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# WEATHERING THE 'PERFECT STORM'

Addressing the Agriculture, Energy, Water, Climate Change Nexus

The Crawford Fund  
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Editor Ann Milligan

## Q&A

Chair: Andrew Campbell

Panel: Sir Charles Godfray

**Chair: Andrew Campbell**

To kick off this Q&A session: with food commodity markets, you're going to starve a country for a little while and see how they go?

**A: Sir Charles Godfray**

I think one would try and do it exactly as one stress-tests the banking system. One would want to know what would happen if there was a real failure of, say, multiple bread baskets; whether the largely private companies involved have both the logistic and the financial capacity to withstand that stress. That's best done by a paper exercise. It's hard, and this is no criticism, because the international grain commodities are largely controlled by the private sector, and of course the private sector companies don't want to have all their data in the public domain. You could argue about how successful the exercise is within the banking sector, but I think something needs to be done similarly in global commodity trading.

**Chair: Andrew Campbell**

And could you ruminate for a moment on potential impacts on UK science and scientific collaboration, UK aid policy and UK climate change policy, of Brexit?

**A: Sir Charles Godfray**

I worry about crashing out of the largest trading block in the world and going onto World Trade Organization (WTO) rules if it's a no-deal Brexit. I worry immensely about what that will do to our farming sector. For example, I cannot see any good way out for sheep farmers in the UK if we're thrown into the WTO. However, I think it's wrong to say that everything will be terrible. Science is a real issue as much science funding comes from the EU, but I suspect science will be relatively easy to sort out, compared with many of the trade issues.

**Q: Colin Chartres, The Crawford Fund**

Last October we had Shenggen Fan, head of IFPRI, here and he was the first person I had met who told me that he'd eaten artificial meat. If, for example, in 20 years' time, 50% of the world is eating artificial meat, has anyone started modelling some of this data, looking at the impact that's going to have? Have we started any serious work in that area?

**A: Sir Charles Godfray**

My group did try to model different scenarios for a report for the World Economic Forum. One of the issues is that it is relatively easy to make assumptions about the effects of a transfer to plant-based meat substitutes. It's much harder when you think about cultured meat. In most cases, greenhouse gas emissions from cultured meat are actually higher than they are from normal

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This Q&A report has been prepared from a transcript.

meat, though that would change as it went to scale. I have changed my mind over the last four or five years, from thinking that it was unlikely to have a major effect in the next decade. I think it will also have an effect on feed. Despite being an entomologist, I find it hard to believe that humans will ever eat large amounts of insects, but I think insects could be a really important protein source for livestock, especially in developing countries.

**Q: Female**

Good morning and thank you very much for your presentation. I am a sheep farmer from up the road; I also work for the Centre for Global Health Security at Chatham House. My first question is a comment: the German Nutrition Society has put out a statement concerning the need for vitamin supplements for some vegan or vegetarian diets. I think these issues need to be talked about, because there are groups of people, particularly women and children, who need very precise supplements, and we know the consequences to their life chances for economic vegans in low income or low resource settings.

My second question is on the modelling. I know Marco Springmann's work and I really appreciate his passion. Would it be possible for the modelling to start to take production systems into account? Looking at different greenhouse gas emissions, plus the other planetary boundaries, in relation to opportunities for carbon sequestration, and the role that animals play in maintaining healthy environments? Is it going to be possible for Marco and his group to be modelling how to meet nutrition requirements in particular geographical settings?

**A: Sir Charles Godfray**

Let me answer those in reverse order. Marco's approach does currently include some different production systems. And I know that Mario Herrero's group in Queensland is also working on that, and I agree that it is important. Your first question was on nutrition, and I think your point about vegan diets is fair. It is perfectly possible to eat healthily without eating meat, though I suspect that you have to be a bit more careful to ensure you get all the micronutrients you need. However, I don't think there are nutritional arguments about calls for flexitarianism, but I agree that there are warnings that you should be careful when you move to a purely plant-based vegan diet.

**Q: Male**

Thank you, Andrew. Thank you to Charles. That was a very comprehensive and tight presentation, which seems to cover all the bases from top down. As an agronomist I find more satisfaction in looking at things from the bottom up – from country level up – the system level up. The next 20 or 30 years is when it's all going to have to happen, which tends to put climate change on the back-burner. In sub-Saharan Africa, the population is growing at 2.6% per annum, and it's totally dependent on imported foods; there is a yield gap of the order of 200–300% in potential yield relative to actual yield. We have the technologies. It is the institutional problems, the structural problems and government problems that are going to have to be solved in that situation.

The rest of the world, I think, is more or less OK. Green Europe's up there doing its own thing; it is, I think, becoming less relevant for the world. The New World



Professor Sir Charles Godfray FRS during his Keynote address in the Great Hall of Parliament House.

will feed the world, that's how I see it. If you look at sub-Saharan Africa, we have some optimism there: for example, Ethiopia's doing very well.

**A: Sir Charles Godfray**

There are many really interesting points there. I do agree with you that much of the action around food security and whether we achieve global food security is going to be in sub-Saharan Africa. I visited Ethiopia for the first time 18 months ago and it is extraordinary what's happened there and I think reinforces your point. Certainly, analysis from our Overseas Development Department in Oxford, which does a lot of work in Ethiopia, has shown the benefits from the mere fact that you have, even in quite small rural towns, banks with expertise in local lending. So I think there are encouraging signs in other parts of Africa – but for every example such as Ghana, Ethiopia, there are other examples of countries that are not doing as well.

I'm slightly less sanguine than you about climate change in the next couple of decades. The frequency of extreme events, which, as every farmer in the room knows, are the ones that hit production most, are increasing. Within our lifetimes I fear that we're going to see them affecting all sectors, including the agricultural sector. I'm really impressed by how the agriculture sector in many countries is stepping up to this; for instance, the National Farmers Union in the UK has set an ambitious goal of reaching net zero greenhouse gas emissions across the whole of agriculture in England and Wales by, I think, 2050. So while I largely agree with your points, I worry about climate change. We really do have to take action sooner rather than later.

**Q: Eric**

In terms of revolution, in our democratic market there are societies where individual agency and freedom is highly valued. Which sort of innovative policy ideas can you offer to achieve that?

**A: Sir Charles Godfray**

That's a very good question. We live in a free market, but it's not an unlimited free market and we as society decide to put structures around our free markets. The challenges aren't so much economic as in the political economy sphere. We can already see social norms changing. We are seeing that people are beginning to think much more about what they consume. We are beginning to see people asking really interesting questions about the private sector and the purpose of the private sector. The way we have chosen to run our private sector isn't the only way to run a private sector. I think some of the economic theory that underlay that as a perfect way to run a private sector, largely from the 1980s, is now being challenged by modern economic theory. Recall the old joke that people don't change their minds but they die leaving new people with new ideas, and I suspect that there might have to be a similar transition in thinking about economics. But I think there are possibilities in all those areas: in the role of government, in setting the boundaries around which markets work, and in the social norms that drive us as individuals.

**Q: April, University of Sydney**

Thank you for your very informative talk. And as conveyed in your slide, now people are spending 9–10% of their income on food, and last year a paper said that Americans are spending 6.5%, which is really low. Considering these new planetary boundaries, can you see whether income output on food will increase or decrease in the future?

**A: Sir Charles Godfray**

That's a really great question. Let me first give an over-simplistic answer to it. Environmental economists often say we should internalise the cost and that would mean food prices would go up and that would be a good thing as they'd go up differentially. It's all very well for a well-paid professor to say that, because if steak increases and doubles in price and I still want a steak I can still afford it. But the poorest decile or two in a country won't be able to do that. To me, it's a straight question of politics. And of course, and again this is a simplistic answer, what one would ideally do is to set up proper safety nets.

If anything, we're moving away from safety nets, and another great challenge ahead in this century – apart from the food system and climate change – is the growth of inequality. We know capitalism works; we know capitalism is the only economic system that can raise all boats, but modern capitalism with the vast profits made by Internet platform companies, etc., looks like it has particular strong effects on increasing inequality.

So – I know there are politicians in the room – to me, that's one of the greatest challenges going ahead. And it's a long way away from food, but this is an area, I think, where it's very hard to think about food in isolation from how we choose to run our economy.

**Q: Male**

Thank you very much for the positive outlook. You don't see that too often nowadays when you're talking about calamity as we look forward. I'm really interested in your demand/supply analysis, and particularly the impacts of

urban growth. In the Sahel, in West Africa, we have been breeding crops for 40 years but haven't had much impact, mainly because there's no market supply mechanism. If we increase yields they're not going to find a market. The urbanisation story you gave there was really interesting. These regional centres, these big centres of population could become regional markets for local commodities. Do you see that as an opportunity, the regional markets around the urbanisation – not on the coastal areas, but in places like the Sahel?

**A: Sir Charles Godfray**

I do indeed. I think that's a really interesting point. I know it's quite extraordinary that in Mali and Burkina Faso, when mobile phones suddenly came in, prices became much more equal, almost overnight. It used to be the case that market prices varied hugely from village to village, town to town. Urbanisation in Africa can be this most tremendous force for good (I'm aware that there are some real experts on development in the room who should shout if they disagree with this) but it often fails to work that way because of issues around inadequate infrastructure, for example. Certainly, where I have worked in Kenya, the vegetable lorries crawl at a snail's speed up towards Nairobi and there is a real infrastructure challenge there.

**Q: Female**

Thank you, I enjoyed your talk a lot, especially the optimism in the long term. But having said that, I was curious about your concern about the short and the medium term. Do you see any relationship between the so-called third wave of Malthusian pessimism and the kind of political movements that we are seeing – towards conservative and right wing governments and populism?

**A: Sir Charles Godfray**

Yes, I worry about that. I was talking rather glibly about changing diets, but if you talk about changing diets, some people will gain and other people will lose. I think also that people have lost out from globalisation, and it's because there has been insufficient care about those losers in globalisation that there is now social discontent, and that has given rise to some of the populist movements.

**Q: Mark Lawrence, Institute of Physical Activity & Nutrition, Deakin University.**

I believe that in nutrition we don't engage sufficiently with the food security area. One of the issues that flies under the radar is around ultra-processed foods and discretionary foods – one of the biggest nutrition transitions that's happening around the world at the moment. It's ironic in a way that we give so much attention to red meat and those aspects, when often the vegan diets include very highly processed, ultra-processed foods. Just having a label saying 'vegan' doesn't mean it's nutritious.

**A: Sir Charles Godfray**

If I can make a comment on ultra-processed food: much of the food that's typically characterised as ultra-processed is quite horrible, full of the worst fats and the worst sugars. But if we look back at some of what are considered wonderful foods in the western tradition – cheeses and pickles and jams – they are processed foods too. I think there is value in concentrating on the nutritional

benefits of the foods. There is clear discontent with the economics of the food system, and sometimes terms such as 'ultra-processed' are used as a stick to beat the food private sector. To me, ultra-processed food is often but not always pretty awful but I worry that sometimes ultra-processed is used as a label and we forget it has both a nutritional and an economic component to it.

**Q: John Angus**

Let's consider rangelands and pastoral systems. If we stop producing meat, what happens to that land? Now perhaps it can be as, Ross Garnaut said last night, paid for by carbon credits. But in particular what happens to the community of herders and pastoralists who live there? What's to become of the rangelands?

**A: Sir Charles Godfray**

That's a really excellent question. Widespread livestock management is the only viable agriculture in much of the west of the UK. If I try and search for a silver lining to Brexit, it is that we will get out of the common agricultural policy and be able to think about new ways of supporting our rural communities. We need to think carefully about that. Livestock production provides multiple goods, and many of those goods are landscape goods around recreation, around carbon sequestration. An alternative for some areas may be for those lands to be managed differently so they support a much broader range of ecosystem services, which may still involve having livestock on them but at lower cost to the climate. Then we might achieve that 'Nirvana' of both maintaining vibrant rural communities and also having a much more environmentally friendly agriculture that is providing multiple public goods.

**Q: Faruq, University of Tasmania**

We looked at the very interesting slides on diet changes and the outcomes. Did you consider what to do in places where diets are culturally or traditionally very rooted, and how willing those people would be to change?

**A: Sir Charles Godfray**

A very brief answer to that is that we were assuming people would transfer to locally appropriate healthy diets, but we didn't assume anything about what might be the 'levers' of change that would be open to policy makers.

**Q: Snow Barlow, The University of Melbourne**

Building on John Angus's questions, would you care to speculate, globally, on the 'Ross Garnaut view', which was an Australian-centric view, of whether we can afford to continue to use what are currently agricultural lands, by and large, for food production?

**A: Sir Charles Godfray**

Thank you for that question. I thought Ross Garnaut's talk last night was absolutely superb. I think, the way to think about that is to focus on outcomes, and those outcomes will be the production of food, fibre and fuel. But we should also include the comparative advantage of producing a much broader variety of goods. When one is talking about comparative advantage, one does need

to think broadly, but in order for adjustment like that to happen, and for it to be politically acceptable, it must be done in a way that brings the people who actually work on that land along with it.

**Chair: Andrew Campbell**

It's been a great topic and great speakers. Charles, thank you for a fantastic opening to our day. We look forward to further interactions as the day goes on.

**Sir Charles Godfray**

And thank you all for some very good questions.