



Is Devon's Agriculture Fit For Purpose In An Era Of Climate Change?

A Report on a Stakeholder Jury for Devon County Council

Matt Lobley and Michael Winter

CRPR Research Report No 26



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1. Introduction

Climate change poses a serious challenge to all of us. Although some individuals still doubt the existence of anthropogenic climate change, many believe that adapting to a warming climate and mitigating the effects of Greenhouse Gas (GHG) emissions requires urgent and often radical action. The purpose of this project was not to rehearse the debates and evidence regarding the existence of climate change, but to take it as a given and then pose the question “is Devon’s agriculture fit for purpose in an era of climate change”?

Agriculture is in a near unique position. It is a major contributor to national emissions of methane and nitrous oxide, both powerful GHGs, many times more potent than carbon dioxide (CO₂). Agriculture is also a source of CO₂ but, on balance, currently stores more CO₂ in soils and permanent crops than it emits each year. There are also a wide range of actions that potentially can be taken to mitigate (i.e. reduce or displace) GHG emissions from agriculture.

Against this background, this project considered how well placed Devon’s agriculture is to face the challenges posed by climate change. Of course, agriculture in Devon is not a closed system. The use of the county’s resources for agricultural production has impacts beyond Devon and vice versa. Nevertheless, the county provides a useful focus for debate on issues with national and international significance. This project was funded by Devon County Council as part of an annual research contract with the Centre for Rural Policy Research and the stakeholder jury event was facilitated by Devon Rural Network.

2. Purpose and organisation of the Jury

The use of citizen juries is becoming increasingly common, both in academic research and public policy formation. In contrast to discussion groups or questionnaire surveys, the idea of the jury is to enable informed and extended group deliberation in order to form a view on often quite complex subjects. For the purposes of this project it was decided to adapt the citizen jury approach and convene a stakeholder jury with expert witnesses drawn from the county’s land management, environmental and research communities and a jury comprised of key stakeholders. Witnesses and jury members were provided with guidance on their role in advance (see Appendix 1 and 2) and the jury foreman was also briefed separately on his role.

The question the jury was tasked with answering was “is Devon’s agriculture fit for purpose in an era of climate change”. In order to do this they heard evidence from five witnesses, each of whom had provided a brief witness statement in advance (see Appendix 3). Each witness had 15-20 minutes to present their evidence and was then questioned by the jury. After all witnesses had been heard, the jury retired to deliberate. Unlike a citizen jury, the stakeholder event was held in public (in the council chamber at County Hall, Exeter) and this provided the opportunity for the results of a question and answer session with the witnesses and audience to be fed into the jury deliberations. The audience were also asked for their response to the question being deliberated, both before and after hearing the evidence of the witnesses. The results are presented in Section 4.

3. Summary of evidence presented on the day

The first witness to present evidence was Dr Dave Chadwick (DC), a senior research scientist at IGER, North Wyke. Dave gave an overview of the issues focusing, in particular, on methane and nitrous oxide, identifying sources and quantifying emissions in Devon, where possible. He then identified the following ‘best practices’ for mitigation and estimated the impact on Devon:

- Do not exceed crop requirements for Nitrogen
- Make full allowance of manure Nitrogen supply
- Spread manure at appropriate time/conditions
- Increase livestock nutrient use efficiency
- Make use of improved genetic resources
- Anaerobic digestion
- Establish permanent grasslands/woodlands
- Grow biofuel/biomass crops

Under questioning by jury members, DC argued that, whilst the current data may not be perfect (given specific issues regarding assumptions and methodology), it is nevertheless the best we have at the moment and that the data he presented on quantifying emissions and mitigation impacts was the first of its kind produced for Defra.

In response to a question on the interactions between different elements at the farm level and between different policies, DC argued that Defra recognise need for joined up thinking in terms of policy interaction and interactions at the farm level such as the impact of a particular mitigation action on other GHGs, other emissions, yields, etc, etc.

The second witness was Paul Gompertz (PG), Director of Devon Wildlife Trust (DWT). Paul began his evidence by stating that he was speaking for himself and *not* DWT and that he was a profound believer in climate change, a 'doom-sayer' and that he believes climate change is much more threatening than it has generally been accepted.

PG then went on to review some of the global impacts of climate change based on a 3 degree rise in temperatures over 100 years: There would be mass extinctions, declining agricultural yields across much of the globe; flooding, droughts, heat waves and wildfires would pose serious risks. The world's poorest populations would suffer most as a result, even though they have contributed least to GHG emissions. As a result, PG argued that we cannot think of Devon's agriculture in isolation. He also argued that there is a need to do more than just produce food from the land and that there is a need to transform food production and food distribution systems. Simple food production may not be the future. There is a need to manage land to deliver the services that keep us alive. In turn, this leads to profound choices about how we use land, what crops we produce and how we use those crops, how we distribute them and how we market them. We also need to re-think how society interacts with the rights of individual freehold landowners.

PG stated that, given these challenges, under present circumstances he did not think that Devon's agriculture is fit for purpose in an era of the kind of climate change *that he expects to occur*.

In response to questioning PG argued that agriculture has to deal with its GHG emissions just as any other business. That should be taken as a given. Far more challenging is the need for agriculture to play its role in delivering a living planet. In this context, climate change is simply another driver that exposes the weakness of the current global system of food production.

The next witness was Mel Hall (MH), Regional Director of the NFU. Mel began by reviewing some of the evidence on emissions from agriculture and then presented a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis of Devon's agriculture.

<p>Strengths</p> <p>Family farm businesses Land tenure Farmer and grower ability to adapt to change – for both benefit of farming, production and society Diversity of sector, skills and soils Ability to provide solutions and mitigate impacts – renewables and flood management Science and research – IGER, livestock diets Industry has already recognised the challenges and opportunities ahead</p>	<p>Weaknesses</p> <p>Lack of forward investment on farm (and ability to do so) Land tenure Poor returns Inefficiencies Scale of economy Succession and business planning Livestock sector emissions Lack of collaboration</p>
<p>Opportunities</p> <p>Renewable energy – biofuels and biomass, geothermal Helping with Climate change mitigation and adaptation – carbon sequestration, flood management etc Local scale solutions for farming and society New markets and services – more diverse industry Added value – positive carbon labelling Collaborative ventures Anaerobic digestion – combined heat and power Rural Development programme funding, Environmental Stewardship Science, research and development, new technologies</p>	<p>Threats</p> <p>Increase risk in weather volatility Natural resource availability (energy and water) Increasing risk of current and new plant/animal diseases Market place not returning profit – inability to reinvest Increasing regulatory burden – costs to business Increasing inputs e.g. fertilisers, fuel, labour, feed Future policy decisions on environmental and climate change agenda</p>

In conclusion, MH argued that there were more positive opportunities than negatives and that:

- Industry can play an enormous role for production in an increasingly diverse agriculture – food, fuel, fibre, access and public services, carbon sequestration and storage, resource management and protection (ecosystems services) etc...
- The combined value of the above to both industry, but more importantly society, is enormous.
- A balanced approach will be imperative to meet the increasing demands from the land in terms of production within environmental limits
- Policy integration and partnership working crucial

In response to a question regarding whether Devon's farmers were able to take advantage of the opportunities identified, MH stated that aspects of Devon's agricultural structure, such as the large number of family farms, presented both a challenge and an opportunity. The key issue, MH argued, is about preparedness and knowing what the industry needs to do to respond to new challenges.

Asked if she thought there are enough market experiments, MH said she thought that there is not. She said that there are lots of small initiatives but not enough at the moment. Farmers can and will respond and adapt but they will need assistance in responding to the climate change agenda, for instance via the RDPE (Rural Development Programme for England) and SFFS (Sustainable Farming and Food Strategy). Farmers in the uplands face particular difficulty in adapting given their precarious economic position at the moment.

The next witness, Mark Howard (MHo), is employed by the University of Exeter and based at Riverford Organic Vegetables. He explained that his area of expertise is post farm-gate in the horticultural sector. In terms of the purpose of farming, MHo argued that whilst it was definitely for food production, it was also increasingly for fuel production and carbon sequestration.

In the case of horticulture, the main GHG emissions arise from field operations such as from fuel for machinery use and fertiliser production. Energy intensive production under glass can also be a significant source of CO₂. This, in turn, raises issues around the use of imports from more southerly countries where crops can be produced without the use of artificial heating. Even though the importation of such crops obviously involves CO₂ emissions, they can still use less carbon than domestically produced equivalents.

In total, only approximately 40% of the UK's food GHG emissions derive from agricultural production with transport, food processing and manufacturing and home related energy consumption accounting for much of the remaining 60%. MHo argued that the current farming and food industry was basically converting fossil fuels into food. The production and storage of 1kg of potatoes results in the emission of ¼ kg of CO₂ (equivalent to 1km in the average car). 1 kg of domestically produced tomatoes leads to 9 kg of CO₂ emissions, or 36km in the average car.

MHo argued that agriculture needs to reduce its dependency on oil. This can be achieved by the use of organic production systems,

anaerobic digestion, addressing the food distribution network, educating consumers and expanding the use of renewable energy. Nevertheless, he felt that given the goals of feeding people, producing fuel and mitigating catastrophic climate change, then Devon's farming is not currently fit for purpose.

In response to a question from the jury, MHo reported that the window of opportunity for taking action to avoid catastrophic climate change was very small, possibly only eight years. He agreed that reducing the estimated 30% of food that is 'wasted' in the home would make a contribution to reducing GHG emissions and agreed that Devon's farmers had a role to play here in educating consumers. Educating consumers about the environmental impact of unseasonal food imports could also help influence consumer behaviour and demand.

The final witness of the day was Mark Robins (MR) RSPB regional Policy Officer and Chair of the Regional Environment Network. Mark began by saying that the question was a highly nuanced one, cutting across issues around food, farming, food chains, soil management and soil futures. It is a complicated question that is difficult to answer Yes or No, although he tended towards No. MR then posed a number of questions: Are we prepared? Have we seen this scope of change before? Do we have the right initiatives on the ground? Is policy matching practice? His answer to all of these was No.

In order to address the question of whether Devon's farming is fit for purpose in an era of climate change, MR argued we need to examine if it is fit for purpose now. One way of doing this is to look at biodiversity and, in particular, farmland birds. The evidence over the last few decades suggests that we are not doing well in these terms. However, there are examples of success stories that show what can be achieved (e.g. the reversal of the decline of the Cirl Bunting).

Looking to the future, an exercise in mapping climate space based on a 2-3 degree increase in global temperatures indicates that, broadly, habitats will move 500 km north east. We have not experienced such a rapid shift before and the chances for biodiversity to adapt are slim. MR argued that existing wildlife populations were isolated and fragmented and therefore not sufficiently resilient; that there is insufficient semi-natural habitat cover to allow wildlife populations to adapt; that the countryside is not managed in a way that will make it easy for less mobile species to move around and that agricultural adjustment strategies have yet to be 'greened' to take account of the biodiversity implications

of adapting to climate change. Consequently, he believed that we are not well placed at the moment to face the huge task ahead. He did, however, stress the need for optimism and argued that agriculture has a huge offer to make in the context of adapting to climate change.

In response to questioning by the jury MR argued that the cultural and symbolic strength of farming in Devon meant that farming was at the heart of finding solutions to the climate change challenge. It was not something that could be left to government and agricultural policy alone but required the mobilisation of Devon's communities, environmental activists, farmers, consumers, etc.

4. The verdict and recommendations of the jury

After retiring to deliberate the jury returned the following verdict:

"We believe that Devon's farming is fit for purpose today. In terms of the future, the jury is out". The Jury's statement continued by saying that they have questions about whether the farming industry in the county is prepared for the challenges ahead. They recognise that farmers are adapting to today's challenges but that for the future there are a number of industry, structural and behavioural changes that have to take place in order to be able to answer the question in the affirmative in a few years time.

The Jury then made the following observations and recommendations:

- There is a need for a strategic overview of the county and an improved understanding in terms of land use planning in order to fully understand what the asset base is and its characteristics.
- There is a need to develop likely scenarios of future change and build a strategy around these.
- There is a need for more active market place experiments. The only way to find out if farming is fit for purpose is to put some experiments in place and learn from them.
- The jury have some real concerns about science and R&D. The jury recognises that it is a national issue not a county issue but are concerned to ensure that the county and the farming industry are linked in to sound research and science to help inform the industry to make the changes that are necessary.

The Jury was then thanked by the chair of the event and the stakeholder jury was drawn to a close.

At that point, the results of the audience 'vote' was announced. When they first arrived members of the audience had been asked to indicate their response to the question "is Devon's agriculture fit for purpose in an era of climate change"? At that point, before hearing the evidence of the witnesses, the results were as follows:

19% voted 'yes', 33% voted 'no' and 48% were undecided or didn't know.

After hearing the evidence, the results of the audience vote were: 27% 'yes' , 70% 'no' and just 3% undecided.

5. Conclusions

Judging from the comments of the participants and the audience at the stakeholder jury, it was a novel and engaging approach to tackling a particularly complex question. Ideally, the jury would have spanned two days with additional witnesses and more time for reflection. It may also have been helpful to have specified more precisely the terms contained within the question.

Despite appearances, the question posed to the witnesses and jury was not one that could easily be answered in the positive or negative. It was, as one witness stated, a highly nuanced question, raising many additional issues. It is not surprising therefore that the verdict, **endorsed by all members of the jury**, was qualified by a number of recommendations. Both the verdict and the Jury's recommendations can help provide a guide for action in the short term as the county prepares to meet the challenge of climate change.

Appendix 1 Witness guidance notes

Is Devon's Farming Fit for Purpose in an era of Climate Change?

Guidance Notes for Expert Witnesses

Stakeholder Jury 19th March 2008

Introduction

Agriculture currently makes a relatively large contribution to total Greenhouse Gas (GHG) Emissions in the UK, largely through emissions of methane and nitrous oxide. Agriculture, however, is in a near unique position in that it is able sequester, store and maintain carbon as well as take other actions to reduce GHG emissions. Against this background, DRN and DCC have asked the Centre for Rural Policy Research (CRPR) to consider if Devon's farming is fit for purpose in an era of climate change. To do this, on Wednesday 19th March the CRPR is facilitating a Stakeholder Jury-style event, hosted by Devon County Council. The jury has been recruited from stakeholder organisations within the region and on the day they will consider evidence and come to a collective judgment or 'verdict' about the issue.

The Role of Expert Witnesses and Jurors

Expert Witnesses are individuals charged with informing the jury on matters of which they have particular knowledge. They provide the *evidence* and *opinion* base upon which deliberations and judgments are made by the jury. Witnesses perform their tasks in four ways.

- First, they provide a witness statement in **advance** of the Jury. This is a half page statement, clarifying the background of witness, and his/her interests and investments in the issue.
- Second, and if they deem it appropriate, witnesses **may** provide the jury with some written/numerical/pictorial evidence in advance of the event.
- Third, they will present their case/oral evidence at the jury event.
- Fourth, they will be available for cross-examination at the jury event should the Jury wish to clarify aspects of arguments made.

The Jury will be lead by John Varley, Estates Director of Clinton Devon Estates, with other members including Mary Talbot Rosevear, Secretary of the Small Farms Association; Philip Wagstaff, Churches Together in Devon; Phil Le Grice, Duchy College; Ian Mercer, South West Forest and DRN Chair; Phil

Norrey, Chief Executive Devon County Council; and Mary Quicke, Quicke's Cheeses.

The Jury should be treated as an interested, intelligent and informed audience but not necessarily with a high degree of scientific background. Together the jury are responsible for assessing the evidence/views surrounding the issue being considered. They are responsible for listening to the evidence, interrogating witnesses over the issues that underpin evidence, and ultimately, forming a collective judgment about the question posed.

I will be briefing the jury foreman in the next couple of weeks and need to ensure that all jury members receive witness statements and a summary of any written evidence by March 13th.

The expert witnesses for this event are:

- Mel Hall (NFU)
- David Chadwick (IGER)
- Mark Robins (RSPB)
- Paul Gompertz (DWT)
- Mark Howard (Riverford/University of Exeter)

What you need to do in preparation

On **March 13th** I need to supply the jury with:

- Witness Statements
- Any supplementary material that may help the jury understand the evidence that witnesses present.

I would therefore be very grateful if you would provide me with a short statement that tells the jury about your background and role, and any personal investments you have in this issue. This should be no more than 300 words. It's an opportunity to write a short personal/professional biography that gives the jury a sense of who you are and perhaps your also line of reasoning. An example statement is provided below. It is drawn from a citizens jury examining a very different issue but should provide sufficient clues as to how to prepare a statement.

*If you feel that there is any material that the jury can read in advance of the event which supports or clarifies points in your presentation then please make this known to me, again **by 13th March**. This information should ideally be*

relatively short and to the point (i.e. no more than 2 sides of A4). You may also supplement your evidence by reports, etc that can be made available to the jury on the day to aid their deliberations.

Arrangements for the day

The timings may be subject to minor modifications on the day, but the jury begins at 11.00 am with the final verdict delivered no later than 4pm. Please try to arrive by 10.45.

- Your witness presentation should be no longer than 15 minutes, and should be made in plain English. You should present a reasoned case that will enable the jury to answer the question *“Is Devon's Farming Fit for Purpose in an era of Climate Change?”*
- You can present using visual aides or without. It's entirely up to you but **please let me know in advance.**

There will be a small window of opportunity for initial questions from the jury after your presentation, but you may be questioned later in the closed deliberations. You can hear the evidence of other witness but you are not able to ask questions of them.

The event is very much led by the jury, and there some is element of waiting around during their closed deliberations. During this period there will be one or more short presentations on recent research on the state of farming in Devon although you are of course free to seek alternative forms of entertainment! A room will be made available for witnesses to use during the day.

Example of a Witness Statement

I am an environmental consultant dealing mainly with agricultural issues. I advise the NFU on a regular basis, and have other clients as well. I often act as an expert witness in court.

I left my scientific research roots (with the British Antarctic Survey) 30 years ago to work for the NFU, and have been a consultant for the past 20 years. My work mainly involves agriculture and pollution issues affecting water, air or soil. I cover legislation at EU and national level, policy and casework. Issues I am or have been involved in include nitrates, phosphates, sewage sludge, manure management, noise and odours, waste management licensing, groundwater issues and the all-embracing Water Framework Directive.

I was brought up on an arable farm where I now live, and I would claim to have some understanding of the farming community.

The risks which microbes (and the like) pose to humans is an increasingly high profile issue. Our ability to identify outbreaks of disease caused by microbes and our increasingly risk-averse and sanitised society play a part in this, but so too do the emergence of multiple resistance to antibiotics, and organisms like *E. coli* O157 and *Cryptosporidium* which have very low infective doses. There are changes in risk perception, risk identification and real risk at work. Understanding and disentangling these is challenging but important to the understanding of what we genuinely need to do and why. When we know this, we will be better placed to devise the mechanisms for achieving what we need to and addressing any funding issues.

Appendix 2 Jury guidance notes

Is Devon's Farming Fit for Purpose in an era of Climate Change?

Guidance Notes for Jury Members

Stakeholder Jury 19th March 2008

Introduction

Agriculture currently makes a relatively large contribution to total Greenhouse Gas (GHG) Emissions in the UK, largely through emissions of methane and nitrous oxide. Agriculture, however, is in a near unique position in that it is able sequester, store and maintain carbon as well as take other actions to reduce GHG emissions. Against this background, DRN and DCC have asked the Centre for Rural Policy Research (CRPR) to consider if Devon's farming is fit for purpose in an era of climate change. To do this, on Wednesday 19th March the CRPR is facilitating a Stakeholder Jury-style event, hosted by Devon County Council.

Thank you for agreeing to act as a juror for this event. These notes are intended to guide you through the jury processes. On the day, the chair of the event (Michael Winter) the jury facilitator (Matt Lobley) and the jury foreman (John Varley) will help guide your discussions (where necessary) and will help address any practical issues that will help facilitate your role.

The jury members for this event are:

- John Varley, Estates Director of Clinton Devon Estates (Jury foreman)
- Mary Talbot Rosevear, Secretary of the Small Farms Association
- Philip Wagstaff, Churches Together in Devon
- Phil Le Grice, Duchy College
- Ian Mercer, South West Forest and DRN Chair
- Phil Norrey, Chief Executive Devon County Council
- Mary Quicke, Quicke's Cheeses.

The expert witnesses are:

- Mel Hall (NFU)
- David Chadwick (IGER)
- Mark Robins (RSPB)
- Paul Gompertz (DWT)
- Mark Howard (Riverford/University of Exeter)

The Role of Expert Witnesses and Jurors

Expert Witnesses are individuals charged with informing the jury on matters of which they have particular knowledge. They provide the *evidence* and *opinion* base upon which deliberations and judgments are made by the jury. Witnesses perform their tasks in four ways.

- First, they provide a witness statement in **advance** of the Jury. This is a half page statement, clarifying the background of witness, and his/her interests and investments in the issue.
- Second, and if they deem it appropriate, witnesses **may** provide the jury with some written/numerical/pictorial evidence in advance of the event.
- Third, they will present their case/oral evidence at the jury event.
- Fourth, they will be available for cross-examination at the jury event should the Jury wish to clarify aspects of arguments made.

Each of the experts will provide a witness statement for you to read in advance of the event. **These will be circulated to you no later than March 14th**. These are short statements that clarify the witness's background, professional interests and investments in the issue at hand. Some of the witnesses may also provide additional written evidence that will help you understand the basis of their talks.

As member of this Jury you are responsible for:

- familiarising yourself with the information in this document and listening to oral evidence over the course of the stakeholder jury day;
- interrogating expert witnesses about the claims they make regarding the fitness of purpose of Devon's farming in an era of climate change;
- returning an oral verdict on 19th March, on the basis of your private deliberations;
- subsequently, you will also have the opportunity to endorse a brief written report of the day which will be based on the witness presentations, your recorded discussions and your verbal verdict.

Arrangements for the day

The timings may be subject to minor modifications on the day, but the jury begins at 11.00 am with the final verdict delivered no later than 4pm. Please try to arrive by 10.45. There will be a small window of opportunity for initial questions from the jury after each witness presentation and you may recall witnesses again during your closed deliberations.

Organising yourself as a jury

Questioning witnesses

All witnesses will be available for cross-examination at the jury event. You will be able to address questions to witnesses either at the end of their testimony or privately when you retire to deliberate.

All the witnesses have been asked to be clear and forcible in their presentations to you. However, just like a “real” jury nothing that the witnesses say should be taken a face value. Experience suggests that the Jury process works best when information/arguments are not accepted as statements of fact. All claims are subject to scrutiny! Questioning may involve:

- ***Points of clarification.*** If there is something you don't understand, then make sure you ask. The witnesses may introduce terminologies that are unfamiliar. Some will speak too fast. It is okay to ask the witnesses what they may mean when they use a term.
- ***Points of argument.*** It is okay to put witnesses ‘on the spot’ and question the evidence they have used to make their case. Feel free to play devils advocate. If they say that Greenhouse Gas mitigation is an expensive luxury for hard pressed farming businesses, you may want to suggest otherwise. When witnesses speak, they have vested interests in an issue. For instance, scientists would be out of a job if there was perfect knowledge on these issues, but they may not be inclined to speak about uncertainties in their research!

Returning a verdict

As explained above you will need to return a verdict. In order to do this you will be given time and a room to engage in private deliberation.

The jury foreman will take responsibility for making sure your discussion stays on course. During the closed deliberations, the overall chair of the event, Michael Winter, will remain present. He will be on call to help guide your discussion, if needed. During your deliberations, the expert witnesses will be available to you for cross examination, until you choose to formally “discharge” them.

At the end of the day you will be asked to return a verdict along with a brief explanation of your findings. For instance, the presentation of your verdict may follow the following framework:

“On the basis of arguments raised and evidence presented this jury believes that:”

“It makes this judgement because.....”

This is just a suggestion. You may find your own distinctive formula for expressing your views about these issues.

The insights from the day will then be summarised by the event chair (Michael Winter) and the day will close.

All of your discussions will be recorded, and on the basis of these and the final presentation, the jury facilitator will draw your views together to compose a brief written report. This will be circulated to all members for endorsement. Please note, that individual jury members will not be identified in the written report nor will anything any individual says be passed on to any third party. If you have any concerns regarding confidentiality please let me know as soon as possible.

If you have any queries about the purpose of this event or your role in it please contact me by phone or email (details below). If you have any queries regarding the facilities available at County Hall on the day, catering arrangement, parking facilities, etc, please contact Jen Brogan (details below).

I look forward to seeing you all on March 19th and to having a stimulating and enjoyable day.

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Appendix 3 Witness statements

Dr Dave Chadwick

I joined IGER in 1994 specifically to work on Defra funded projects on quantifying non-CO₂ greenhouse gas (GHG) emissions from livestock agriculture and generate a simplified UK inventory for nitrous oxide and methane emissions. (IGER collates the UK agriculture inventories for nitrous oxide and methane on behalf of Defra). My interest in GHGs has increased into developing and testing management practices to reduce emissions from livestock agriculture, understanding how current trends in livestock numbers and fertiliser N use will affect emissions, and estimating the impacts of other policies and EU commitments on GHG emissions. I am assisting in the development of the methodology for a new publicly available specification (PAS) for the assessment of the life cycle of GHG emissions for agricultural products.

I was the group/team leader of the Manures and Farm Resources team at IGER for the period 2001-2007. I sit, as an expert, on the Sustainable Organic Resources Partnership (SORP) panel, and I am currently revising the Organic Manures section of the Fertiliser Recommendations Handbook (RB209).

Paul Gompertz

I am the Director of an organisation dedicated to the sustainable use of natural resources and the maintenance of the richness of life in Devon. Devon Wildlife Trust's Vision is of a Devon in which Wildlife is plentiful, varied and widespread, has a secure future and is enjoyed and valued by people.

I began life as a student of English Literature, and went on to teach it for a number of years. I was always particularly attracted by writers with a close relationship with the natural world; one of my areas of special interest was John Clare, a Northampton farm labourer who wrote poetry inspired by the natural world. I also worked on a farm on and off for ten years when my father owned a hobby farm in the Midlands, mainly working with pedigree Hereford cattle.

My original connection with Devon's farmed landscape was a spiritual one; I always felt very at home here. My professional life, however, has given me a very different perspective on farming. Man's domination of the planet requires cultivation of its surface, a

taming of what would naturally flourish. The population explosion of the 20th century has intensified that exploitation. Devon farmers have responded as society required; the prevailing conditions have led to a largely pastoral agriculture. Until very recently, the worst consequences of that were perceived to be a reduction in species and habitats. Even as the realisation has dawned that those species and habitats are manifestations of more profoundly important life systems, and that their weakened state weakens us, so the changes wrought to the climate have begun to put them under intolerable pressure. Agriculture will be challenged to respond in ways counter to its recent history and instincts; it will be some time before its success will be judged.

Melanie Hall, NFU

I am Regional Director for the NFU in the south west region, representing 10,000 farming and growing businesses. I have held the role for two years, being senior policy adviser for the NFU in the region for four years prior to that.

I represent the industry on all aspects of farming and growing as well as many aspects of wider rural business and strategy.

Before joining the NFU I was part of the Cornwall Agricultural Development team for Objective One as assistant co-ordinator, my first role after graduating from Seale-Hayne where I gained my agricultural degree. Prior to this I also studied at Duchy College in Cornwall (agriculture) and was a herdsman for five years working on dairy units in Cornwall (my family's farm being one of them). I also undertook the Worshipful Company of Farmers Leadership course two years ago. My farming background, combined with my qualifications and experience allows me to have a good understanding of the current challenges and opportunities facing Devon's farming community and not least the question of climate change.

It is imperative to debate and understand, with best science and evidence to date, how the farming industry in Devon will react to the changes in our climate, both in terms of being able to respond to mitigation as well as the opportunities that will arise for the industry – farming and growing, and land management will be able to provide many of the solutions to the challenges posed. The county is diverse in terms of farming practice, sector, scale, tenure, topography, geography, in terms of infrastructure and is largely underpinned by farming families that have risen to the challenge

decade after decade in adapting their businesses to an increasingly diverse agricultural agenda.

Mark Howard University of Exeter/Riverford Organic Vegetables (ROV)

I am a Knowledge Transfer Partnerships Associate employed by the University of Exeter and seconded at Riverford Organic Vegetables. I am running a two year project examining the sustainability of ROV in the context of anthropogenic climate change, working to reduce environmental burdens associated with the business and embed the concept of 'carbon costs' alongside economic costs.

My main interests lie in the field of carbon footprints and energy management, their practical use to business and existing drivers (Corporate Social Responsibility, increasing energy costs). Less visible but often more significant activities in terms of contribution to climate change such as sourcing policies and packaging specification are also of interest.

I am a fairly recent graduate (2005) leaving the University of Nottingham with a 2:1 BEng honours degree in Mechanical Design, Materials and Manufacture. My background is as such rooted in engineering; I have no formal training in environmental sciences but a great passion for reducing human impact on our environment. I grew up in a rural area and have a broad understanding of farming practices but no expertise.

Like all industry agriculture is vulnerable to oil supply and costs, primarily energy use is due to fuel driving machinery and production of nitrogenous fertiliser. These activities are also responsible for significant contributions to climate change. With world population set to increase by almost a third by 2050 and increasing concerns that world oil production may have peaked on top of climate change issues agriculture must evolve rapidly to move away from turning oil into food.

Mark Robins, RSPB

I am the regional Policy Officer for the RSPB – the UK Charity working to secure a healthy environment for birds and wildlife, helping to create a better world for us all. My experience now spans

30 years of environmental science, advocacy and policy development, with most of it focussed on rural land use systems of the South West.

I am Chair of REN – the Regional Environmental Network, a member of Regional Assemblies Executive and regards this Stakeholder Jury – I chair the Steering Group of the region’s Climate Change Action Plan. I also lead a national project on protected landscapes – England’s National Parks and AONBs and their role and place in England’s system for biodiversity action.

I will approach the discussion about the future of Devon’s farming by posing questions about birds and biodiversity as both a core component of rural land management and as a key test of a sustainable future. Climate pressures in this context make these questions more demanding because the rate of change - driven by climate change - in agricultural systems is likely to be beyond our contemporary experience.



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