

The Royal Society of Edinburgh

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Feeding the Future: Can we do it Sustainably?

**Professor Tim Benton
UK Champion for Global Food Security
and Professor of Population Ecology, University of Leeds**

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Report by Jeremy Watson

Professor Tim Benton spoke to the thorny topic of adequately feeding the world without destroying the global environment. As the “Champion” for the cross-Government UK Global Food Security Programme, he made clear from the start that he is in no doubt about the scale of the challenge.

Whilst billions of people might have food security at present, there are still 805 million people who do not get sufficient quantities every day. “That,” he said with some understatement, “is a crying shame.”

Access to food can affect how society works in many ways. Food prices, for example, can correlate with civil unrest; rising prices were one of the determining factors in the origins of the Arab Spring. Adequate nutrition early in life, even pre-conception for the mother, can impact upon life-course health and affect a country’s economic growth. The wealthier West is also not immune; in the UK last year, one million people received food hand-outs. “So food poverty is a reality in the society in which we are living,” Professor Benton said.

On a global scale, the production of food has immense impacts. Agriculture employs more people the world over, emits more pollution than other sectors (in terms of greenhouse gases and the effects of fertiliser use) and impacts more land. In terms of global ill health, food-related factors top the risk factors for mortality.

So what are the problems in terms of creating a stable and sustainable food supply, Professor Benton asked? In the simplest terms, it is that although there are seven billion people on the planet now, by 2050 there will be a third more. The matching amount of food will be needed from land in finite supply.

There are certain factors making the problem of food security worse, Prof Benton explained. One is that as countries get richer, they demand more calories, much of it driven by demand for meat, some by urbanisation. The more we live in cities and get dislocated from how food is produced, the more we buy from shops, stick it in the fridge and forget about it until it has gone slimy. That leads to massive waste.

Increasing globalisation is also a concern. Professor Benton used the simple British Kit-Kat as an example. The popular chocolate bar has sugar from the Caribbean, cocoa from West Africa, milk and butter from the UK, whey from New Zealand, palm oil from Indonesia, soy from Latin America, yeast from India, salt from China and wheat from within 35 miles of the British factory; the latter because the manufacturers said they wanted locally-sourced ingredients. “They told me that without a hint of irony,” Professor Benton said. Most

supermarket products have similarly global ingredients, so the logistics of getting these around the world is a risk in a changing world. Political or climatic incidents can shut down vital transport routes.

Another issue confronting policy makers is widespread changes in diet. Everyone's diet in the world has changed since the 1960s – becoming more similar, Professor Benton said. That means the same crops are being grown on a global scale, with almost two-thirds of the world's calories now coming from three crops. If one of those crops were to fail – perhaps due to disease – that would constitute a major threat to the global food supply.

Climate change is also having an impact, with numerous studies showing that the world is warming. The forecast is for the world to be hotter by four degrees on average by the end of the Century, unless global warming is curtailed. That scale of temperature rise could have a severe effect on crop growth in some of the world's major agricultural regions, such as the American mid-West. Again, this would increase the volatility of the food supply.

Professor Benton said he has heard it argued that crop failure in one part of the world – for example, South America – would be a business “opportunity” for European countries. However, that would mean putting more strain on our own land resources and putting our own environment at risk. So how can we move to a better model of agricultural sustainability, both at home and overseas, he asked? Are solutions available?

He argued, first, that sustainability requires – perhaps paradoxically – more intensification. Statistics show that since the 1960s, the amount of land available for each person to produce their food has fallen from 1.7 hectares to 0.7. As the per capita land area shrinks, and our demand does not, growing more per unit area is necessary. “Intensification is part of the answer.”

The problem is that after decades of rapid growth, yields from intensively-cultivated arable land are not growing as fast as previously, and in some places are declining. The causes are, as yet, uncertain but biologists have an important role in reversing the declining yield growth. The effect of falling yields has been the compensatory loss of an area of rain forest the size of Scotland and Wales every year, as developing countries seek more land for food production. Professor Benton described a conversation with an Indonesian Minister, who told him that it is his “duty” to convert rain forest into productive agricultural land to help feed his nation's people.

The importance of intensification is, therefore, rising, Professor Benton said. Increasing output from the land we already have will reduce pressure on virgin forest. Intensification can come about by advances in many areas; it is not all about GM crops. The land resource we have can be used better. More can be grown within cities and new technologies can be applied as they emerge. Intensification can also be applied more rigorously in areas which can easily absorb it. In some parts of Africa, for example, the land under cultivation is only producing 10% of what it could if better technology were applied.

The second challenge of sustainability, Professor Benton continued, is to understand what is meant by the term. Sustainability means different things to different people. Farmers might make a certain amount of money per hectare but, until recently, the cost to society as a whole, through undermining the environment and reducing what the land could produce in the future, has not been taken into account. These hidden costs relate to factors such as air and water pollution and biodiversity. “Up to now we have got away with not paying these costs because the environment, to an extent, could absorb them,” Professor Benton said. “But as pressure on the land grows we will have to recognise the costs and work to avoid them.”

One of the problems is that there is no simple recipe that will bring the right balance between the requirement for cheap food and the protection of the environment. Although it is known there is greater biodiversity on low-yield organic farms, high-yield organic farms can be no different to non-organic farms. The impact on the environment can be similar; it is possible to farm with lower environmental impact, but this may come with a reduction in yield.

Agricultural land produces food, provides water, supports biodiversity and provides recreational and cultural value. “To me,” Professor Benton said, “sustainability is making sure we always get all of these things out of it, but from a business perspective only food and water and, to an extent, tourism have a market value. Who, therefore, should pay to preserve the other things we love about the countryside?”

Skewing the balance towards biodiversity in developed countries with high-yielding agriculture, however, could mean more land elsewhere being converted to agriculture to make up the food supply gap. The only way to prevent this, Professor Benton argued, is to reduce the overall demand for food and cut the amount of waste.

Most people now eat about 20 % more calories than they need on a daily basis, which is why obesity is a growing and ever-costly problem around the world. Added to that is the third of the food that we buy that is thrown away. Wiser purchasing and consumption decisions in the UK would free up the equivalent of all the country’s arable area, Professor Benton said.

Carrying on as we are would mean that by 2050, the world will need to produce more over the next 35 years than we have ever needed to in human history. Up to 120% more water would be required each year in 2050 – an impossibility. Around 40% more crop land would also be needed and some of that would have to come from rain forest. Such an expansion of, and intensification of global agricultural land would mean the loss of much of the world’s biodiversity.

Striking the balance between cheap, nutritious food for all and protecting the environment is very complex, Professor Benton concluded, as no-one takes overall responsibility for the decisions that would bring real change. Supermarkets say they give us what we want; consumers say we don’t know what their hidden attributes of food are and so, typically, choose only on price. Government stands back and says it is alright as long as the market works. “Ultimately, it is up to us,” Professor Benton said. “If we say to supermarkets we don’t want this, they will supply something different.”

Questions and Answers

Q: The message appears to be that all we have to do is waste less and eat less. But how does that square with the people wanting to make money?

A: There is nothing wrong with making money, but it needs to be equitable and not exploitative (of people or the planet). But changing agri-business is quite difficult, given the economic power vested in the current system. Some of my colleagues believe real change only comes from major events. Some say the only time we got it right in the UK, and designed agriculture in terms of nutrition and health, was during World War Two. Decisions were taken away from the market. However, it is possible for a household to spend the same on food, but buy less, buy better (better nutritionally and for the environment) and waste less and eat healthily. There is still the same money in the system, but spent differently.

Q: What’s the best way of using Britain’s aid budget to promote sustainable agriculture?

A: The old way of thinking was that agriculture is the engine room of the economy and by helping people to produce more there is a virtuous circle in which they produce a surplus they can sell. With incomes, they can invest in education and things get better and better. That is still the way of thinking at departmental level.

Q: I have launched sustainable programmes in Africa. You mentioned about how we got it right in WW2, but there is still an underinvestment in horticultural research. There is some evidence that always simply replacing meat is not necessarily the right thing in some places.

A: You are right in terms of some pastoral systems where meat is very important – ecologically and nutritionally. For many people in the developed world, we eat 2–3 times more meat than is recommended for health and this contributes to GHG emissions. But a key area of unknown is if we reduce meat, what would happen to our diets instead? If we eat less, then does that mean we need more soy, in which case we will need to chop down more rain forests? Do we need more root vegetables or leafy vegetable or insects or ...? If you do things more sustainably in your diet you might save money, but the rebound effects of that have to be taken into account; for example, do you fly off on a tropical holiday?

Q: To what extent should animal welfare be sacrificed to intensification?

A: That is a moral choice. Campaigner Rosie Boycott says you can pay 35p for a chicken breast from China or £3.50 for one from an organic farm. Once in a meal, they taste pretty much the same, yet one has been produced in what we might think are less than ideal conditions. That's a choice we have to make. My personal view is that welfare is a very important issue but, ultimately, there is a societal choice (as with any aspect of sustainability); the cheaper we want food, the more other things tend to give.

Q: We have heard a lot about domestic food waste and a lot of responsibility for that is on the individual. But what about the waste created by the big chains rejecting produce that isn't what they want? Don't we need to tackle that as well?

A: Yes. But we, as consumers, are complicit in this. Watch people in supermarket fresh-produce sections; they will sort through and pick out the "best", leaving mis-shapen or flawed produce. If we were less fussy, perhaps retailers would not reject so much? But retailers do exist to sell, and sometimes this creates waste. For example, offers such as three bags of lettuce for the price of one to shift goods near their sell-by dates. We will never eat all that before some of it goes off. We have to say to the supermarkets that we don't want that sort of deal.

Q: I am assuming that sustainable intensification is predicated on a greater use of nitrogen fertilisers. How do we get intensification without that?

A: It is not predicated on it. Yes, we need to increase our output per hectare, but that can be done through more intensive use of labour or scientific knowledge.

Q: Isn't there a lot of food waste that could be given to food banks?

A: The problem is food safety regulations, which are designed to stop people from becoming sick. However, sometimes we can see technology development potentially alleviating some of these issues. Waste is banned currently from re-entering the food chain, which is a pity, as some livestock evolved as effective waste disposers (pigs, for example). I have high hopes we can find ways of ensuring that waste food is treated in ways to minimise risk and allow it to become more useful than compost or anaerobic digestion.

The Vote of Thanks was offered by Professor Stuart Monro OBE FRSE.

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