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IS FOOD SAFE?

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Introduction

It is a great honour to give this distinguished lecture following in the footsteps of your previous speakers, all of whom have been eminent men (no women!).

I am going to cover three topics in my presentation today

First I will give you a brief update on the Food Standards Agency: how we are doing at the end of our first year.

Second I will talk about uncertainty, science and risk – which is after all central to our business.

Third I will share with you some of my thoughts about the future of food production and agriculture in Britain, in the wake of Foot and Mouth Disease.

The agency one year on

How is the FSA doing at the end of its first year?

You will need no reminding of the origins of the Agency or its basic organisation and role. As you know we were set up on April 1 2000, with the particular purpose of protecting the health of the public and other consumer interests in relation to food.

I should say right up front, that being a consumer protection body does not set us against industry, since we share many, if not most, of our aims in common, and we will only succeed in delivering benefits for consumers in many areas by working with industry.

The Agency, as you know, is run by a Board, of which I am the Chair. Our aim, which is clearly stated at the front of our strategic plan published last month, is *"to be trusted as the UK's most reliable source of advice and information about food"*. This is no modest aim, given that we started from a situation in which the public had little confidence in the way government handled food issues. If we succeed in our aim, it will be good not only for consumers, but also for the food industry.

How have we done in our first year? Let me first say what I think, but then tell you what others have said about us: some of you have been amongst those who have given us feedback on our progress.

I think in our first year we have done three important things.

- Completed some significant early tasks.
- Begun to set new standards for openness in government
- Developed our longer term strategy

I will say a few words about each of these

- **Significant early tasks**

Many of the things we have initiated will take time to bear fruit, but in our first year we have sown the seeds. In areas such as **labelling**, where we have an 18 point action plan; in **food borne illness**, where we have set quantitative targets and put in place the strategic framework for their delivery; and in **nutrition**, where we have sketched out our aspirations.

Some of our early tasks are already coming to fruition, notably the establishment of the Framework Agreement with local authorities, introduction of licensing for Butchers and the completion of our public review of BSE controls.

The Framework Agreement is particularly important because it is a partnership agreement that sets for the first time national standards for food law enforcement, and gives the public direct access to information for them to judge how well the job is being done by the front line workers.

The Agreement sets out the requirements for effective food law enforcement by local authorities and places on them the obligation to provide us with regular reports. We will carry out a rolling programme of audits of the authorities. We see publication of data on enforcement as an important component of our openness agenda, as well as a potential driver of change.

- **New standards of openness in government**

On day one we declared our three core values to be:

- Putting the consumer first
- Openness
- Independence

We have been very active in putting these values into practice and in doing so we are pioneering new processes in government.

Our **openness** commitment has been put into practice not only by holding all our board meetings in public – itself a radical new departure because we **only** decide on policy in public – but also in other ways.

We have encouraged direct debate amongst stakeholders, for example in our review of BSE controls, where the debate between initially very divergent viewpoints (e.g. the Human BSE Foundation and some elements of the meat industry) enriched the process and helped us to unravel the arguments and to gain a better understanding of acceptable risk. We have held similar public discussions of other difficult issues, such as *Mycobacterium avian paratuberculosis* in milk, low levels of genetically modified organisms in food, bisphenol A in tin cans and radiological safety of food.

We use our website extensively to put out information, encourage debate and make transparent what we are doing. To give one example of the public's response to this, our dedicated BSE website had more than a million hits in its first six months.

One of our commitments is to be honest and open about uncertainties. This is a difficult area, but one in which our experience has shown that one can say *"Here is what we know and don't know, and here is what we are doing about the uncertainties"* without causing mayhem and panic amongst consumers. Two examples to which I will return later when I talk about risk are the possibility of BSE in sheep, and more recently, the possibility of dioxins in milk from farms near the funeral pyres of FMD animals.

I think one of the keys to our success will be showing that we are **independent** – independent of ministerial influence, of pressure groups, of industry and so on. By independence, I mean that we form our view on the basis of best objective evidence, rather than succumbing to pressure, emotion or dogma.

Of course there are value judgements to be made on food issues, for example in relation to welfare and environmental aspects of production, but in assessing the extent to which these values are achieved or compromised, we must rely on objective evidence.

People ask how independent we are of Ministers. Without going into any detail, which would be particularly inappropriate on the day before a general election, I can tell you that we have always maintained our independence within government.

Our commitment to put consumers first means that we approach issues from a consumer perspective. We try to involve consumer groups in all stages of our thinking and where appropriate test out our ideas with them.

I think one of our continuing challenges is effective two way communication with the full range of consumers, and not just those represented by pressure groups. We are establishing a consumer committee, as one of the ways to improve our communication.

- **Strategic Plan**

The Board of the Agency has put a lot of thought into its strategic priorities, culminating in the publication last month of our first Strategic plan, which lays out our five-year commitments in 10 key areas of work. This will provide an important way of benchmarking our progress in the years ahead. I do not have time to go through it today, but I do recommend that you look at it on our website.

In parallel, the Board asked one of its members, Sir John Arbuthnot, to carry out a fundamental review of our research strategy (we spend £27 million a year on research and surveys). The Arbuthnot review will be discussed by the Board later this month at its open meeting in Edinburgh.

I know that the Board is very keen to ensure that all the research we commission should have clearly identifiable outcomes of relevance to the FSA's policy needs. Perhaps surprisingly this has not always been the case in the past.

Feedback from others

During our first year we have been listening to what others say about us. For example we invited about 30 stakeholders, including people from the scientific community and from industry, to a meeting at the end of April to give us feedback on our first year's performance.

On the positive side, there was more or less general agreement that we have done well on openness and consultation, although we could do more to consult early about emerging issues.

Those who attend our board meetings and fill in the exit questionnaire also praise our openness.

Our stakeholders also agreed overall with the priorities we have identified, but felt that we need to make more progress on nutrition.

On the debit side, most people thought our profile was too low. We were also criticised by some stakeholders for a lack of proactivity in handling the GM seed contamination shortly after we were set up. Some people criticised our statement about organic food. We said that the scientific work done has not shown that organic food is better for you. We were criticised by some for not being sufficiently transparent about how we reached this view. Others said it was simply a fair summary of the current state of scientific knowledge.

Risk

Risk is at the heart of the FSA's business. We are responsible for assessment, communication and management of risk. People want to know from us whether or not the food they eat is safe.

The straight answer to the question "Can you guarantee that food is safe?" is "No, nothing is life is absolutely risk free". Lord Phillips in his 16 volume, £27 million enquiry is clear about this: *"The government does not set out to achieve zero risk, but to reduce risk to a level which should be acceptable to the reasonable consumer"*. This of course begs the questions of what is "acceptable" and what is "reasonable".

People's perception of risks, as is well known, may differ from the objective assessment. The American psychologist Paul Slovic showed many years ago that risks that are involuntary, unfamiliar, unknowable, irreversible and long-term are perceived as higher that those that have the opposite characteristics.

Riding a bike is considered safer than living near a nuclear power station, but all the evidence shows that the former is much riskier.

As far as food is concerned, the top five risks in the mind of the public, according to our 2001 survey of 3000 consumers, are: Food poisoning, BSE, growth hormones (although not legally used in Europe!), animal feed, and pesticides. (GM was just outside the top 5).

Compare this with the actual risks in relation to food. A crude way of assessing these is the number of deaths per year. Using this measure, the top two food risks are both related to dietary health. Approximately one third of cardiovascular deaths and one fifth of cancer deaths are attributable to diet, amounting to over 100,000 deaths per year in the UK, whilst GM foods and the food use of growth hormones and pesticides have not been shown to cause any deaths through food in the UK.

To put these food risks in perspective, the number of people dying of food poisoning each year is in the same ballpark as the number reported as dying as a result of accidents sustained whilst getting in or out of bed!

What do we do about this discrepancy between perceived and assessed risk? Whilst we cannot base our risk assessment on what people think, as opposed to the objective evidence, we have to take into account what people think in our communication and management of risk. I will return to this in a minute.

Because we do our business openly, the three elements - assessment, communication and management - cannot be arranged in a nice linear sequence. If you discuss your assessment of risk in public, you are communicating as you assess, and once you communicate you get drawn into discussing how you might manage risks on behalf of the public.

What are our biggest challenges in handling risk?

I could give you a long list, but I will stick to three points.

- Communicating uncertainty
- Being proportionate
- Relating the scientific assessment of risk to people's perceptions and concerns

As you will know, often we are faced with the job of managing food risks in the face of incomplete knowledge. Rather than dealing with well-established scientific facts, we are at the frontiers of knowledge where there are uncertainties, a changing evidence base and disagreements amongst the experts.

This can seem confusing or even incompetent to the public, which expects scientists and regulators to know for certain about whether or not something is safe. The FSA has taken the approach of being honest about uncertainty and so far we have found that we have been able to say *"we don't yet know for certain, but we are onto the case. This is what we are doing about it and in the meantime here is our advice"*.

Three notable examples of our approach to uncertainty are our statements on BSE in sheep, imported meat products and dioxins in milk (I referred to the first and third of these earlier). In being open about uncertainty, we have not created public panic, media hysteria or a collapse in demand. In the case of dioxins in milk, the media, in spite of the headlines, reported accurately and responsibly on what we said. There is now recognition that something is different and change is afoot.

Phillips says that we must learn to trust people with information, and I think he is right.

Another point that comes out of our experience is that with some kinds of risk, those that are very slight, affect very few people or can be avoided given the signposts, it is the best approach to give people the information and let them choose. It is all too easy to respond by banning everything in sight, but this is not a sensible way to manage all kinds of risk.

This brings me to the second point. How precautionary should one be when there is uncertainty? Luckily for you I am not going to give you an exposition on the Precautionary Principle, other than to say that it has become subject to many interpretations and therefore presents difficulties when you try to put it into practice. In order to steer between the *Scylla of laisser faire* and the *Charybdis of intervention*, the FSA has to come to a view about the right level of precaution.

There is no formula that you can look up in a book, and in the end it is a matter of judgement. The judgement can be refined and informed by open debate, particularly direct debate amongst stakeholders with opposing views, as we found in our review of BSE controls.

Equally important is to be willing to change one's mind as new evidence comes to hand. For politicians, changing your mind may be seen as a U turn; for us it is simple common sense to continue to scrutinise all the evidence as it comes to hand.

We also believe strongly in challenging the evidence and calling in the experts to debate the uncertainties. This is what we did with the expert epidemiologists who modelled the FMD epidemic (not a food safety issue but one with big implications for the Meat Hygiene Service, which is part of the FSA) and with the experts on dioxins coming from funeral pyres.

What about the disconnect between the actual risk as assessed by scientists and perceived risk? GM is a good example. The fact that scientists say GM is as safe as its conventional counterpart is for many people beside the point. They don't trust it (and what's more they don't see any benefit) so why should they eat it?

As I said earlier, we cannot base our risk assessment on what people might think as opposed to what the scientific evidence shows, but we can take another, complementary approach: to give people a choice, by clear and unambiguous labelling. At the moment the labelling rules are potentially confusing: most people do not know the difference between "non-GM" and "GM free", nor are people aware that GM processing aids are widely used (eg in cheese and bread making) and that GM derivatives are not labelled.

More comprehensive labelling does not come without costs (for example, if it involves complete segregation or sourcing from specialist suppliers) but if these costs are transparent and passed directly on to consumers, they may help to show whether or not people want completely GM free food.

There is, of course, also a further question. If segregation costs money, is the premium to be passed on to those who want GM free or to the others who don't?

Before leaving this discussion of risk I want to briefly consider more general questions about science, risk and society.

A few years ago there was a fashion for "public understanding of science", which has been caricatured by some social scientists such as Alan Irwin, as the deficit model. "If only we could fill the deficit in public knowledge about science, everything would be OK".

As summarised eloquently in Lord Jenkins' House of Lords report on Science and Society, we now recognise that the issue is not to simply try to teach the public more about science, but to engage in a dialogue that helps to bridge the gap between science and civil society. In their recent book Re-thinking Science, Nowotny, Scott and Gibbons refer to "socially robust knowledge" as the outcome of bridging the gap.

In many ways this is central to our role in risk. In our open debates on risk, science and uncertainty, such as our review of BSE controls, we are exploring novel ways of bridging the gap. We are not trying to seek consensus or replace beliefs with science, but rather to explore the landscape of agreement and disagreement, fact and uncertainty.

This also relates directly to the question of trust in scientists. Jonathan Porritt in his book **Playing Safe**, starts off by saying *"In a way that many scientists find baffling, they no longer command our unquestioning trust and respect."* I think there is a lot of confusion about who is and is not trusted. Most opinion polls show that people do in fact trust scientists (as long as they are seen as independent) but they don't trust government or anyone with a label such as "government scientist".

However scientists, along with all other figures of authority, now have to earn trust rather than expect it as a right. Part of the process of earning trust is bridging the gap between science and society.

Helpful changes could also be made to our science education. I think too much emphasis is placed on science as a set of ineluctable facts, as opposed to science as a way of finding out, a way of knowing. I think there should be a change of emphasis on how science is taught to place more emphasis on science as a way of acquiring understanding. When I learned Chemistry, if the answer to a titration was 53 and you got 49, you were wrong. But as I have said, much of the science we deal with in food risk is incomplete: there is no right answer, but science is the way of getting there. This way of getting there has to be presented in the wider context of people's concerns.

The new Nuffield AS course Science for Public Understanding seems to be heading in the right direction for preparing the public to deal with science, risk and society.

How we get our food

The foot and mouth crisis is not yet over, but already the post mortem has begun. Some voices are saying that our agri-food business is fundamentally wrong; that we have gone down the road of cheap food at the expense of quality, safety, public health, environmental protection and long term sustainability.

For some of the pressure groups, the FMD crisis has provided a new opportunity to put forward their established point of view. For some people, the sight of burning mountains of animals has raised questions and fears that they had not thought about, and would probably rather not remember for long.

Here are some of the questions that are being asked. Is intensive agriculture, which has brought us plentiful and cheap food in the past 50 years, sustainable for the future? Do we need better controls over farmers and the movement of animals? Are there sufficient controls to protect us from the risks associated with a global market in food? Is it right that farmers should receive such heavy subsidies? Should farmers, if they are subsidised, be paid to farm biodiversity and protect the landscape, rather than to produce food, at least some of which is surplus anyway?

Whichever party is elected tomorrow will have to ensure that these questions are discussed, perhaps through an independent policy commission. The proposed enquiry by the Royal Society, into the scientific assessment of risk in relation to animal disease and farming, will also be highly relevant. Before going any further I should avoid disappointment by admitting that I am not going to give you the answers.

Although FMD is not a food safety issue, as the FSA has made clear right from day one, the FSA does have a key role to play in the future debate about food and farming in the UK. It will bring a consumer perspective to the debate, and argue for openness and consultation, and a debate based firmly in evidence and fact, rather than in assertion and dogma.

To anticipate where I am heading, I think the debate is about tradeoffs. The Economist, in its editorial on March 3rd, said it very succinctly: *"Food cannot be cheap, local, green, safe and varied all at the same time"*.

In leading to this conclusion I want to say a bit about each of the following

- What do consumers want?
- What is the UK's comparative advantage?
- Was there an arcadian golden age?
- Are we doing enough to assess and control the risks?
- Is the green revolution system sustainable?

- **What do consumers want?**

Perhaps the best starting point for considering a future for food production in the UK is consumer demand. What do consumers actually want from food? You in the food industry will all have done a great deal of work on this, for who understands consumer needs better than those who produce and sell food? There are many different kinds of consumer, so any generalisations will inevitably be an oversimplification. Bearing this in mind, consumer surveys tend to show that the top five concerns of consumers (in rank order) when they shop for food are as follows:

- Price/value for money
- Quality/safety
- Choice
- Healthy eating
- Methods, place and standard of production

The first three are "traditional" consumer concerns and the agri-food industry has come a long way in the last 50 years to meeting them as a result of the improved efficiency of agriculture, improved transport and storage and industrial innovation. They will probably remain the primary concerns for most people.

To summarise briefly, when expressed as a proportion of disposable income, the price of food has about halved in the last 30 years (chicken to take one example, costs a quarter, in relative terms, of what it did in 1960). It is difficult to obtain good data on whether

or not food safety has increased, but anecdotal evidence suggests that it has. To take one example, reflect on the fact that in the 1930s, 2000 people a year died of bovine TB contracted from drinking raw milk. Although there are still many uncertainties about the eventual impact of BSE, as I said earlier, the big food risks today are about diet and health rather than "traditional" food safety issues such as food poisoning.

Choice has also increased. Take fruit and vegetables as an example. One major retailer tells that in 1960 they sold 60 fruit and vegetable lines; today there are over a hundred lines of fruit alone, including conventional, organic, fair trade, economy and premium ranges. I can remember in the 1970s when things such as courgettes, green peppers and avocados were a rare speciality.

The nutritional value of food is a concern for a growing number of consumers, reflecting an increasing awareness of the links between diet and the major killer diseases, as well as the explosive epidemic of obesity.

Among the problems that many consumers face in relation to healthy eating include achieving a balanced diet from convenience foods and navigating their way through the welter of advertising, and the confusing mass of claims and counterclaims about nutrition and health.

The fifth concern is a relatively new one, reflecting an increasing worry on the part of some (mainly more affluent) consumers, about the ways in which food is produced.

Consumers may come from an ethical standpoint, they may be interested in sustainability, or they may simply want to know what it is they are buying.

Examples include worries about the use of pesticides and GM technologies, about animal welfare, country of origin and the environmental impacts of food production, such as loss of habitats and biodiversity, pollution of rivers, and contributions to global warming through energy expenditure. The concerns are reflected, for example, in the rapid growth in demand for organic food, the rejection of animals fed on GM feed, and the interest in local produce sold through farmers' markets.

It seems to me to be self-evident that a successful future for agriculture and food has to be based on meeting the right combination of these demands. As the Economist leader said, there is a tradeoff, and the challenge for the future will be to determine which mix is best for the UK. The mix may well include both mainstream and niche requirements. The mainstream itself may evolve both in response to what is produced, but also in response to a more transparent accounting of the costs and subsidies of food production.

- **Comparative advantage**

This brings me neatly to the next point. If I were looking to the future as a food producer I would be trying to identify where I would have a competitive edge.

Europe is due to expand to include large agricultural economies such as Poland (if Poland joined the EU tomorrow, nearly one quarter of European farmers would be Polish, albeit with very small farms) and the market for food production is increasingly global. Furthermore, subsidies for agricultural production are likely to decline as Europe expands.

All of these changes will put further pressure on the hard-pressed UK farmer and therefore concentrating on the areas of comparative advantage will be critical.

The UK starts out with a disadvantage relative to many competitors because of its environment. With its shortage of land, short summers, unpredictable weather, poor soil, and uneven terrain, much of the UK could be viewed as a marginal country for agriculture. Even for the currently most productive regions of the South and East, water shortages are predicted to become a problem within the next fifty years, as a result of global warming.

A simple calculation illustrates Britain's climatic disadvantage. All other things being equal, plants grow twice as fast for each $10^{O}C$ rise in temperature. Or to put it another way, a farmer in the North of England has to start work each day 6 hours earlier than his or her counterpart in central France, just to make up for the climatic handicap.

So a possible future for the UK is the "New England Model". As the mid west of the United States opened up and became the breadbasket of the continent, farming in New England declined, because it was unable to compete, and much of the farmland reverted to forest or other uses.

Another future might the "Alpine Model". Alpine farmers make a living out of a difficult farming environment through a combination of producing added value products rather than staples, multiple sources of income (notably tourism) and subsidies.

- **A golden age?**

Was there some arcadian golden past which we might aspire to recapture? I think a look at the history books gives a resounding 'no'. The rural idyll of the past was not a good time for poorer people. William Cobbett in his Rural Rides wrote that *"he was ashamed to see countrymen reeling with weakness; their poor faces nothing but skin and bone"*. Choice for the poor at the turn of the 20th century was tea, bread and sugar: no wonder that 40% of recruits to the Boer War were rejected on physical grounds.

A poor family today spends 30% of its income on food (and this is often nutritionally inadequate). This is bad enough, but 150 years ago, poor families could not buy enough food even by spending 100% of their income.

Nor is it the case that food used to be all locally produced. In 1856 George Dodd wrote: *"Let the query be, whence does London obtain its butchers meat? Bacon from Ireland, hams from Germany and Spain, rabbits from Ostend. If the daily bread of the metropolis be the subject of our enquiry, we must travel yet farther to trace the sources of supply"*.

At the beginning of the second world war, 70% of our food was imported, now it is 50%. The plain fact is that 59 million people cannot be supported by domestic agriculture.

- **Assessing and controlling risks**

I don't want you to get the impression that I am an apologist for the current model of agri-food production. In fact, as I will say in a minute, I think it is in the long run unsustainable.

Risk and modern agriculture
Are there attendant risks associated with intensive agriculture and the global market, and are these adequately recognised and controlled?

Although we don't know yet (and probably never will know) it seems possible if not probable that the FMD epidemic started from illegally imported meat or meat products, combined with inadequate cooking of pigswill.

Once it started, the unprecedented ferocity of its spread was related to the network of contacts inherent in modern agriculture. Sheep are moved around and traded as commodities. Farms are large so that once one animal is infected a large number of others catch the disease. Farm businesses often operate on multiple sites with frequent transport of people, machinery and animals between them. The closure of small abattoirs may mean that animals are carried further from farm to slaughter.

All of these changes have come about in order drive down prices or increase profit margins through improved efficiency, but they have a cost – a huge cost in fact – that is paid when there is a crisis such as the recent FMD epidemic. It seems to me that one of the key questions for analysis is how the costs and benefits stack up: not easy if the costs are rare, unpredictable and large whilst the benefits accrue day by day to consumers, but nevertheless this calculation is important.

Luckily FMD was not a food safety crisis, but another disease at another time could be.

Risk and imports

What about the control of imports? This is currently high on the FSA's agenda. We think that the level of checking is partly a matter of resource allocation and partly a matter of whether or not inspection can be made more efficient.

At the moment we have no evidence that legally imported food poses any greater risk than domestic produce, but the limited data we have suggest to me that we should continue to be vigilant.

Here are three examples that paint a rather mixed picture.

A 1994 survey of *Salmonella* in chickens showed that the UK was about average in European terms. We are in the process of conducting a new survey, the results of which will be published later in the year.

The 1999 survey of pesticide residues in produce by the Pesticides Safety Directorate showed that although exceedance of the MRL (not a safety limit) is relatively uncommon, imported fruit and vegetables were three times as likely to exceed the level than was domestic produce.

The pattern varies among products. The most recent data published by the Pesticide Residue Committee on lettuce show that, following a consistent pattern over the last decade, pesticide levels are higher in UK lettuce than in imports. This is not to say that these levels represent any threat to human health.

Controlling the risks not linked to any particular production system or country of origin, it is ultimately about having the right systems in place, the generally acknowledged approach being HACCP. Our view is that HACCP principles should permeate the whole food chain, from farm to fork. Whether or not this needs to be accompanied by licensing of farmers, as argued by the RSPCA among others, as we have done for butchers, remains an open question.

Traceability is an important part of controlling the risks, because it allows product withdrawal and identification of the source of any problem. For consumers, traceability provides assurance about what they are buying. Whilst it would seem obvious that with long supply chains in a global market, the problem of traceability becomes more acute, the recent cases of unfit chicken being recycled into the human food chain shows that traceability can be a problem even within the UK. Some of the chicken involved is reported to have travelled 900 miles en route from the production plant to the manufacturer, criss-crossing the country many times.

- **Sustainability and externalities**

No one can dispute the fact that intensive agriculture and modern food production have brought cheaper, more plentiful food (on a global basis although world population has doubled since 1960, there is 25% more food per person today). But these gains have been bought at the expense of environmental degradation. We don't pay for environmental damage, although our grandchildren will, and the cost could be huge. One estimate of the global environmental goods and services provided "free of charge" is that they are greater than global GDP, amounting to about $33 trillion a year.

In the UK for example, one indicator of this is the loss of biodiversity in the agricultural landscape. Many formerly common birds such as the skylark are rapidly disappearing: ten million breeding individuals of ten common agricultural birds have vanished in the last 20 years. The government recognises this is an unacceptable trend, and has set specific targets to reverse the declines over the next two decades.

These environmental costs, combined with the fact that gains from the green revolution have now reached a plateau, is why the Director of the Rockefeller Foundation, Gordon Conway, has argued for a Doubly Green Revolution in agriculture.

What will this future be like for the UK? The tendency in recent debate has been to polarise: it's either organic or it's conventional, it's either local or it's global; it's either GM or non-GM. I don't think that we should think in terms of simple polar alternatives. Rather we should pick and mix: take the best of what each system has to offer.

If the market is to determine the best way forward, there will have to be clearer accounting and pricing, for example to reflect environmental costs, to create a level playing field.

If on the other hand the future food production in the UK is driven by policy, then the issue of improving people's health comes into the debate.

If we are to achieve the optimum mix of food that is cheap, local, green, safe and varied, and maintain UK agriculture as a competitive industry, we will have to use all the technical and intellectual resources at our disposal.

Let me end with a quote from Max Perutz's book *Is Science Necessary?* "In *Gulliver's Travels* Jonathan Swift wrote of the king of Brobdingnag that: 'he gave it for his opinion that whoever could make two ears of corn, or two blades of grass to grow upon a spot of ground where only one grew before, would deserve better of mankind and do more essential service to his country than the whole race of politicians put together'."

And Perutz goes on to write: “Yet I have seen no monuments erected to Norman Borlaug, the American who developed high-yielding wheat, nor to Douglas Bell, the Englishman who developed high-yielding barley. Their names are unknown to the great public”.

I agree with the sentiments of Max Perutz that the UK’s comparative advantage in food and agriculture, as well as securing food safety for the public, lies in our scientific knowledge and our scientific creativity.