ACM/594

ADVISORY COMMITTEE ON THE MICROBIOLOGICAL SAFETY OF FOOD

DEFRA HORIZON SCANNING INITIATIVE

1. At the 21 March meeting of the Committee, Paul Gayford undertook to provide details of the outcome of DEFRA horizon scanning.

2. DEFRA have provided the attached paper for Member's information.

Secretariat
June 2002

DEFRA HORIZON SCANNING INITIATIVE

Background

1. DEFRA is currently developing its approach to horizon scanning. The main focus of this initiative is to establish a new horizon scanning research programme, but horizon scanning also has important linkages to policy development, and the functioning of the scientific advice process, including organisations' capacity to carry out horizon scanning effectively.

2. The development of the DEFRA horizon scanning programme was announced on the 11th of January 2002, and a consultation exercise (primarily web-based) to help DEFRA to develop the programme was launched on the same day and closed at the end of March. The consultation, managed by the Science and Technology Policy Research Unit (SPRU) at Sussex University generated much interest from a wide constituency of stakeholders; the web site received 280 specific research ideas, and further proposals were generated by two workshops for a wide range of stakeholders. DEFRA staff were engaged through a series of internal lunch time seminars, internal articles and dissemination of information through a Steering Group.

3. An external Advisory Panel was appointed by SPRU and chaired by Anna Bradley, Director of the National Consumer Council. The Advisory Panel has met twice to consider the results of the consultation, and develop their own recommendations to DEFRA ministers on the content of the first horizon scanning research programmes. This report is currently being finalised, and should be posted on the site (http://www.escience.defra.gov.uk/horizonscanning) around the end of June.

4. DEFRA's response to the Advisory Panel report and the consultation exercise are currently under development, and it is not yet decided exactly how we will take forward this project, including what work will be commissioned with available funds in 2002/3. However the following paragraphs which are based on the material developed in the process so far may be of interest to the Committee.

Defining Horizon Scanning

5. One of the challenges encountered has been to define what kinds of activities, including research, qualify as horizon scanning. Whilst the general intent is understood, there is no single criterion (for example, a timescale) which can be used to distinguish horizon scanning from other kinds of research. The Advisory Panel is likely to recommend that horizon scanning is best defined through a statement setting out general characteristics of/and aspirations for horizon scanning activities – see box below.

Horizon Scanning

Horizon Scanning aims to help government departments to anticipate future risks and opportunities so as to improve the robustness of policymaking and implementation. In practice, Horizon Scanning involves the systematic examination of new scientific and other knowledge, unorthodox approaches to handling policy problems, and a more integrated assessment of policy issues. Typically, Horizon Scanning involves working beyond conventional time horizons by adopting a more strategic perspective. A number of different activities may be included in Horizon Scanning including research, scoping studies, scenarios exercises, surveillance approaches and more deliberative and consultative processes. Horizon Scanning covers both natural and social and economic scientific research and encourages multi-disciplinarity.

Horizon Scanning may explore novel and unexpected issues, as well as persistent problems or trends. It may address issues that cut across the areas of responsibility of different government departments that are not currently being addressed. Research and other activities that aim to re-frame policy issues and challenge current policy approaches are encouraged.

DEFRA is committed to broadening the range of contractors that provide it with advice.

Priority areas for horizon scanning

6. The Advisory Panel is likely to recommend that:

- resources are devoted to the development of **horizon scanning capacity** in DEFRA and in organisations which interact with it;

- a series of **five priority themes**, which serve as headings overacting the ideas generated by the consultation process, as well as the views of Advisory Panel members. Food safety issues, including those arising from interactions with new technologies, environmental and social change and unrecognised hazards, are covered.

7. A number of the specific ideas on the web site seem of potential interest to the Committee, and these are attached in the Annex. The full list (including a search facility) is accessible through the web site link. A few other ideas (including one of potential interest to the Committee) were submitted in confidence to the consultation.

Conclusions

8. The development of this initiative has been an experimental process, and we have learned a variety of lessons from it. The following conclusions are offered by way of an interim perspective.

9. The open consultation revealed that there is a considerable appetite for this type of initiative amongst stakeholders, and that it offers potential benefits for departmental research commissioning processes. However the form of the consultative process used needs careful design (for example how to engage the right range of stakeholders, including those outside the conventional research community).

10. Dealing with the outputs from such a consultative process is potentially difficult, and likely to be resource-intensive.

11. The Advisory Panel has already identified clearly the need for DEFRA, and the organisations with which we interact, to develop their capacity for this type of activity. We would agree with this conclusion; the current initiative represents the first stage of this process.

12. It is clear from the results of the consultation that many of the likely subjects for the horizon scanning research will fall at the boundaries between responsible organisations (for example FSA and DEFRA) and there is a need for us to develop a dialogue with other funders about the best mechanisms for dealing with such issues.

MICHAEL HARRISON
DEFRA Science Directorate
11 June 2002

152. Rapid detection of low numbers of pathogenic bacteria

David Cowell, University of the West of England, Bristol

Description: In the food, water industries the detection of low numbers of pathogenic bacteria quickly (less than 30min) would have significant impact on the industry – reducing holding times and the risk of infection to customers. Currently techniques take up to 3 days to isolate and identify pathogenic organisms. The cream cake has been eaten or the water has been consumed.

Importance: Potential for large scale infection of the public exist – food poisoning, terrorist attack. Reduce risk of litigation to the companies.
Time scale: The problem could arise at anytime and although HACCAP reduces probability it does not remove it. Rapid identification of pathogenic organism, even at low numbers would alert companies to with hold product from the supply chain.
Consequences of no action: Possible death of members of the public – E.coli 0157 infection in Scotland is a good example.
Benefit of further research: Applying modern electrochemical and immuno-capture techniques could reduce the
detection limit of pathogen to about 10 organism in 10 min. Multiple organism detection simultaneously is also possible.

Research questions: Rapid sampling techniques from water, carcass wash waters, meat surface sampling, rapid bacterial extraction from complex foods. Detection of aerobes and facultative aerobes has been demonstrated; strategies for anaerobic organisms require further research.
Research provider? Yes
Other actions: No

154. Animal, plant and human health implications of increasing access to farmland

Ian Crute, Institute of Arable Crops Research

Description: There are trends for more people to access or be in proximity to farmland. There are a number of reasons for this: demand for public access to farmland; use of farmland for recreational pursuits; proximity of farmland to urban development; greater road access etc. This trend creates an increased two-way contact between larger numbers of people, livestock and crops. Waste derived from people visiting farmland has implications for animal health; movement of people between farms has implications for the spread of pests and diseases of crops and livestock; farms are hazardous environments and increased contact between people and livestock, rodents, agrochemicals, machinery etc. brings with it increased risks.
Importance: There are potential risks to the health of crops and livestock associated with greater volumes of people accessing farmland; similarly, farms present health hazards to people. Altered land management practices, greater use of the countryside for recreation etc. may have implications associated with crop, animal and human health. Risks may be particularly acute if visitors have recently been exposed to exotic crop or animal diseases overseas.
Time scale: This problem is probably already with us but the scale is not known. Distribution of animal disease by human contact is well-documented. Livestock can be a source of human disease. Movement of people and vehicles is well authenticated in the spread of soil-borne crop diseases.
Consequences of no action: Possible outbreaks of diseases in crops, livestock or people that could have been foreseen
Benefit of further research: Epidemiological modelling associated with different land use and access scenarios would assist in ascertaining the scale of the potential problem. Models could be validated by empirical studies.
Research questions: What are likely to be the consequences for animal, crop and human disease severity and incidence resulting from alterations in public access to the countryside and farmland.
Research provider? No
Other actions: Options for control of litter and urban waste disposal near farmland should be examined. Options for regulation of contact between livestock, crops and people visiting

farms should be considered, as should options for restricting access to people recently returned from high risk areas overseas.

157. Promotion of food safety through improved identification of new hazards and development of risk communication

Christopher Livesey, DEFRA, Central Veterinary Laboratory

Description: Hazard identification:

Hazard identification necessarily precedes risk assessment and risk management.
The initial identification of a new hazard depends on the association of a chemical, a pathogen or an event with an adverse effect.

All chemicals (including essential nutrients) are potentially toxic if the dose received is sufficiently high. Chemical contamination of the food chain may be detected by detecting the presence of food animal poisoning but many significant chemical hazards cause no disease in exposed food animals.

Examples:
Food animal exposure to dioxins can cause no adverse effect in exposed food animals at levels of food animal exposure sufficiently high to cause unacceptable transfer of dioxins residues into human food. However, in a recent dioxin contamination incident in Belgium in 1999 recycled oils, contaminated with PCBs and Dioxins, were incorporated into animal feed with severe implications for public health. This incident was only detected because the co-contamination with PCBs caused disease in exposed poultry. Failure to investigate the cause of animal disease would have greatly increased the public health risk.
The adverse effects of chlorinated hydrocarbon pesticides, such as DDT, were identified through the investigation of disease in wildlife. Understanding of the factors causing or predisposing to bioaccumulation of chemicals in the food chain developed as a result of these wildlife investigations.
Many essential nutrients, which are unavoidable constituents of our food may accumulate in excessive (for critical groups of humans) amounts in certain foods. The amount of vitamin A in liver is has been assessed to be excessive for pregnant women. The identification of this hazard resulted from the diagnosis of a teratogenic effect in a woman eating an unusual diet containing a very high proportion of liver.

Microbiological hazards to public health may also cause no disease in exposed food animals whilst causing significant microbiological contamination of meat and animal produce.

Example:
The detection of the hazard associated with human exposure to VTEC bacteria resulted from disease diagnosis in humans.
Importance: Effective horizon scanning enables risk analyses to be carried out at the earliest possible stage in the emergence of a new disease. There may be risks to human food safety, animal health and welfare together with economic implications for the agricultural industry, including maintenance of the food supply, international trade and the rural economy.

Early recognition of hazards increases the time available for risk assessment and implementation of controls / risk reduction measures. Early recognition of new diseases and changes in the severity of recognised diseases in food animals is of immense importance to all stakeholders including officials in DEFRA/ SVS and the Food Standards Agency, the industry and consumers.

Effective Risk Communication is a crucial part of risk management since it identifies stakeholder concerns and perceptions, enables these to be addressed in risk assessment and risk management, and builds confidence and trust between stakeholders.

Effective risk communication enhances ownership of risk management by all stakeholders and optimises the acceptance of control measures, minimising the need for regulation.

Effective risk communication educates stakeholders. The presence of new hazards cannot always be predicted / foreseen. The occurrence of disease in humans may be the first indication of the presence of a new hazard. Effective horizon scanning of food animal disease will reduce but not eliminate the risk to public health.

Time scale: The emergence of new and emerging problems is unpredictable therefore continual vigilance is necessary.

Actions taken depend on the type and severity of the hazard identified.
For example, in the PCBs and Dioxins contamination in Belgium in 1999, immediate, international action was taken to investigate the severity and extent of contamination and reduce human exposure to contaminated food. In addition, the EU has since taken action to ban the recycling of oils into the food chain.

Consequences of no action: Failure to carry out surveillance and horizon scanning increases the risk that new diseases or contamination incidents remain undetected or increases the delay before diseases are identified and the risks are effectively controlled.
Benefit of further research: Improve recording of relevant disease information.
 Improve data storage and recall, facilitating data analysis.
 Improve trust and confidence of consumers in the agricultural industry and government.

Research questions: New and emerging problems are unlikely to be identified by a system that only records recognised disease categories. Horizon scanning requires the recording of pathological changes, which do not fit the diagnostic criteria for recognised diseases. What are the most relevant disease data to record to ensure that new and emerging problems can be identified?
 How much surveillance (e.g. using sentinel farms, abattoir surveys, etc) of the total food animal and wildlife populations is necessary?
 Can On farm Quality Assurance Schemes be utilised to identify contamination incidents, new disease trends and new diseases?
 Interrogation of stored data requires further development of methods of data storage and recall. How should disease data be stored to achieve this objective?
 Improved risk communication builds the confidence of stakeholders in the agricultural industry and in government and facilitates the transfer of information and advice between stakeholders. How can risk communication are improved?

Research provider? Yes
Other actions: A pilot project should be carried out using the existing disease diagnosis data recorded by The Veterinary Laboratories Agency (VLA). The objectives would be to commence horizon-scanning activities as soon as possible, assess the current data and recording systems and propose improvements.

VLA already records diagnoses made in investigations of diseases of domestic animals. These may result from submission of tissue samples to VLA laboratories or as a result of on farm investigations made by VLA staff.
The diagnostic categories include recognised diseases and disease syndromes (diseases with no known cause) but diseases are also recorded according to their pathological effect.

Our proposal is to interrogate the disease diagnosis records, and where appropriate to also interrogate the persons investigating the diseases recorded, in order to ascertain the probable cause of apparently new diseases and the reasons why there may be a change in the presentation of recognised diseases. The objectives would be to produce horizon-scanning information but also to propose improvements in the data recorded and methods of recording to facilitate and improve the quality of horizon scanning in the future.

A successful recent example of horizon scanning which used these data is the identification and investigation of the recent marked increase in copper poisoning in adult cattle in the UK. This is still under investigation by VLA on behalf of the Food Standards Agency.

159. The safety of fish and fish products: managing consumer confidence

Nicola Ridout, CEFAS

Description: Although the majority of media attention has in the past focussed on meat, poultry and dairy products, a significant proportion of food-borne illness is, in fact, related to the consumption of fish and fish products. In the United States seafood (fish, crabs, lobsters and other crustaceans) is thought to be responsible for approximately 15% of documented food poisoning cases [Environment News Service, 2001]. The EU Council Directive 91/493/EEC lays down the health conditions for the production and the placing on the market of fishery products. This directive states that microbiological criteria will be laid down when there is considered to be a need to protect public health from a particular pathogen. UK legislation for fishery products is covered in The Food Safety (Fishery Products and Live Shellfish) (Hygiene) Regulations 1998. Like the aforementioned EU directive, these regulations contain no specific criteria for potential food-borne pathogens. Unlike most other food products, there are no legal requirements for routine microbiological analysis of the final fish product before it is considered safe for human consumption. With ever-increasing public concern for food safety and the current trend for raw fish, this is alarming. Research is needed to fully investigate this issue and the possible need to update our legislation to ensure consumer safety.
Importance: A number of human pathogens have been associated with fish and fish products. Firstly, there are the bacteria naturally associated with the living fish or the aquatic environment such as Clostridium botulinum type E, the causative agent of botulism, a potentially fatal food-borne illness in humans. Other such bacteria include Listeria monocytogenes and Leptospira interrogans (responsible for listeriosis and leptospirosis, respectively). Secondly, there are the pathogens that become introduced post-harvest by inappropriate storage or non-hygienic practices during processing. Such bacteria include members of the family Enterobacteriaceae such as Salmonella spp., Shigella spp. and Escherichia coli.
Time scale: These pathogens are not ‘new’ but the risk associated with them is rising with the increasing trend for raw fish and the abundance of processed/rendered fish products on the market. Until now, fish has generally been regarded as a healthy and 'safe' food option but recent issues, such as PCBs in salmon, are bringing this sector of the food industry into the public eye. Appropriate action must be taken before public confidence is lost.
Consequences of no action: In England and Wales alone, the cost of food-borne disease is estimated at a massive £0.75 billion per annum [Humphrey, 2002]. Loss of consumer confidence in a food product is costly for the industry concerned and can be very long-lasting. A food-scare surrounding fish products would undoubtedly prove expensive for both aquaculture and the fishing industry.
Benefit of further research: Future research should aim to achieve sound scientific facts upon which modifications to the current legislation and practices can be based (if necessary). To date, very little work has been performed in this area as much of the attention has previously been focussed on shellfish.
Research questions: a. Which food-borne pathogens (bacteria and/or viruses) pose a potential threat to the consumer?
b. What are the acceptable levels for these potential pathogens in fish products intended for human consumption?
c. How 'safe' is the fish sold in the UK (including imports) with respect to these pathogens?
d. Is there a need to introduce detailed microbiological criteria for fish products intended for human consumption?

Research provider? Yes
Other actions:

161. Safety in the food chain

Dave Tinker, Silsoe Research Institute

Description: Consumers increasingly expect that their food will require minimum preparation. Concerns about food safety, particularly chemical or microbiological contamination will increase, and steps will need to be taken to overcome them in all types of produce and at all stages in the food chain.

Importance: Contamination can lead to food scares and lack of confidence in food products, with a consequent decline in demand. There are also public health implications of consuming contaminated produce.
Time scale: The problem could arise at any time and action should be taken as soon as possible.
Consequences of no action: The consequences of not taking action are food scares and potential outbreaks of disease.
Benefit of further research: Research can provide the technology for preventing or detecting potential contamination before the produce reaches the consumer.
Research questions: Research would make it possible to minimise chemical usage during growth and storage, identify transfer mechanisms of microbial pathogens and diseases, detect microbial contamination during processing, provide feedback on sources of contamination to enable preventive action to be taken in the future, and provide methods of decontamination.
Research provider? Yes
Other actions:
Has a comment been made on this idea? Yes (Please refer to a separate Annex to read comments on individual ideas)

170. Reducing the risk from natural toxicants and mycotoxins in foodstuffs

Ewen Brierley, British Potato Council

Description: Natural toxicants in foodstuffs, such as glycoalkaloids in potatoes, and mycotoxins in cereals, present a potential health risk, as well as a risk to consumer confidence.
Importance: A potential incident of poisoning due to natural toxicants or mycotoxins could lead to a dramatic loss of consumer confidence and thereby impact on the agri-food industry and rural economy as a whole.
Time scale: The problem may arise at any time, due to crop management and environmental factors, from the field to consumption. Climate change and the ongoing trend towards organic production may also lead to increased risks from glycoalkaloids and mycotoxins respectively. There is therefore an immediate need to address this issue.
Consequences of no action: The consequences of not taking action include a potential food-scare that could lead to a loss in consumer confidence and drop in demand. In the case of glycoalkaloids in potatoes this would impact significantly on both the potato industry and rural economy.
Benefit of further research: Identification and evaluation of environmental and production factors affecting natural toxicant and mycotoxin accumulation would enable risk to be minimised through the modification of production practices. In the case of potatoes, research to underpin the breeding of low glycoalkaloid potato varieties would lead to a long-term minimisation of risk.
Research questions: The impact of environmental conditions, including climate change. The influence of food production and storage practices, is there scope for improvement? Breeding for reduced risk, e.g. low glycoalkaloid potato varieties.
Research provider? No
Other actions: There is an urgent need to educate the catering industry and consumer regarding the correct handling of foodstuffs to minimise risk from natural toxicants and mycotoxins. For potatoes there is a need to reassure the consumer that correctly handled potatoes pose minimal risk.

190. Transference of pathogenic traits between microorganisms

David Shannon, David Shannon ltd

Description: The problem envisaged is that which would arise if E Coli O157 infection was to become widespread in the poultry population.
Importance: The problem arises from the hazard that E Coli o157 presents to human health. potential impact is difficult to assess. Might depend on whether it was anticipated or arose by unexpectedly
Time scale: Speculative but not unimaginable.
Consequences of no action: Need careful assessement, which I cannot provide.

Benefit of further research: Others are better placed to advise on precise lines of research and how this might help.
Research questions: See 6 above
Research provider? No
Other actions: Careful consideration may lead to actions which might make this event less likely and might mitigate its effects if it did arise.