



Can we trust our food?

Professor Colin Dennis

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I feel I should explain my day job. Professor Michael Mainelli has explained that we both work with the United Kingdom Accreditation Service, but my day job is very much heading up Camden BRI, which has been created in the last few months by the merger of an organisation which was at Chipping Campden with the Brewing Research International, hence the 'BRI' bit, which is based at Nutfield in Surrey, so we now cover the whole of the food and drink spectrum. We are now an organisation which has got three sites in the UK, one in Chipping Campden, one in Nutfield, and another small one at Stoneleigh Park, and also a small subsidiary in Eastern Europe, in Budapest.

Our origins date back really to 1919, as far as Camden is concerned. After the First World War, the Government of the day, quite rightly I think, recognised the need for preserving some of our basic commodities, namely fruits and vegetables, which were grown just to the west of Chipping Campden, and so that was the reason that our existence started. We really started the British canning and bottling industries, and those of you that make wine probably come across Camden tablets, and the Camden tablet was developed in Chipping Campden. So we have got a long history: initially a Government organisation, then subsequently part of Bristol University, and in 1952 we became a totally independent and commercial organisation.

We are a membership organisation. We serve just over 2,000 members in over 60 countries around the world, so we operate internationally. You see our turnover this year is just over 18 million pounds, and we employ about 380 people, 300 of which are based in Chipping Campden, not necessarily what you would expect of a little Cotswold village, having such a large industrial organisation. We work for both industry and Government clients, and the four key words of our business are all about safety, quality, efficiency and innovation. Part of our work is research and development, but a lot of our work is actually transferring the results of research that we do, but also that which is done in Government institutes and in Universities, and applying it into the food industry, to address some of the issues that I am going to discuss with you this evening, mostly in the area of safety and quality, but also a little bit in the area of food security as well.

The issue 'Can we trust our food?' is not an issue that is modern; it is something that has been discussed since the early 1800s. The real first campaigner that really looked into the quality and authenticity of our food and safety was an ex-patriot German chemist, Fredrich Accum. In the book that is published this year by B. Wilson, there is quite a very readable account of all the work that he did in the early 1800s, and the steps that have been taken up until the modern day, and the final chapter is really focusing in on the work that our own Food Standards Agency in the UK now does in relation to trying to make sure that our food supply is safe.

I want to start from a consumer perspective. We are all consumers: what are we thinking about in relation to our food supply, and not just here in the UK, but in other parts of world as well?

Perhaps the first issue is, in many parts of the world, or even in some parts of the UK: is food available to us? Is it accessible and is it affordable? This term 'food security' has attracted a lot of political attention in the developed and developing world in recent times, partly stimulated by the very high cost of food commodities not that many months ago, but also a realisation that other issues in the social and economic development around the world are going to impact on food availability in the years to come.

Another issue I want to touch on is maybe the first thing that comes to your mind: 'Is our food safe?' Is it free of pathogens? Is it free of toxins? Is it free of contaminants? If we have allergenic responses to certain food ingredients, am I sure that this food product that I am now going to consume has not got any of those particular ingredients in? Increasingly, in the Western world, where we have ample food supply, we get concerned about 'Is our food authentic?' 'If we are buying beef, is it really beef?' etc. etc. and 'Are the ingredients what they say on the can or on the label?' Also, an increasing proportion of the population is interested in the way the food was produced, in terms of animal welfare, in terms of the environment - is it organic, is it fair-trade, etc. - and also, partly related to that, is, where did our food come from, which country did it come from, and, if it is from the UK, perhaps which locality, the provenance of products that we want to consume and purchase.

Those are the sorts of areas that I want to sort of cover. First of all, I will just touch on the area of food security, because I think it is one that we all need to give more consideration and attention to in the years to come, and I will explain why I believe that.

The first thing just to remind you of, is that the world population is currently just over six billion people, and virtually half of our world's population has barely got sufficient food to provide the nutritional content that we need as human beings. On top of that, we have continuing population growth. Various estimates are around, but it is believed that by 2050, we are going to have at least 40% increase, and I think the figure that is usually reported is the population of the world will be around nine billion people. We are also seeing substantial economic growth, or at least we have done in recent years, in countries like India and China and certain parts of South America. That leads to increased urbanisation; that leads to changing in lifestyles; and one of the major developments has been the amount of meat consumption, increasing meat consumption, in many of those parts of the world. That impacts also on the food supply chain, because it is estimated, by 2050, that the amount of grain that is needed to feed the number of animals that we shall need to provide the meat is equivalent to feeding four billion people. So, there are obviously increasing pressures on our food supply, and the demand, by 2050, is expected to double.

So, what are we going to be able to do about that to try and respond to these developments, especially when we know there is only a certain amount of land available in the world that can support agricultural production? In some areas, maybe there is lots of development for growth. In India, there is 12% of agricultural land, but they only produce 4% of the world's food supply, so there is an increase in efficiency there that can be gained.

If we look at some of the data, in many parts of the world we waste 40, 50, 60, or even 70 percent of the food that is grown before it is processed or stored or converted into a form that can go to the consumer. Even in this country, 25 percent or more of what we purchase from retail stores is wasted. So there is obviously some parts of the system that we can increase in efficiency.

We have seen earlier this year the impact of the drive for biofuels and how that may divert raw materials from the food supply into energy production, and that is another issue that has got to be addressed.

We certainly know, if we look around the world's population and where the agricultural land is, that there is a mismatch between where people are and where food can be produced, so that drives us to a situation where we have international trade, and increasingly so in the food sector. Of course, we also have the issue of climate change coming along, which is going to influence where food can be produced in the future.

Land is obviously going to be a major constraint, but water is equally a major constraint. Depending on your diet, this concept of virtual water or embedded water in our food supply, is equivalent to between 2,000 and 5,000 litres per day, depending on whether you are a vegetarian or a meat eater - the higher number is for those that consume higher quantities of meat. That compares to some of the other uses that we have for water, and therefore there is a debate going on about how international trade might assist in relation to the efficient use of water in our world food supply.

There are issues around food security, and I think there is general acceptance that, in order to address some of these issues, there is going to be development of a more organised food supply chain in the developing

countries around the world in order to feed the increasing urban populations and the change in lifestyle that is associated with those developments.

It is interesting to read a statement from Dr Yumkella, who is the current Director General of the United Nations Industrial Development Organisation, where he clearly states that the policy within UNIDO is very much about encouraging the agro industries, the manufacture of added-value products, in some countries, and the desire to make sure that there is the opportunity to build capacity in terms of the technologies, the infrastructure, that is going to be needed for that.

So much for some of the issues around world food supply, and whether we are going to have an adequate food supply going forward. I will now come back closer to home and give you one or two little bits of information about the UK situation.

Consumer expenditure in the UK is over 150 billion per annum. It is now roughly 50/50 in terms of retail and food service and catering. Together, it accounts for almost four million jobs in the country, currently. It is our biggest manufacturing industry. Maybe that is not a great claim in a country that does not now have huge manufacturing potential, but the food industry is our largest one and does add 21 billion of gross added value during each year.

What are the key industry issues? Although I have focused on the UK, these apply to many other countries around the world. First and foremost, if you are involved in the food industry and you are a reputable trader and you value your brand, then safety is essential; it is non-negotiable. If you begin to sell food that is unsafe to the consumer, the chances are you are not going to be in business for very long. I will focus a lot of what I have got to say around the systems and approaches that have been developed, particularly in this country, but in other countries as well, to try and ensure that we do have a safe food supply.

Increasingly, health and wellbeing, and how can food and our diets contribute to a lifestyle that helps prevent disease and provides health aging. Obviously, this is a topic of increasing interest at this moment in time, as is the issue around sustainability and resource, not just in the global food supply chain, but in relation to trying to reduce greenhouse gases etc. within our own manufacturing industry: reduce waste and save energy.

All of this has to be achieved in a very competitive environment. It is a dynamic industry, it is a very competitive industry, and one that has got a fair degree of international trade, so it is all about production efficiency and making sure that products that are available do meet the needs of the marketplace - in other words, do meet the needs of the consumer. Of course, all of this is done within national and international regulatory frameworks.

I will just highlight a report that was published last week by the Food and Drink Federation in the UK, and the commitment that the major food manufacturing industry has made to reducing CO₂ emissions. Since 1990, a 17% reduction has been achieved, and that is equivalent in CO₂ emission of removing 22,000 cars from the road each year. Similarly, there is a commitment to reducing waste, packaging, reducing the use of water in food processing, and also trying to make sure the distribution and transport of our food system is more efficient going forward in terms of food miles and so on, accepting there has to be distribution of food, there has to be international trade.

Those are some general comments by way of introduction; now, I will get on to the main thesis of what I want to say this evening.

Just to look at a food supply chain, in rather simplistic terms, we are starting with the production of crops and animals and the inputs that go into that part of the food chain, and the practices that are undergone within harvest, within slaughter, and so on, and then into storage and distribution, into processing and packaging. Although there is not time to discuss everything, what I am trying to do is indicate to you that there are a whole range of complex issues and a whole range of areas where there has to be very tight control to ensure that our food supply is safe when we are dealing with mass production of food in terms of feeding urban populations. And so on to storage and retail and to food service, and then, last but not least,

the consumer: we, as consumers, also have a responsibility in terms of the way we handle and treat the food that we purchase to consume in our homes.

Increasingly, as I have said, we have an international aspect to it, so that ingredients, products or parts of products, come from various countries around the world. Just a very simple product in a food service establishment could have ingredients coming from 17 different processors, nine countries and three continents. Similarly, another added-value food product, could have 10 ingredients from 11 countries, potentially, so it is important, when you think about food supply chains, that the issue of traceability is vitally important.

The food industry has done a lot of work in terms of developing and establishing voluntary codes in relation to traceability, and it is now in-built in European legislation as well, or at least the 'one-up, one-down', so where did your food come from/who you were supplying it to is in-built in regulation. Over and above that, most, if not all, of the industry standards that are accredited are able to trace the total supply chain by making sure each of the companies within that chain operates a traceability system. Why is that important?

It is important to us, as consumers, to make sure that we have the ability to have an effective recall if there is a problem that is recognised in the industry. In the UK, just a few years ago, you may remember, there was a major food recall because of contaminated chilli powder with Sudan dyes. The British food industry withdrew almost 1,000 products within about 24 hours, and that, I think, was a reflection of the efficiency of the recall systems and traceability schemes that they had in place. Obviously, some of us, as consumers, want to avoid certain ingredients, and therefore we need to make sure companies that supply us can trace the source of our ingredients, and, as I said earlier, some of us want to choose products produced in different ways.

Similarly, the Government needs to support and encourage traceability systems, from a public health point of view, controlling emergencies, such as livestock disease, when we are doing more and more international trade, and the issue of fraud.

Of course, it is good for industry. Obviously, the last thing they want is to have a recall, but accidents do happen, and you will see advertisements in the paper that there have been recalls on products because maybe there has been a breakdown in the safety control system; maybe it relates to pieces of glass, maybe it related to other issues around the food safety area, but at the end of the day the industry needs to have traceability systems to make sure they have a viable business going forward as well.

I will now focus in on aspects of food safety and quality, firstly in relation to food safety. You may think we have been producing, distributing, processing food, for many, many years - surely we now understand all the issues around food safety? Well, we certainly do understand many of the issues, but, as I said, it is one of continuing concern, because we have changes in demographics and susceptibility of parts of the population to certain pathogens, etc. We have a more varied geographic origin of our food ingredients. We have developments in food production and processing technologies, often in relation to consumer demand. There was certainly a situation not many years ago where a small company changed their production process, but did not appreciate that by changing the process, they actually made their products unsafe. That was in relation to hazelnut puree going into yoghurts. Also, food consumption patterns are changing, as I said, and, because we are doing things differently, because we are using different production systems, then we have new pathogens and new issues emerging all the time. So, we have to keep thinking about what we are doing in the food industry, what we are doing in our food supply chain, and ask whether that has an impact on food safety. Because we are getting more and more international, there is a great emphasis on trying to make sure we have common food safety management systems adopted globally and that we do operate to common principles in relation to food safety management, right from farm to consumption.

The whole area of food safety is about identifying hazards, and then assessing the associated risks in our food supply. Of course, sometimes, the reality and the perception is not always consistent. I will just refer back to some work our own Food Standards Agency did, just after they were established, around 2000, 2001, 2002, with some consumer research. We compared the perceived risks that consumers felt, and then the real risks. In fact, most of the real risks were in relation to our choice of diet, in relation to cardiovascular disease or cancers. There were no deaths from GM, from pesticides, from growth hormones, in the UK. In

a lecture that Lord Krebs gave a few years ago, he said that it is quite difficult to find data on deaths from food poisoning in the UK, but it is in roughly the same ballpark as those statistics of people dying from accidents of getting into or out of bed, so it is very small, compared to the deaths that are caused by the choice of diet. So, there are real issues around food safety of communicating the hazards and the risk to consumers.

Just to refresh your memory of the opportunities where things can go wrong. Our food supply chain is quite complex, and there are many opportunities where pathogens, toxins, or contaminants might get into the supply chain, unless we have a very systematic and a very controlled and responsible approach to food supply.

The system that we have adopted now, for many years, in the food industry is something called HACCP, the Hazard Analysis and Critical Control Point concept, and this system is really all about identifying the hazards, evaluating those hazards in terms of potential risk, putting in control systems that will minimise or eliminate the possibility of the hazard causing the problem that are significant to the food industry. This came out of the US Space Programme many years ago and has been modified by the food industry in all of the developed countries around the world. I have to say that the food industry, in most countries, was there before the regulators. It is only in relatively recent times that HACCP has been implanted certainly into European legislation, but industry codes adopted this approach many, many years ago. This is where it is important that we have assurance schemes and that we build in the HACCP concept into our food safety and food quality systems, but particularly food safety.

Since the establishment of our Food Standards Agency, they have taken a great deal of interest in this, and their guidance in relation to food assurance schemes is very much about having bodies that establish standards in relation to safety and quality, that there is consumer representation on their bodies, so there is consumer input from a very early stage, but there is a balance between the consumer benefit and the cost. There is no such thing as absolute safety, and I think we all appreciate that from driving or travelling etc. It is the same: with we cannot guarantee absolute safety in our food supply, but we endeavour to make sure the chance of anything going wrong is absolutely at the minimum. And that there is a hazard approach to standard setting, that there is a critical evaluation of what the real hazards are, and that that is applied right across the food supply chain.

In order to adopt these food assurance schemes, and to make sure that these schemes are adopted, and they are not just documents on somebody's shelf, there are companies, or bodies, called the Accredited Certification Bodies. These bodies then go around the agri-food industry and inspect the various regimes that are in place and see whether they do comply with the standards that the independent body has set. They also have to make sure, within their own personnel, there is adequate training and assessment and review of the inspectors' expertise. In the food sector, the individual expertise of the inspectors is absolutely essential, because, as you can imagine, going in to look at a bakery is somewhat different to going in to looking at a ready-to-eat chilled food/chilled meat company. The hazards from eating bread are somewhat less than the hazards from eating sliced, cooked meats that is undergoing no other preparation prior to consumption and is a type of product that can support the growth of food pathogens. So, the individual expertise of the inspectors is vital, that they do have clear and effective procedures if they detect non-compliance to the standard, and that they do exert sanctions on those companies that are not complying to the standards.

Accredited certification is really about having standards agreed by the stakeholders, including the consumer; having those standards assessed where companies are applying them to make sure that companies do comply with the standard, whether it be in products or processes or systems, etc.; but the accreditation bit comes from the fact that we have a National Accreditation Body, UKAS, which Michael Mainelli and I mentioned earlier, that actually accredit the competence of those certification bodies. UKAS is the National Accreditation Body in this country, and we rely on them and their staff to make sure that the certification bodies are operating to good practice and that the companies that they certify are operating to the standards that we have set in relation to safety and quality. UKAS itself is then exposed to peer review on an international basis as well, so that there is a lot of input in trying to make sure the schemes that are now established, and well established in many parts of the food industry, are doing the job that they set out to do.

There is a whole range of these standards, and I think you will appreciate we do have to have different ones for different sectors, because producing wheat for bread is very different from producing salad crops and so on for direct consumption by the consumer. Obviously, producing meat products is very different from producing plant products. There is a little logo commonly known as the Red Tractor logo, which is now becoming more and more common as the recognised logo for food-assured schemes. It is not universal yet, and probably not that well recognised by the consumer. In fact, I think one of the most recent surveys think it is still below 40% of the population that really recognise what the Red Tractor logo means on products.

In addition, we have specific programmes that are related to eggs, to animal feed, to malt for the brewing industry, the whisky industry, and a separate scheme up in Scotland for combinable crops. All of these schemes do use Accredited Certification Bodies to make sure the standards that they have set - and not all of them have consumer input at this stage, but the majority do - are meeting the standards that they were set out to achieve.

We also have some niche areas that are covered: Freedom Food, in relation to animal welfare; the LEAF Marque, in relation to linking farming to the environment; and the Soil Association, in relation to organic foods, as well. All of these use Accredited Certification Bodies to make sure that companies are abiding by the standards that have been set.

I have emphasised the linkage right along the food chain and the importance of that, and you will appreciate that the standards that I have just talked about apply to particular sectors, but there is now a lot more joining-up and a lot more common thinking about these standards, and cross-referencing between animal feeds, into beef production, or pig production on farms, and then there is the final one in the chain, the British Retail Consortium Global Standard, which is about food processing and food manufacturing. My own organisation was quite heavily involved in getting the retailers together some years ago to adopt a common standard, so we did not have separate ones for each of the major retail chains. So, there is now this joined-up action and thinking right along the food chain.

As I was saying, the Food Standards Agency issued a report, just earlier this year, where they reviewed what was happening with all of those standards and how they were being applied in reality. Their top-line messages were that they felt the standards had been tightened across all the schemes, and that they were better now than they were, about five years or so ago, that all the certification bodies now have UKAS accreditation, and the only aspect that was probably still missing in some of the schemes was sufficient consumer input at an early stage. Increasingly, these schemes are now becoming part of the consumer retail awareness experience, but I think there is still quite a long way to go.

We have definitely moved from a situation that I can remember, many years ago, where too much emphasis was placed on end product testing, i.e., the quality control concept, as opposed to quality assurance and looking at the systems all the way through the supply chain. If you think about it, if you have got a low level of contamination, you have to test one huge amount of material to check that you are going to find a contaminant present, and the only sensible approach, and economically viable approach, is to do the HACCP concept all the way through the supply chain, and not just HACCP in relation to food safety, but adopting the same principles in relation to the production of organic food or any other type of standard in which you are interested.

Having said that, we still need to have testing. Companies need it because part of the Food Safety Act in this country, and other countries, requires companies to exert due diligence. In other words, they have to take all reasonable precautions that their food is safe, but they have to demonstrate that they are checking the source of their materials and so on. I think one of the classic examples recently has been the melamine problem in a whole range of products coming from China. I had the privilege of being out in China just a month ago at the World Food Congress, and one of my American colleagues visited one of the companies that has been implicated in this problem. He said it was probably one of the most advanced and modern food processing sites he had ever seen, but they made one mistake: they did not check their raw material. But what people were doing was adding melamine in milk that had been watered down, and the melamine would simulate the original protein level in the milk. Of course, milk goes into a lot of infant formulas, and the problem really came to light in China because babies were dying and there have been huge, huge numbers of children that died from this fraud and adulteration.

So, there is still need to do testing, and certainly where you have got something where it is as common as that, in almost every sample that you look at, and especially with something like milk that is very homogenous. It is very different with a load of grain or other products, where it may be in a small proportion of the consignment but not in the totality. We have to look for contaminants, we have to try and make sure our foods are authentic, and of course, when you look on the label, you will see the composition of a food product. In order to declare that composition, the food business has to do analysis, and has to keep analysing their products on a sampling basis, to make sure that what they say on the label is what they are actually delivering from their factory day-in, day-out, week-in, week-out.

Also, our authorities, the Food Standards Agency and other people, will do surveillance of products, and label declarations have to be there as well. When we are doing these analyses, we have to make sure we are taking the right approach in order to get a valid result, and this, again, is where it is important that we have laboratories that are prepared to expose themselves to third party assessment to make sure that the methods they are using, the systems they are using, are appropriate. A lot of the methods we now use in food analysis are very sophisticated. It really is forensic science.

This sample is really because canned food is one of the most difficult products to analyse reliably using some of the genetic and molecular techniques that we have, using systems where we take part of the DNA in the original food material, but the heating processes damage our genetic material, or the material in, say, this fish product, but now we do have techniques where we can reliably, if it says it is a certain type of salmon, we can actually prove that from analysis, and similarly, you can do it with nuts, you can do with vegetable oils, or whatever. We have got very rapid, very sophisticated, techniques that help us search out contaminants and fraud in relation to having products that are not what they say perhaps on the label.

How do we ensure that our measurements, our analyses, are valid? There are essentially six principles to valid analytical measurement. First of all, we need to define why are we doing the analysis, and what sort of level of detection we expect to get. We need to have the appropriate methods and equipment, we need to have the right people, and ensure that there is some independent assessment of the technical performance, and we need to expose ourselves to taking in samples that are sent to us from another body, and where there is perhaps an unknown level of a contaminant or a pathogen present, and if your laboratory is competent and able to do analysis properly, it will get the right answer on this unknown sample that it has been sent. We do that across a whole range of laboratories to make sure we are getting the correct information and correct data. We have our own quality control and quality assurance procedures.

To expand that a little bit: a simple flow-through within any laboratory is: taking the sample, going through the analysis, getting the results, and submitting the report. The important thing is obviously the analysis. The validity of the analysis starts with the sample, and a lot of effort is being put in to sample design for different types of food products, but, perhaps even more importantly, how the samples are handled prior to analysis after collection, because if they are stored at inappropriate temperatures or frozen when they should not be, you are going to get an invalid answer. So, it is important that we have control right the way along the system, very similar to our food supply chain.

For a laboratory to be accredited, it needs to have the appropriate equipment, and that equipment needs to be calibrated, so that you are going to get the same result day-in, day-out. You have to have appropriate methods, and ensure that you have got evidence that you have validated those methods, or somebody has validated those methods, and that they are being applied in the right way, to the right food material, and the materials you use in those analyses have been stored and treated in the appropriate way, and you have a quality control system in there. You also need to have staff that are appropriately trained and can demonstrate the appropriate competence, and be sure that the management of those staff are appropriate for the analysis that is being carried out; that the laboratory practices are part of an integrated quality system that makes sure that we are doing everything in the right way, every day of the week, and every week of the year; and have the facilities, and the proficiency testing is where we compare our results with other laboratories. That is the important part of making sure that you have a system, and Government agencies like the Food Standards Agency, the major food companies, will only use AKAS accredited laboratories for these types of analyses.

I believe UKAS accreditation and accredited certification where appropriate is good for business and, indeed, is good for consumers as well. I hope, from what I have said, you can see that our food industry, certainly in the UK, but in many other countries around the world, does put a lot of effort into ensuring that we have a safe food supply, despite the fact that it is increasingly international and increasingly complex.

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