between Ranil Jayawardena and Thérèse Coffey is that they might as well have come from different planets. That is the challenge. It is for the Secretary of State to sign off. I am conscious that she has a huge amount on her desk. Mark Spencer, the farming Minister, tells me this is an absolute level of urgency now, but don't forget that he has not been in the job that long. Change and churn of Ministers and leadership has led to a place where these things, and the parliamentary time to get these things on the—

Q248 **Chair:** It doesn't require legislation, does it?

Minette Batters: It requires time.

Chair: Not parliamentary time, though.

Minette Batters: Well, there are things that do. For instance, on seed treatments and on parallel trade, that has required legislation. There are many different components to this. It requires time and ministerial leadership. When George Eustice was in there, I think he felt very strongly about the national action plan and the opportunity outside the EU to regulate differently. It was a passion of his that he wanted to deliver on. He obviously is no longer there now, and maybe it is not quite a priority. I do not know. It is something that we have been pushing on.

My colleague here, Chris Hartfield, leads on this for us on plant health. We are engaged on many different steering groups. We are on the national pollinator strategy and the DEFRA healthy bees plan. We are engaging at every single level. I think everybody is frustrated that the lack of certainty now is really pressing and really damaging.

Q249 **Chair:** Before going back to Aaron, the Prime Minister represents a farming constituency, a rural constituency. You have met with him, I imagine, in the last year. Have you been able to ask him what his view is on this and whether he will unblock it?

Minette Batters: We have not got into that level of detail, it is fair to say, but it is why I have pushed so strongly for the Government to have an ambition on food production. This is a defining moment as to whether or not we want to be producing food at the same level in this country. You heard it very well articulated by Vicki Hird about the need to be producing much more of our fruit and vegetables in this country. There has to be a strategy to do that, and at the moment there is not.

On the campaign trail for the leadership elections in 2022, he said that if he was Prime Minister he would set a new self-sufficiency target and he would put in annual reporting. It is currently three-yearly at the moment. I would say that needs to happen. I would have the same ask of all political parties. It is not just a given that we are going to keep doing that. We have an opportunity to be world leading in this area of how we sustainably produce our food.

Chair: Thank you. Aaron, sorry to interrupt.

Q250 **Aaron Bell:** No, not at all. Thank you, Chair. I just wanted to touch on the impact on your members—I think you have mentioned this in your evidence to us as well—of the perception, the narrative, that sometimes it is farming that is driving declines in insects nationwide. First, how do your members rebut that narrative? Secondly, what impact is that discourse having on farming communities and individual farmers? Are they feeling under siege from the public at large about insect decline?

Minette Batters: I think they often feel under siege because often things are not reported with a fair analysis of what is going on, or it is

reported from a lowest common denominator point. The farmers I represent are farming across all different land areas and all different soil types, and they face hugely different challenges with the weather. On the eastern side you often have much dryer conditions compared to the western side. As a farmer, you need to be able to react differently to the conditions that you are working with. I think they have found that extremely frustrating over the years.

When you look at the global comparisons and the European comparisons, actually, what we are doing here is really good. We are farming, and there is a desire to farm, with fewer and fewer synthetic inputs. It is extremely costly. The more we can take that out and the more we can focus on precision technology, that is what they want to get to. I think their frustration is often stemmed from wanting to have the conversations about what they are doing and what they are achieving rather than what is wrong.

Q251 **Aaron Bell:** I know the NFU does a lot in that space in trying to do the PR job for agriculture a lot more widely, but is there more that could be done either by farmers themselves or by Government to explain that we are actually in a good position in terms of international comparisons?

Minette Batters: Certainly talking to Thérèse Coffey recently, she said she was very surprised at how favourable the UK was. She said, "When I look at what is going on in the rest of Europe and the rest of the world, we clearly are in a very good place." We are world leading in what we are doing with our training and our responsibility. You cannot use pesticides unless you are trained to do it. It is illegal.

I talked at the beginning about farmers being excited about this change. You will hear a lot of buzzwords about regenerative agriculture and conservation agriculture, as some people will refer to it. You have initiatives like Wildfarmed now. You have farmers who are really diversifying into different cropping systems, and it is important that they tread carefully with that. At home we have put in herbal leys. It takes three to five years to fully establish. I had one that was completely taken out. We are on chalk gravel. Our farm dries out extremely quickly. We lost a herbal ley due to extremely dry weather. That is the challenge.

This moment is a moment of change and a moment that farmers are really up for trying, but we need to do it carefully and constructively. I have been quite outspoken about the co-design process in ELMS because I really do think we should be working with the scientists and focusing with the Rothamsteds, the NIABs, and the Wakehurst project on how best we do this, and we cannot afford to get it wrong. These are businesses. These are livelihoods. They are not trials. This is an existence. It is a business that cannot fail, effectively.

Aaron Bell: Thank you very much.

Q252 **Tracey Crouch:** Just following on from those comments, in the 13 and a half years that I have been an MP I have quite often been on the opposite

side of the NFU on the debate and the discussion, and as a consequence it has often felt like a conflict, an us-and-them aspect of discussion. Do you think that there can ever be a harmonious relationship between conservationists and farmers? Can there be a better collaboration between the two parties, or will there always be a conflict?

Minette Batters: I just see it as one and the same thing. I see what I do as being a conservationist. I am part of, and very proud to be part of, the Environmental Farmers Group, which is a whole catchment-based cluster approach to deliver on conservation in a farmed landscape and to try to join up literally every field with a corridor. We have so much focus, to the point that you made, that there is division, and, actually, we need to keep conservation and biodiversity in the nature reserves. What we need to do in the nature reserves is open the door and let everything out and let everything have a corridor to go down.

I am a huge fan of the clusters and what they can achieve. One of the big challenges we face—this relates to the previous question—is that we do not have the data and the evidence in many cases on a farmed landscape to be able to show what we are doing. A classic case in point within this cluster group was when we found that beetle banks were a fantastic home for harvest mice, but the fact was that nobody had ever measured the harvest mice that were there, so they did not know they were in the beetle banks.

The way forward, I feel, is very strongly around that cluster approach, bringing farmers together at scale to allow everything to travel. We have got to be conservationists. We have got to be environmentalists. We cannot farm in any other way unless we are. When I look at the lobbying within parties, the lobbying, effectively, within the Conservative party CEN, I would love to see the same level and the join-up of food into that so that we are focusing on sustainable food production and the environment, and that we stop dividing it. Most people do not want to see division.

Q253 **Tracey Crouch:** For many of the people I talk to on various issues, whether conservation, environment or animal welfare, a lot of what they do is being driven by science. Bear in mind you would have heard Mr Edmunds talk earlier about both his interest and background in that as well as the need for better training. Do you think that science needs to be a core part of what farmers are learning about and what they are studying in order to remove some of that conflict between the farming community, the scientists, the environmentalists and so on?

Minette Batters: Anybody doing an agricultural degree now will tell you that science is absolutely embedded in that learning. We have gone from a mechanised industry to a tech industry, effectively.

Q254 **Tracey Crouch**: I am sorry to interrupt. Forgive my ignorance, but how many farmers have an agricultural degree?

Minette Batters: I have an FBT on my farm. My son or daughter—

Tracey Crouch: What is an FBT?

Minette Batters: Farm business tenancy, which is the future for tenant farmers. My landlords and every other landlord I have spoken to have made it very clear to me that unless my children had a degree in agriculture, they would not be looking at them coming into the tenancy. That is very much the way forward now. Our agricultural universities and colleges are bursting with people who do not necessarily have land but who want to be the farmers of the future.

Q255 **Tracey Crouch:** This is my final question because time is very short. You mentioned trade-offs and whether there can be trade-offs between food production at scale, profitability, insect conservation, and, I would add in, affordability. Returning to the answers that you gave to the Chair about the action plan, is that also the case within Government? We have a DEFRA that is huge. It has all of those aspects within one Department. Is part of the problem here that we have a Government Department that is trying to deal with the environment and conservation as well as food production?

Minette Batters: You will remember, I'm sure, Michael Gove saying in the beginning, "This Department does not agree with each other."

Tracey Crouch: Unless that changes with perhaps a Whitehall restructure, we are never going to solve this problem.

Minette Batters: I think it can and it should be changed. It is a great shame and a sadness if delivering for the environment and the legislative targets and producing our food cannot be brought together to be treated as one. Half of me would say that agriculture should be in DBT, effectively—it is business. The other half would say that that would be completely wrong because, actually, I do not want to take environment away from farmers. Every farmer should have that opportunity and is delivering for the environment, so they should not be divided.

There are things, though, like a food strategy, that probably should sit in Cabinet Office so that it dovetails into education or into health. It can go across Government. There are dangers with the food strategy that sits in DEFRA that does not then join up with those other Departments. None of the points that Vicki Hird made on education, food and diet will change unless we join it up with other Departments.

You can have other neater ways that bring a whole-Government approach to dealing with these things. The current approach with everything that has happened and huge workloads, for which I have enormous sympathy with civil servants, with leaving the EU, which is still ongoing, the covid pandemic, and now war in Ukraine—massive items all happening in a six-year period—put a lot of pressure on everyone, but we have to get it right. It is too important. We face rationing. Nobody wants to face rationing of food. We have legislated targets. The future has to be about delivering on the legislated targets and delivering on the nation's food security. We cannot have an either/or.

Tracey Crouch: Thank you.

Q256 **Stephen Metcalfe:** Good morning and thank you for joining us. I just want to talk about the decisions that farmers make. When they choose a crop protection strategy, where do they get their advice? What sources are available?

Minette Batters: There are a lot of different sources available. To give you one example, we are very much involved with a voluntary initiative. I know that 4,400 IPM plans have been submitted so far this year. My advice very much comes from my agronomist. We have the Agriculture and Horticulture Development Board whereby farmers pay a levy. It is a sort of parafiscal tax. I think there are a lot of opportunities with that levy. We have talked to Government and indeed requested match funding for that levy to be looking at trade and band development and everything else, as well as having a look at other countries that are independent trading nations, to look at advice and set up something similar to a "what works centre" alongside it.

You have the two platforms effectively: one leading with market development and the other leading with advice. Don't forget, within that structure at the moment you have the monitor farms across the country. That would be a great step forward. A lot of our advice would come from that. Advice comes, I guess, in many different forms, but there has never been a greater thirst for advice than there is right now.

Q257 **Stephen Metcalfe:** What sort of role does the agrichemical industry play in that? Is it a source of advice, or does it help to provide the tools to execute the advice?

Minette Batters: It does, I guess, in some cases provide advice. It is a vital part of a business to have that relationship. I can see in the last decade enormous change, and the war in Ukraine is driving a game-changer approach into how the agchem companies are operating, how we have a much greener approach and how we make far better use of resource use efficiency. All these are very clunky jargonised words.

I am trying with my business to completely take nitrogen fertiliser out because it is a huge cost. The more we can cut our costs but keep the yield, that is the important thing. If you are just going to cut your costs, cut your inputs and decrease your yield, you do not achieve the outcome that you are trying to achieve. What you are trying to achieve is the same yield but using greener fertilisers and a greener approach to the way you are producing. Everyone wants to get there.

Q258 **Stephen Metcalfe:** In terms of sharing the goal that everyone wants to get there, what advice would you give to us as potential policymakers and report writers to improve the access to advice or that information sharing? What can we do that would improve the situation?

Minette Batters: One of the things that we have called for—and I have referred to it just now—is a scientific advisory group, effectively. It is very easy in this discussion to run before we have learned to walk. We

need to start with the basic principles of getting the baseline right, measuring the baseline and measuring where we are in our soil health—everything has to start with the soil—and we need to use the very best people, which we have in this country, to be designing what that looks like.

You cannot underestimate the challenge of where we started this journey from. In 2019 it was a different manifesto. It was a manifesto that we were not going to be producing much of our food here. The current Prime Minister is having to take a different approach. I say "having to take a different approach"; we have a maritime climate here, we have a war in Europe, food security is challenging right now, and we have one of the best climates in the world to be producing food here. Things have changed, and it is about being agile to change and getting this right. What I am requesting on behalf of my members has not changed in the last six years. I hope now we can get some things over the line that speed up this process.

Q259 **Stephen Metcalfe:** Okay, thank you very much. Just briefly, if I may, I want to talk about neonics. In your view, have the restrictions on their use affected crop production? As I understand it, the NFU was opposed to their ban. Can you just touch on why and whether that is still your view?

Minette Batters: That is historical. As I said earlier, they have been banned in flowering crops, but the impact of that is that we have half the oilseed rape production in this country now than we had previously. If you look at the shortages of oil now, which are probably only going to get greater on the back of the war in Ukraine, we are importing—

Stephen Metcalfe: I am sorry to interrupt you, but just for clarity, is it that people have chosen not to grow rapeseed oil, or is it because lack of use of the neonics has reduced yield?

Minette Batters: The disease outbreaks of cabbage stem flea beetle have made it impossible in some areas. In other areas, I have to say, as part of a rotation it is growing well. The fact is that there is half of what there was in 2013, so there is less. If you look at what we are doing with sugar beet, there is nobody else in Europe who is doing what we are doing and that has the methodology in place that will only trigger when we get to that high level of disease.

These are the trade-offs. We are using that Cruiser product for sugar beet production. We have completely liberalised our relationship with Australia. In 15 years, we will be fully liberalised, and potentially with India, yet when you look at sugar beet production here we are not going to ban sugar. People want sugar. Do we not want the most sustainable sugar produced in the world? It is about following the science, the evidence and the risk, and making sure that all of us—policymakers, regulators and farmers—are working together on that same path to get that right.

Stephen Metcalfe: Okay, thank you.

Q260 **Chair:** Thank you very much, Stephen. We have covered the area that we wanted to. I just want to finish by going back to some of the evidence we took right at the beginning of our inquiry, which was the relatively small number of people who are trained and educated in entomology in our universities and colleges compared to the diversity of the field in terms of insects and their importance.

Applying that to farmers, do you think that farmers are educated and trained enough about entomology? With the best will in the world, do they have the expertise? You will have heard Mr Edmunds describe himself as a very enthusiastic but amateur entomologist. He has a lot of knowledge; how widespread is that among farmers?

Minette Batters: That is why I mentioned the work of the clusters. They have been incredible in how they have driven change and understanding. For a cluster that is working with a technical expert, an entomologist, they can record and gather the data of what is going on and then transfer the knowledge to the farmer. In the cluster that we are involved with in the Avon valley, the change and their desire to learn more and the involvement has grown on the back of working with entomologists and ecologists who explain what is going on and record what is going on. My neighbouring farm, for some bizarre reason—I do not like snakes, but that is a purely personal thing, and they have an enormous role to play—wanted to bring in more snakes and allow more corridors for them to go down, and that is what they have done.

On our farm, we have been involved in the lapwing restoration in the Avon valley. Different farms have different requirements and maybe there are different levels of enthusiasm for different species. Working with that technical expert advice, we had a BioBlitz that the NFU organised whereby we brought in ecologists from all over to record what was going on. I found it the most fascinating thing that I have been involved with because I had no idea what was there.

This is the big issue; I am sorry to keep coming back to it. We have to inspire, empower and work with far more to find out what is there. We have a real challenge in knowing what is within our farmed landscape. A lot of it is because we tend to take things off and separate them, focus on the money going into the nature reserves, or the money going outside, or not having food production in that place, rather than saying, "Actually, what can be available within a farmed landscape? Let's measure what is there."

All of this is voluntary. This is not about farmers being paid. This is voluntary, and farmers are really excited and really enthused. Of course, there is a set-up of co-operatives and there are developing new trades. These new environmental markets will be an incredibly important income for farmers, with that investment going back into the soil, effectively, into biodiversity and into ecology.

Chair: Minette Batters, president of the NFU, thank you very much indeed for your evidence to us today and for your colleagues supplying

the written evidence. Thank you to all our witnesses for today's session. That concludes this meeting of the Committee.