ACM/896

ADVISORY COMMITTEE ON THE MICROBIOLOGICAL SAFETY OF FOOD

INFORMATION PAPER

Food Safety: FSA Board paper

A recent FSA Board paper on food safety, reviewing achievements and developments against the Agency's Strategic Plan targets, is attached for information.

Secretariat
March 2008

FSA 08/02/07 **13 FEBRUARY 2008**

PROGRESS REPORT: FOOD SAFETY

Executive Summary

1. This paper is the first accountability report on food safety, reviewing achievements and developments against Strategic Plan targets and setting out future challenges.

2. The Board is invited to:

   - **note and comment** on the progress to date on the Food Safety theme, the current status of strategic and corporate plan targets, future challenges and issues that will influence future work;

   - **agree** that the current Strategic Plan target of securing improvements in slaughterhouse hygiene by the end of December 2010 is no longer attainable and should therefore be changed to "**we will develop a new way of measuring slaughterhouse hygiene by the end of 2009, which will help operators to identify effective controls and inform the negotiation of more risk-based EU meat hygiene Regulations**."

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FSA 08/02/07 **13 FEBRUARY 2008**

PROGRESS REPORT: FOOD SAFETY

Issue

1. This paper is the first regular accountability report on food safety, reviewing achievements and developments against Strategic Plan targets and setting out future challenges.

Strategic Aim

2. The Agency's strategic aim is to improve public health by making food safer through reducing foodborne disease and food-related illness. Key strategic plan targets are:

   - 50% reduction in *Campylobacter* in UK chicken by 2010;
   - 50% reduction in *Salmonella* in pigs for slaughter by 2010;
   - Slaughterhouse hygiene improvements by 2010;
   - Sensitive, rapid and cost effective live test for TSEs by 2010;
   - Effective interventions to prevent incidents by 2010;
   - Safety and choice for food allergic and food intolerant consumers; and
   - Reduced risk from contaminated food.

Background

3. Where the Board has received papers on topics included within this paper, a reference to earlier papers is provided. The specific aim of this paper is to provide a strategic overview of the overall impact and progress on food safety, setting out the different aspects of our work and presenting trends in disease. It will go on to highlight developments in key policy areas; provide detail on important developments over the last period and set out the critical challenges facing the Agency in delivering its strategic plan targets. It is not a comprehensive account of all work on food safety as this would not be possible in this short report.

Overall Impact

4. Good progress has been made in quantifying risks and costs of food safety issues and key analyses have been included in the Cabinet Office Strategy Unit Food Project, published in January 2008.

5. For example, the risk matrix for foodborne disease[1] brought together estimates of the number of cases, markers of disease severity (hospitalisation and death) and the

[1] The Risk Matrix for foodborne disease was described to the Board in PRO 06/10/01

associated economic costs for all cases of foodborne disease. It is in the process of being updated using data for 2006 which has recently been received from the Health Protection Agency. This approach highlights where the key risks to public health lie and can be used to direct further investigation into possible interventions in priority areas.

6. Additionally, the Agency estimates the cost of foodborne diseases in England and Wales annually as a way of measuring the resource and welfare losses attributable to foodborne pathogens. The updated estimates given in Annex 1 show that the cost has remained below the baseline level of £1.7 billion in 2000 throughout subsequent years up until 2006, the latest year for which incidence data is available. In 2006, foodborne diseases are estimated to have cost the economy in England and Wales slightly less than £1.5 billion.

7. Farm-to-fork risk assessment modelling is a tool the agency uses to support targeted risk management of microbiological hazards within the food chain. An example of this approach is a project undertaken by Microbiological Safety Division and the Operational Research team on modelling *Salmonella* through the egg food chain which arose from initial risk assessment work that was done by an ACMSF[2] working group on *Salmonella* and eggs. The team developed a probabilistic model, based on evidence gathered through FSA funded research and surveys along with other published data and expert opinion, that estimates the likelihood of an egg being contaminated with *Salmonella* as it passes through the four main stages of the food chain - production, retail, preparation and cooking (the figure at Annex 2 shows the first two stages). This approach has proved useful both in identifying the key points in the food chain that have the greatest impact on consumers' exposure to *Salmonella*, as well as assessing the relative effectiveness of interventions aimed at reducing the risk of consumers consuming contaminated eggs. The work is expected to be presented to the ACMSF later in the year.

8. Data and resources permitting, this work could be developed further into an overall assessment of the food chain, or a 'HACCP for the whole food chain'. We are keen to do this and aim to start work on it in the new financial year. We will bring the outcome of this work back to the Board on completion.

9. Adopting a whole food chain approach will essentially involve building on this two stepped process: obtaining data to quantify the various risks in order to identify high risk areas and secondly using more detailed modelling to understand the costs and benefits of options to help tackle those risks. Other countries are using this approach. For example, we are liaising with the US who have developed a conceptual framework (see Annex 3) based on this two stage approach.

[2] Advisory Committee on the Microbiological Safety of Food

Foodborne Disease

10. Figures for 2006 for the five key foodborne pathogens monitored by the Agency[3] indicated a small increase (+1.7%) compared with 2005[4]. This is the first increase since 2000 and follows a general downward trend from 2000 to 2004. It is too early to tell whether this indicates an upward trend but there is a risk that cases of foodborne illness might start to rise again.

11. A large number of cases caused by *Campylobacter* and *Salmonella* still occur each year and their incidence in 2006 showed small increases compared with 2005.

12. Cases of *E.coli* O157 also increased in 2006 to a level comparable to that in 2000 while cases of *Clostridium perfringens* have been relatively consistent since 2000 except for unusually high levels in 2004 and 2005 caused by reporting artifacts.

13. Listeriosis, which can cause severe illness, is now twice as common as it was in 2000 and there are more cases in patients aged over 60. The cause of this increase has yet to be determined but it is being investigated through research into the epidemiology of the disease and surveys for the presence of Listeria in foods thought to be linked with the disease (e.g. smoked fish, retail cold sliced meats and pâtés). The Advisory Committee for the Microbiological Safety of Food (ACMSF) has been asked to advise on this issue and is currently considering this through its *ad hoc* sub-group on vulnerable groups. Similar increases in the incidence of listeriosis have also occurred in other EU Member States. At present, our advice to vulnerable groups, for whom the illness can be severe and life-threatening, remains unchanged.

14. Data for 2006, presented on both a numerical and population basis, are provided at Annexes 4 and 5 and details of trends for individual pathogens are described in Annex 6. Provisional figures for 2007 are expected to be available by July 2008.

15. Although current Foodborne Disease Strategy work has progressed well, we are concerned that our interventions, in partnership with industry, may not deliver the Strategic Plan targets of 50% reductions of *Campylobacter* in poultry and *Salmonella* in pigs. Further detail on the progress with these issues is provided below (*Salmonella* in pigs and Slaughterhouse Hygiene, both of which have *amber/red* status allocated to them under our Management Information System or MIS) and in a separate paper on the *Campylobacter* strategy[5] which has a *red* MIS status.

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[3] *Campylobacter, Salmonella, E.coli* O157, *Listeria monocytogenes* and *Clostridium perfringens*

[4] Progress on reducing UK foodborne disease between 2000 and 2005, was reported to the Board in October 2006 (PRO 06/10/01) and featured in the Annual Report of the Chief Scientist 2006/07.

[5] Paper FSA 08/02/08 on Campylobacter strategy is being discussed at the Open Session

16. Although public awareness of foodborne illness amongst consumers remains high, the Agency is aware of the need to maintain this level of awareness and to focus attention on vulnerable groups. We plan to work with new and existing partner organisations and major retailers to deliver Food Safety Week (9-13 June 2008) and other initiatives under a new food hygiene 'umbrella' brand.

Salmonella in Pigs

17. Our target to work with the industry to reduce the incidence of *Salmonella* in UK pigs has not, so far, produced the hoped for reduction and has an *amber/red* status in the MIS, mentioned above. We expect this to be reflected in the results of the EU baseline survey due to be released by EFSA in April 2008. This lack of progress appears to be due, at least in part, to the industry scheme, which we have been supporting, not targeting a big enough percentage of problem herds. In partnership with Defra and the industry, we are therefore refocusing our efforts.

18. In future all assured herds will be targeted and required to have a *Salmonella* action plan. The slaughterhouses will become more involved as herd *Salmonella* serology levels will be part of food chain information and carcase contamination will be used as a performance indicator. This new scheme will become the national control plan as required by the EU.

19. The Agency has also redirected some of its support away from the serological monitoring programme towards education of the farmer, through a 'back to basics' campaign, and identification of slaughterhouse practices that affect the safety of pig carcases. A point to note, however, is that the resources available for this work are a fraction of the cost of providing post-mortem inspection of every pig carcase at a time when there are EFSA opinions that such inspections do not identify lesions of public health concern.

Slaughterhouse Hygiene

20. The mismatch between the controls required for food safety and the EU Meat Hygiene Regulations was well described in the Tierney report, which the Board discussed in July 2007. The Regulations, although more risk-based than previous Directives, still contain prescriptive requirements with no basis in science and still require officials to visually inspect every carcase, when there is very little of public health significance that can be seen. In addition, by requiring the constant presence of officials tasked with enforcing compliance with the Regulations, rather than securing food safety, they inhibit slaughterhouse operators from taking responsibility for food safety.

21. Work being undertaken by the Agency on developing a new way of measuring slaughterhouse hygiene was originally aimed at providing a tool for slaughterhouse

operators to identify what they could do better to reduce contamination of meat by human pathogens. Development of the tool has taken longer than expected due to the lack of records that can be demonstrated to have any link with pathogen control and the complexity of the regulatory framework; had slaughterhouse controls only been HACCP-based, the task might have been simpler. However a prototype system will shortly be ready on which the advice of the Advisory Body for the Delivery of Official Controls can be sought, prior to piloting.

22. As the development of the measure has taken longer than originally expected, the target to deliver improvements in slaughterhouses by 2010, which is allocated an *amber/red* status, is no longer attainable. However, if as the result of the pilot the measure is shown to identify which best practices are the most important in the production of safe meat, it will not only aid operators to put effective controls in place but will inform the re-negotiation of the EU meat hygiene controls that the Board charged officials with at its July 2007 meeting[6].

23. The Board is therefore asked to agree to change the current slaughterhouse hygiene Strategic Plan target to "we will develop a new way of measuring slaughterhouse hygiene by the end of 2009, which will help operators to identify effective controls and inform the negotiation of more risk-based EU meat hygiene Regulations." New research is also planned to start in April 08 to develop a scientific approach to assess the effectiveness of inspection activities.

TSEs

24. BSE has continued to decline and is now at a very low level in those cattle that are eligible for human consumption (see Annex 7). In light of this favourable trend, and new developments in science and technology, the European Commission published in 2005 a "TSE Roadmap", which considers possible amendments to the TSE controls over the short, medium and longer term, while maintaining food safety and consumer protection as the highest priority. The Agency will therefore, over the next few years, need to continue to contribute to the review of TSE controls taking place in Europe, with the aim of maintaining effective public health protection at a level that is proportionate to the risks[7].

25. At the same time, in view of the significant uncertainties that remain about TSEs, the Agency will continue to be watchful for any new information that might affect our current assessment of the risks to human health from these diseases. The areas which

[6] Board Paper FSA07/07/06 – Review of the Delivery of Official Controls in Approved Meat Premises: Final Report

[7] Board Papers PRO07/02/01 and FSA07/07/04 – Update on BSE Testing Implementation Review Group and the Group's final report on the system of BSE testing of cattle over thirty months

currently need to be monitored include TSEs in sheep, notably atypical scrapie[8] and any evidence that BSE might be present in the UK sheep flock, and unusual BSE in cattle.

26. Ante-mortem tests are considered a key element in strategies to eradicate TSEs. The FSA continues to promote and aid the development of a sensitive, rapid and cost effective TSE test that can be used on live animals. The research into diagnostic tests was independently reviewed in July 2007 with the projects highlighted as novel and innovative. As such, the progress of research is difficult to predict and the strategic plan target current has an *amber/red* status in the MIS. Although a number of projects are starting to produce promising results, it is unlikely that the development and validation of a test for field use will occur before the FSA strategic plan target of December 2010. The independent review panel considered that there is still a need for a rapid, sensitive and easy to use ante-mortem TSE diagnostic test, particularly in light of the new and emerging TSEs (unusual BSE, atypical scrapie), but noted that the Agency should consider a cost benefit analysis of an ante-mortem diagnostic test. Such an analysis will be commissioned early in the financial year 2008/09 and will highlight options the Agency faces should the strategic target not be met.

Incidents

27. Work on incident handling and prevention is progressing well, with all strategic and corporate plan targets on *green* or *green/amber* status in the MIS.

28. Incident notifications have been increasing over the decade and in 2007 the Agency managed 1309 incidents in all (Graph 1 at Annex 8). Compared with our 2006 data, we noted a marked decrease in the number of environmental contamination and veterinary medicine incidents, but an increase in those incidents involving natural chemical contaminants (due in part to the wet summer leading to problems with mycotoxins), microbiological and on-farm incidents (Graph 2 at Annex 8) .

29. We have also noted an increase in the number of incidents classified as *High*[9] largely due to issues around traceability of products. Such incidents may also generate a raised level of public and media concern. This approach helps us to organise the best management response to a given incident, scaled appropriately.

30. Continuous improvement is a key feature of our incident response systems which include the Incident Response Protocol and Incidents Database. These have developed

[8] Previous Board papers - SEAC Sheep Sub-Group Position Statement on Atypical Scrapie, FSA 06/03/06; BSE and Sheep Contingency Policy, FSA 06/04/03; small ruminants risk management measures, FSA 06/06/03

[9] We use an internal system to classify incidents into high, medium and low. Combinations of parameters are used including both the likely severity of the incident and the complexity of the investigation. Incidents classified as “High” will usually have the potential to cause serious illness, often via product(s) that have a wide distribution and sometimes with poor traceability.

significantly over the last two years and are now mature and working well. In August 2007 we introduced an enhanced on-line reporting system which has been well received by industry stakeholders. We intend to trial its use with Local Authorities over the next few months with a view to making the form more widely available to reporting bodies.

31. We shall be publishing our 2nd Annual Report on Incidents in May 2008. The report will also include analyses of our incidents' data from 2000 to 2007. These data are being used to inform targeted action on incident prevention.

32. In March 2007 we published the Food Incidents Taskforce guidelines on preventing and responding to incidents. These guidelines aim to help our stakeholders be clear about our respective roles and responsibilities.

33. We are increasingly developing a collaborative approach with external stakeholders both during incident investigations and in "peacetime". Initiatives include training workshops, *post hoc* incident reviews and a rebalanced programme of emergency exercises developed jointly with food industry and enforcement authorities.

34. These initiatives are in line with the recommendations made in the external review of the Sudan I incident[10], which also recommended focusing our attention on horizon scanning and incident prevention.

35. Following a successful workshop early in 2007, the Agency has been working with the Food Industry, Enforcement bodies and other stakeholders to develop an incident prevention strategy and work plan which will be covered in more detail in a paper for the March Board meeting. The strategy contains three key themes: intelligence gathering and horizon scanning; building trust and partnerships; and better science, better regulation. Under these themes some of the key activities will include identifying the root cause of previous incidents; improving the flow of information between stakeholders and the Agency; and exploring a joint surveillance programme coupled with a mechanism for sharing surveillance data from stakeholders.

Food Allergies

36. Current estimates indicate that around 10 people die each year in the UK as a result of allergic reactions to food. In 2004/5 there were 829 hospital admissions in England caused by anaphylactic reactions to food with associated costs of treatment and impact on quality of life for affected individuals.

[10] Sudan 1 External Review progress report INFO/07/12/01

37. Estimates suggest that approximately 1-2% of adults in the UK have a food allergy with about 5-8% of children affected. In addition, about one person in 100 has gluten intolerance (coeliac disease).

38. The Agency has an Allergy Action Plan, which includes a wide range of activities to help consumers with food allergies and food intolerances that were summarised in a report to the Agency Board in September 2007 (INFO/07/09/01). It should be noted that the two corporate plan targets (promotion of guidance for non-prepacked food and evaluation of pilot training courses for enforcement officers) have now been delivered.

39. The Agency continues to be a significant funder of research into food allergy in the UK and also has a major role in taking forward the application of new scientific information, to help inform legislation on food allergen labelling and development of best practice guidance for industry.

40. Some of the major work being funded or part funded in this area is an investigation into:

- the development of allergy or tolerance following the early introduction of peanut into the diet of children at high risk of development of peanut allergy;

- the role of the weaning diet in the development of food allergy in children in the general population;

- a systematic review of the scientific literature on early life exposure to food allergens, particularly peanut, for subsequent consideration by the Committee on Toxicity as to whether any changes to the current Government advice in this area are necessary; and

- the possibility of developing practical management thresholds for use by industry, when making decisions about voluntary labelling (such as ‘May Contain’ or ‘Free From’) and by regulators when deciding appropriate actions to be taken (i.e. withdrawal or not) when dealing with possible allergen cross contamination incidents.

Shellfish Contaminants

41. The Agency has an extensive programme of work to replace the use of animal testing in the statutory monitoring programme for the detection of marine biotoxins in shellfish. In the last year the Agency has funded a programme to develop and evaluate a high performance liquid chromatography (HPLC) method, which has been shown to provide a sound basis for replacement of the mouse bioassay in the shellfish monitoring programme for Paralytic Shellfish Poisoning (PSP) toxins.

42. The findings of this research have allowed a staged implementation of the method in the statutory monitoring programme, first as a screen in November 2006, saving over 3,500 mice in the first year of implementation, as seen in Table 2 in Annex 9. Work continues for the use of the HPLC as a full replacement of the mouse bioassay and the implementation of the method for some shellfish species (covering over 80% of samples tested) is expected by mid 2008. This strategy has allowed quick progression to the Agency's corporate plan target of reducing reliance on animal tests, while providing at least the same level of protection for public health. The status of this target is therefore currently *green/amber* in the MIS.

43. There are a number of future challenges in this area, directly related to the statutory requirement to monitor marine biotoxins and microbial contaminants in shellfish. It is a highly resource intensive and ever changing field and perhaps industry contributions to the cost of the programmes is one challenge to be considered. Some unpredictable impact is likely from climate change as microorganisms and toxins previously undetected in UK waters are expected to become prevalent due to the changing temperatures and water circulation patterns.

44. More immediate challenges concern the increasing prevalence of norovirus, the establishment of methods for its detection and enumeration, and its significance for public health. While detection methods are well advanced, and it is reported that the European Commission is keen to set limits for norovirus in shellfish, we are still far from knowing what level would be appropriate both in terms of infectivity to consumers and current prevalence within the UK waters.

45. In the biotoxin area, legislative changes in regulatory limits are expected in the near future. The pending review from EFSA (expected to be published within the next month) and the deliberations of our own COT are expected to be discussed by the Commission and may result in lowering the current statutory limits for some toxins, providing an even greater challenge in the development of detection methods.

46. The continuing challenge not only for the PSP toxins for which we have already had significant success, but also for other toxin groups such as the Diarrhetic Shellfish Poisoning (DSP) toxins which may prove an even more taxing exercise. A fully quantitative HPLC method for the detection of PSP toxins will be introduced later this year into our monitoring programme and it is anticipated that planned FSA work, over the next 2 to 3 years, should lead towards the development of an internationally validated LC-MS method for the detection of the DSP toxins.

Resources and Risk

47. We aim to deliver the strategic plan targets within existing resources and have undertaken a critical look at all of our work, seeking to prioritise key activities over the

three years of the Comprehensive Spending Review Settlement to ensure that we fulfil our statutory obligations and continue to maintain a strong scientific research portfolio.

48. There is, however, a reactive nature to our work on food safety and an ongoing risk that two or more major incidents could occur at the same time, stretching resources and impacting on other areas of work. Contingency plans have been developed to deal with such situations and food safety incident response is afforded highest priority in the Agency's Business Continuity Plans.

49. We work closely with colleagues across the whole Agency, including SWANI offices, Communications and Legal, to deliver our strategic plan targets and key priorities. This is evidenced by a number of current cross-cutting projects, including the Foodborne Disease Strategy programme; the Food Hygiene Strategy Group which is overseeing the development of an Agency-wide food hygiene strategy, and the Feed Hygiene Regulation Project Board which continues to oversee implementation and enforcement of this key piece of EU legislation.

Sustainability

50. There are no sustainability issues that the Board need to be made aware of at this time.

Next Steps

51. The Board is invited to:

- **note** and **comment** on the progress to date on the Food Safety theme, the current status of strategic and corporate plan targets, future challenges and issues that will influence future work;

- **agree** that the current Strategic Plan target of securing improvements in slaughterhouse hygiene by the end of December 2010 is no longer attainable and should therefore be changed to "**we will develop a new way of measuring slaughterhouse hygiene by the end of 2009, which will help operators to identify effective controls and inform the negotiation of more risk-based EU meat hygiene Regulations**."

ANNEX 1

Cost Estimation of Foodborne Disease

1. The cost estimation builds on the methodology described in Annex D of the Regulatory Impact Assessment (RIA) entitled 'Consolidation of EU Food Hygiene Legislation' and available from the Agency's website at http://www.food.gov.uk/multimedia/pdfs/EURegulationsRIA.pdf.

2. The calculation is first broken down into the following three components, which together form the cost-of-illness:

   - NHS costs, which include GP, laboratory and hospital costs. Those were reported in the Report of the Study of Infectious Disease in England (IID study) and the figures are uprated using the Health Care and Health Services Pay and Price Inflation Index.

   - The direct costs to the patient, including the cost of medicine and transportation costs to the GP clinic or hospital, are also taken from the IID study. However, they are uprated using the Consumer Price Index.

   - The lost earnings of the afflicted person and his or her carers. Here, the IID figures are uprated using the Average Earning Index.

3. The cost-of-illness provides an account of the economic flows resulting from illness and premature death but underestimates the adverse effect of diseases on social welfare because it does not take into account important factors, such as pain and suffering, which affect the well-being of individuals. We therefore build a cost of pain, grief and suffering by attributing a monetary value to different health outcomes:

   - Death is valued using the value of fatality prevention of the Department for Transport.

   - Permanent incapacitation, minor illness and major illness are valued based on the figures used by HSE, as described in the RIA.

4. The two tables below present the results of the calculation. It is important to acknowledge two main caveats. First, the cost-of-illness estimates derive from data reported in the IID study, which is not up to date (most of the data was collected in 1993 and 1994). Second, it is not ideal to measure the cost of pain, grief, and suffering resulting from food poisoning by using figures that were derived to value different types of harmful events.

Table 1: Estimated economic costs of foodborne diseases in England and Wales

Year	Economic Costs (2007 Q1 Constant Prices - £ millions)			
	NHS	Lost earnings and other expenses	Pain and Suffering	Total Cost of IFD (England and Wales)
2000	36	167	1,541	1,744
2001	*	*	*	*
2002	*	*	*	*
2003	25	111	1,232	1,368
2004	30	125	1,505	1,660
2005	26	111	1,274	1,411
2006	28	125	1,332	1,484

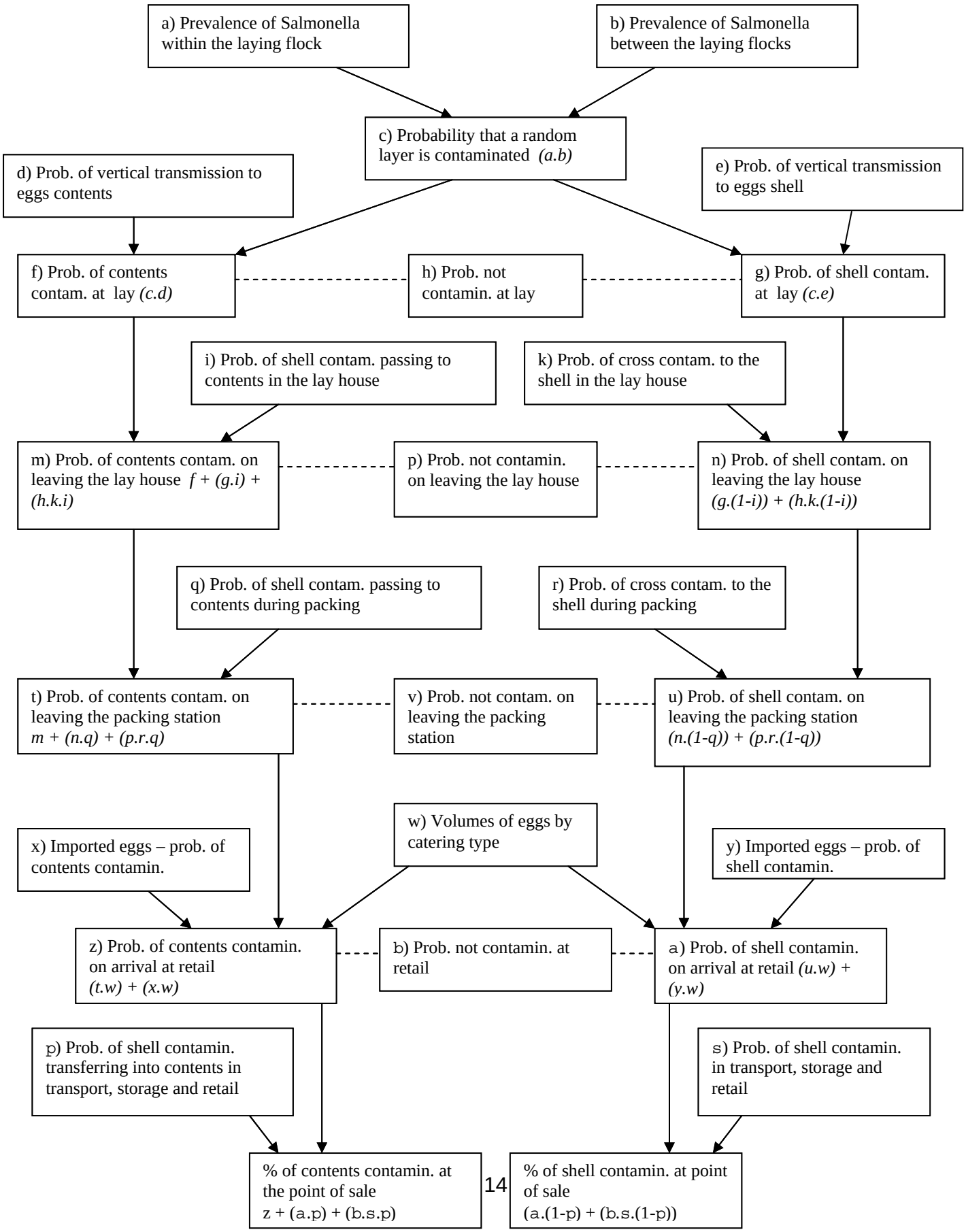
Table 2: Estimated economic savings resulting from the decline in the burden of foodborne diseases in England and Wales

Year	Savings with respect to 2000 baseline (2007 Q1 Prices - £millions)			
	NHS	Lost earnings and other expenses	Pain and Suffering	Total Cost of IFD (England and Wales)
2001	*	*	*	*
2002	*	*	*	*
2003	11	57	309	376
2004	6	42	37	85
2005	10	57	267	333
2006	8	43	209	260
Cumulative (2001-06)	34	198	822	1,055

* Estimates for the total burden of disease in 2001 and 2002 are not available. In estimating the cumulative changes from 2000-05 it has been assumed that the number of cases, hospitalisations and deaths remained at 2000 levels for these years.

ANNEX 2

Salmonella model from production up to the point of sale



ANNEX 3

The Risk Matrix: A comparison with the US

1. The Food Safety Research Consortium (FSRC)[11] in the US is working to develop a set of tools to support a risk-based approach to food safety. The FSRC envisage that these analytic and decision tools will be used to devise research, regulatory and educational interventions and make resource allocation decisions – much the same objectives as for Risk Matrix which is under development here in the FSA. The FSRC has set up a number of projects to investigate and develop tools and approaches to support these aims.

2. The most advanced of these is the development of a risk-ranking model. The model compares the relative burden on US society for 28 foodborne pathogens. As with the risk matrix, it estimates the annual number of cases, hospitalisations and fatalities caused by each pathogen, based on top-down estimates of illness. Although, the FSRC make use of active and passive surveillance data, as well as the outbreak data used in the Risk Matrix to derive estimates. The US risk-ranking model also contains a number of features that are not currently present in the Risk Matrix:

   - Estimates of the economic costs and QALY losses associated with these illnesses;

   - Considers the risk of illnesses and costs for specific pathogen-food combinations, based on a combination of outbreak data and expert judgement; and

   - Incorporates probabilistic uncertainty, using Monte Carlo simulation, to produce confidence intervals and statistics for all outputs.

3. As with the risk matrix the ranking model's utility is limited by data availability, particularly in relation to food attribution, and the statistical uncertainty of incidence data. The FSRC are looking at how they can reduce data gaps and uncertainty by validating outbreak incidence estimates with surveillance data, and exploring data sources are available to expand the model to cover chemical contamination.

4. The FSRC has also begun working on the second stage of the process, developing decision tools to prioritise the allocation of resources to reduce the risk of foodborne disease, although this strand of work is at a much earlier stage of development. In September 2005 the FSRC held a conference to consult on a draft conceptual

[11] The FSRC is a collaboration of research institutions in the US, with the common aim of improving the effectiveness of the U.S. food safety system in reducing foodborne illness.

framework. The framework highlights four analytical elements to consider in prioritising opportunities to reduce the risk of foodborne illness:

- Risk ranking – to understand the relative impact of food safety risks;

- Intervention assessment – identifying potential risk reduction interventions, and where data permits, understand their feasibility, effectiveness and cost;

- Health Benefit assessment – to understand the public health benefit of specific interventions and intervention strategies; and

- Combined assessment – integrates outputs from the above risk, intervention and benefit assessments to inform resource allocation and risk management decisions.

5. The extent that the evaluation of each of the elements is possible, and desirable, is dependent on the purpose, and scope of the priority setting decision. For instance, when prioritising resources at a high level, across the whole range of potential areas of risk, then the top-down approach to risk ranking is likely to be the preferred option. Whilst for lower level prioritisation decisions, aimed at tackling a specific risk, such as campylobacter in chickens, a bottom-up risk assessment might be preferable as this builds an understanding of where and how hazards enter the supply chain. These could then be ranked according to scope for improvement, to identify and compare potential areas in the supply chain for intervention.

ANNEX 4

UK FOODBORNE DISEASE DATA (2000 TO 2006)

Figures for 2000-2006 as number of annual cases and on a population basis (annual incidence, cases per 100,000 population)

1. CASES NOT THOUGHT TO HAVE BEEN ACQUIRED ABROAD

Number of laboratory reports	*Campylo-bacter*	*Salmonella*	*Clostridium perfringens*	*E. coli* O157	*Listeria mono-cytogenes*	All pathogens being monitored
2000	51,166	13,148	181	1,035	113	65,643
2001	50,550	14,336	161	932	156	66,135
2002	43,158	12,719	60	761	159	56,857
2003	41,281	13,271	78	777	239	55,646
2004	39,791	11,791	527	818	232	53,337
2005^	41,659	9,835	319	1,019	220	53,052#
2006^^	42,226	11,079	180	1,146	210	54,841

2. ALL CASES

Number of laboratory reports	*Campylo-bacter*	*Salmonella*	*Clostridium perfringens*	*E. coli* O157	*Listeria mono-cytogenes*	All pathogens being monitored
2000	63,370	16,989	181	1,147	113	81,800
2001	62,912	18,410	161	1,049	162	82,694
2002	53,535	15,828	60	851	160	70,434
2003	51,366	16,422	78	876	239	68,981
2004	49,471	14,713	527	927	232	65,870
2005^	51,769	12,732	319	1,161	220	66,201
2006^^	52,404	13,974	180	1,292	210	68,060

^ Provisional data, July 2006
^^ Provisional data, July 2007
# 19.2% reduction 2000-2005

ANNEX 5

UK FOODBORNE DISEASE DATA (2000 TO 2006)

UK FOODBORNE DISEASE DATA 2000 - 06, BY COUNTRY

CASES NOT THOUGHT TO HAVE BEEN ACQUIRED ABROAD

UK	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Salmonella	13,148	14,336	12,723	13,271	11,991	9,956	11,079
Campylobacter	51,166	50,550	43,158	41,281	39,788	41,882	42,226
E. coli O157	1,035	932	818	777	820	1,029	1,146
Cl.perfringens	181	161	60	78	538	551	180
Listeria mono.	113	156	160	239	232	220	210
Total	**65,643**	**66,135**	**56,919**	**55,646**	**53,369**	**53,638**	**54,841**

England & Wales	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Salmonella	11,500	12,951	11,691	12,245	10,786	9,096	10,205
Campylobacter	43,815	44,368	37,316	36,204	34,693	36,531	36,537
E. coli O157	790	693	595	595	618	838	884
Cl.perfringens	139	93	0	23	486	509	147
Listeria mono.	100	140	138	225	213	189	187
Total	**56,344**	**58,245**	**49,740**	**49,292**	**46,796**	**47,163**	**47,960**

Scotland	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Salmonella	1,337	1,176	873	913	829	743	735
Campylobacter	6,359	5,302	5,026	4,381	4,286	4,505	4,811
E. coli O157	196	200	196	132	185	143	218
Cl.perfringens	32	56	40	35	41	21	4
Listeria mono.	9	12	20	11	15	28	17
Total	**7,933**	**6,746**	**6,155**	**5,472**	**5,356**	**5,440**	**5,785**

N. Ireland	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Salmonella	311	209	159	113	376	117	139
Campylobacter	992	880	816	696	809	846	878
E. coli O157	49	39	27	50	17	48	44
Cl.perfringens	10	12	20	20	11	21	29
Listeria mono.	4	4	2	3	4	3	6
Total	**1,366**	**1,144**	**1,024**	**882**	**1,217**	**1,035**	**1,096**

ANNEX 6

UK FOODBORNE DISEASE DATA (2000 TO 2006)

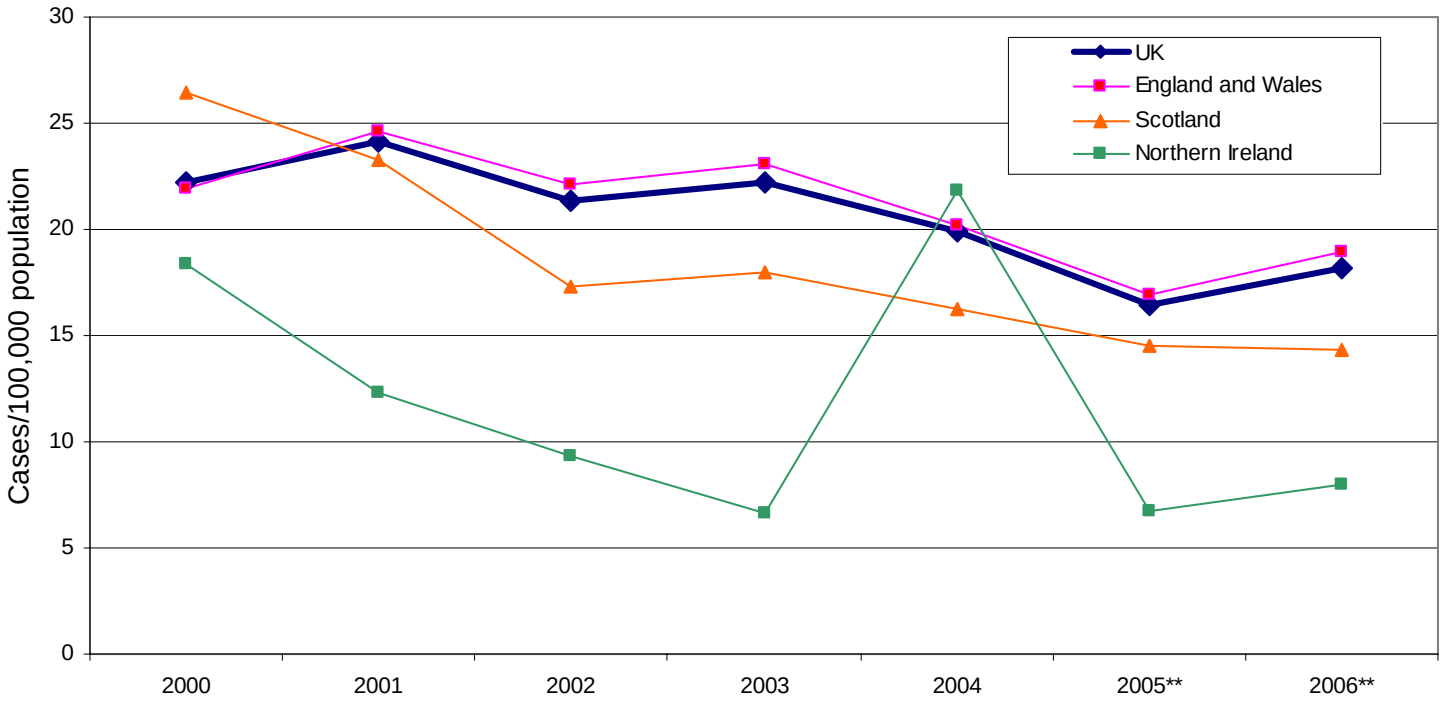
1. The following tables and graphs on the present data for the Agency's key foodborne pathogens on a population basis, i.e. their annual incidence as cases per 100,000 population. This allows easier comparison of trends between countries.

All Pathogens	2000	2001	2002	2003	2004	2005**	2006**	change 05-06
UK	111.0	111.5	95.6	93.0	88.6	88.6	90.2	1.7%
England and Wales	107.6	110.8	94.2	92.9	87.6	87.9	88.9	1.2%
Scotland	156.7	133.5	121.7	107.8	105.1	106.2	112.4	5.8%
Northern Ireland	80.9	67.4	60.1	51.6	70.6	59.7	62.9	5.4%

UK Incidence rates for key FSA foodborne pathogens 2000-06

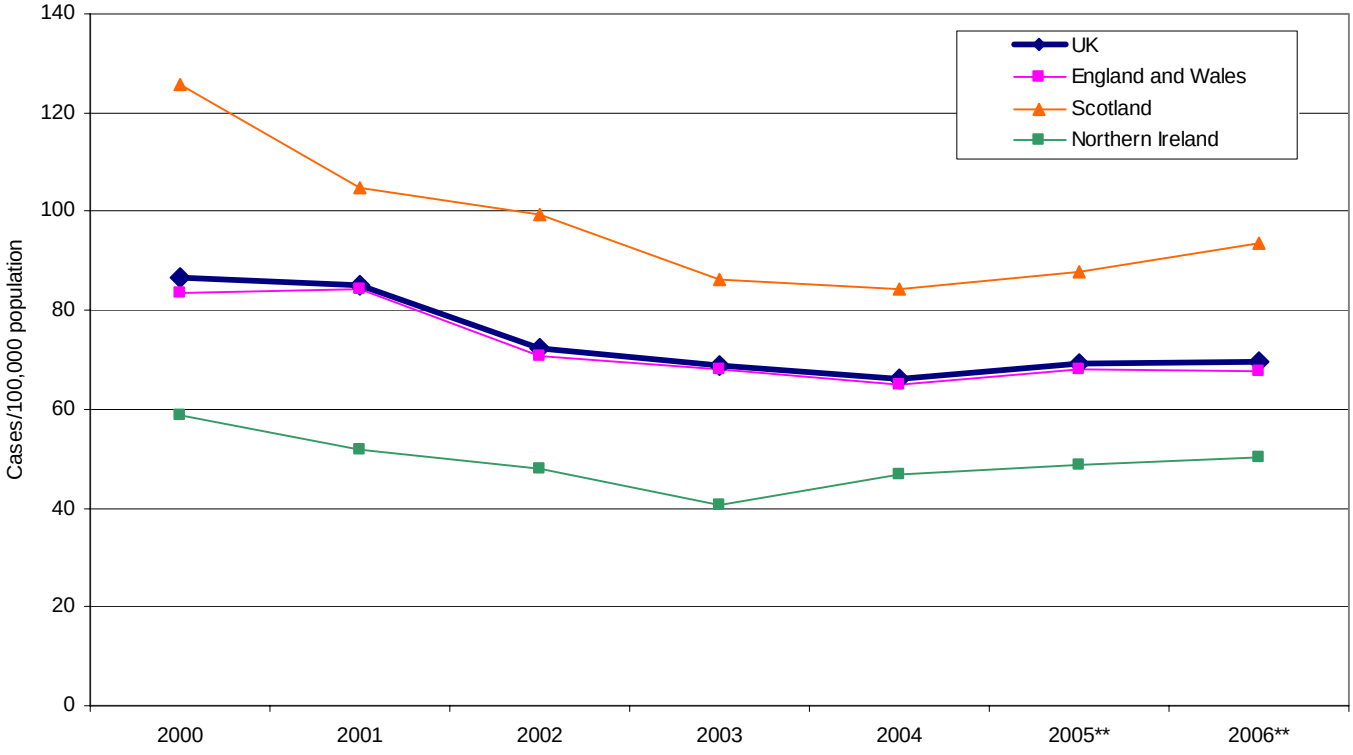
Salmonella	2000	2001	2002	2003	2004	2005**	2006**	change 05-06
UK	22.2	24.2	21.4	22.2	19.9	16.5	18.2	10.7%
England and Wales	22.0	24.6	22.1	23.1	20.2	17.0	18.9	11.6%
Scotland	26.4	23.3	17.3	18.0	16.3	14.5	14.3	-1.6%
Northern Ireland	18.4	12.3	9.3	6.6	21.8	6.8	8.0	18.2%

UK Incidence rates for *Salmonella*, 2000-06

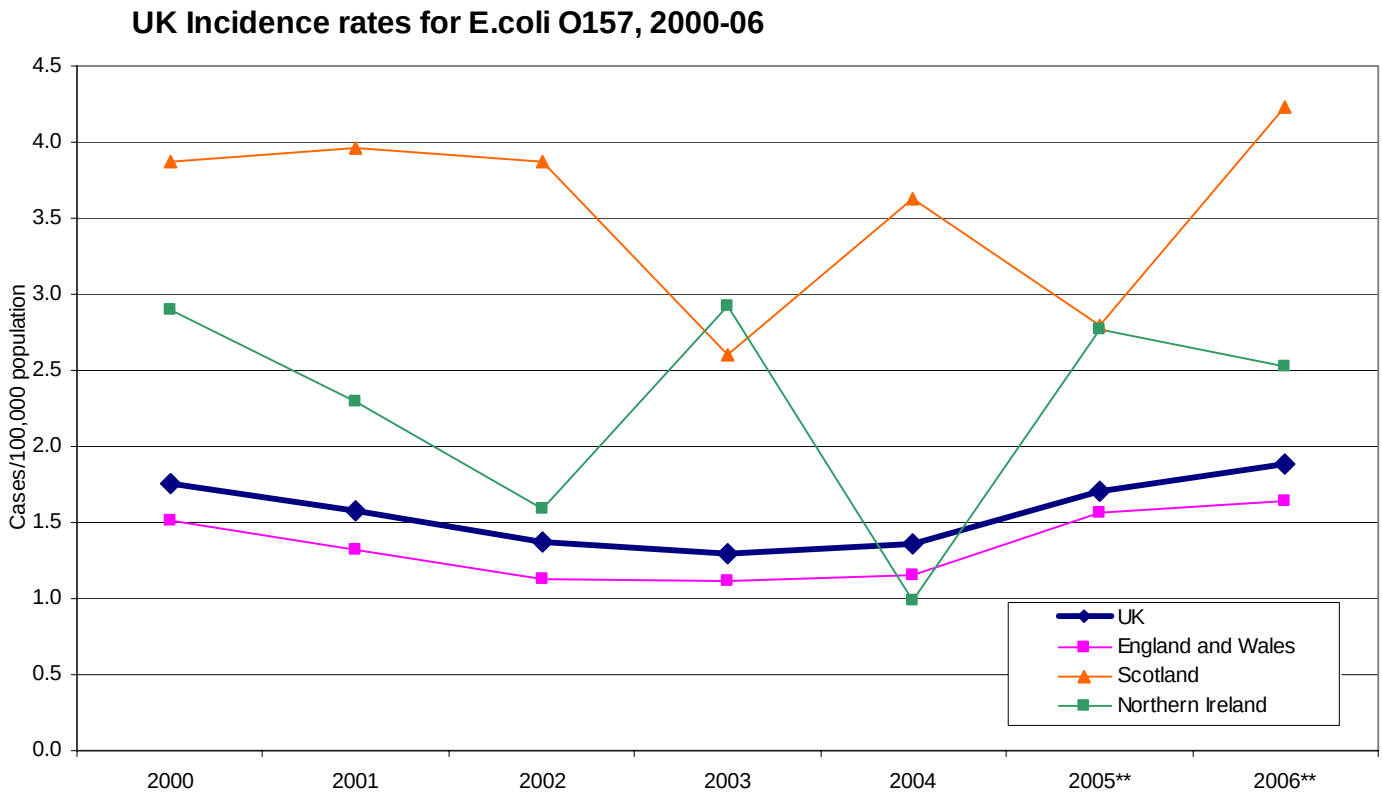


Campylobacter	2000	2001	2002	2003	2004	2005**	2006**	change 05-06
UK	86.6	85.2	72.5	69.0	66.1	69.2	69.4	0.3%
England and Wales	83.7	84.4	70.7	68.3	65.0	68.1	67.8	-0.5%
Scotland	125.6	104.9	99.4	86.3	84.1	88.0	93.5	6.3%
Northern Ireland	58.7	51.9	47.9	40.7	46.9	48.8	50.4	3.3%

UK Incidence rates for *Campylobacter*, 2000-06

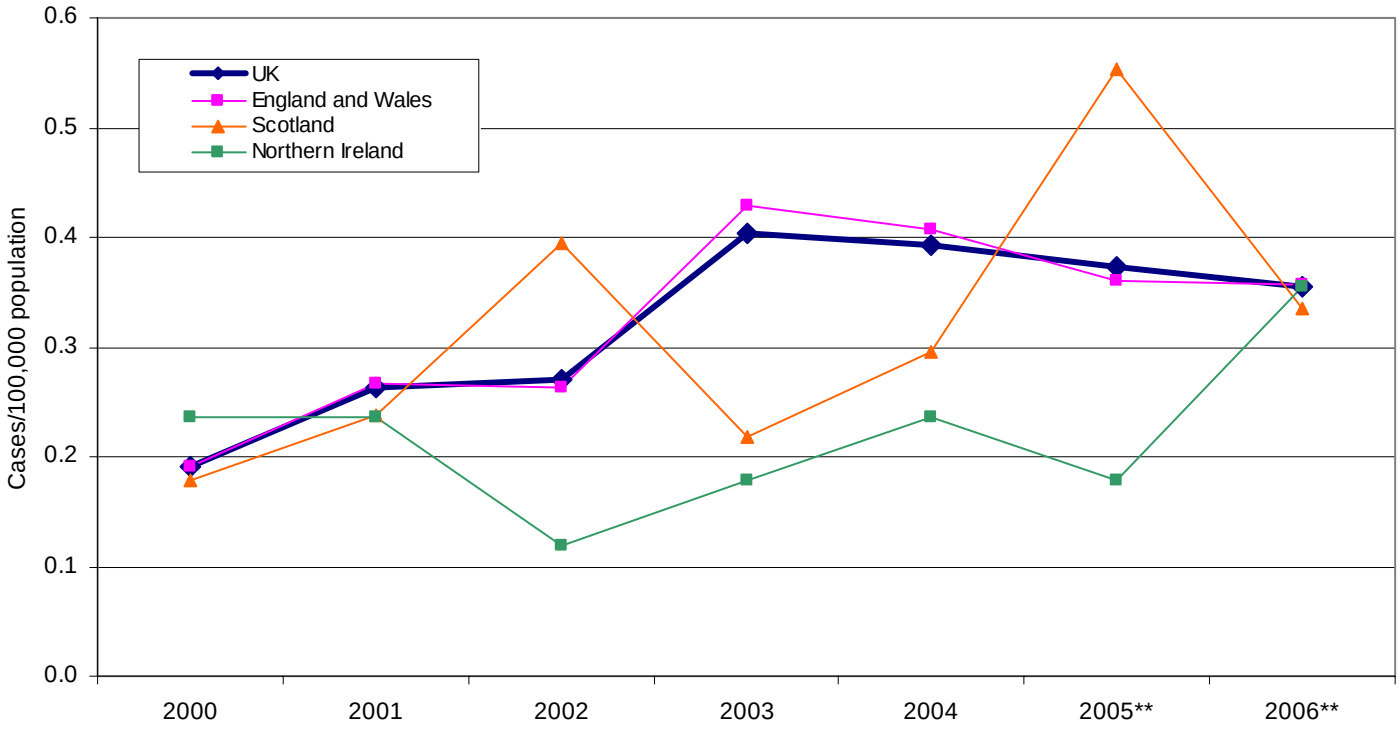


E. coli O157	2000	2001	2002	2003	2004	2005**	2006**	change 05-06
UK	1.75	1.57	1.37	1.30	1.36	1.70	1.88	10.8%
England and Wales	1.51	1.32	1.13	1.12	1.16	1.56	1.64	5.0%
Scotland	3.87	3.96	3.88	2.60	3.63	2.79	4.24	51.7%
Northern Ireland	2.90	2.30	1.59	2.92	0.99	2.77	2.53	-8.8%



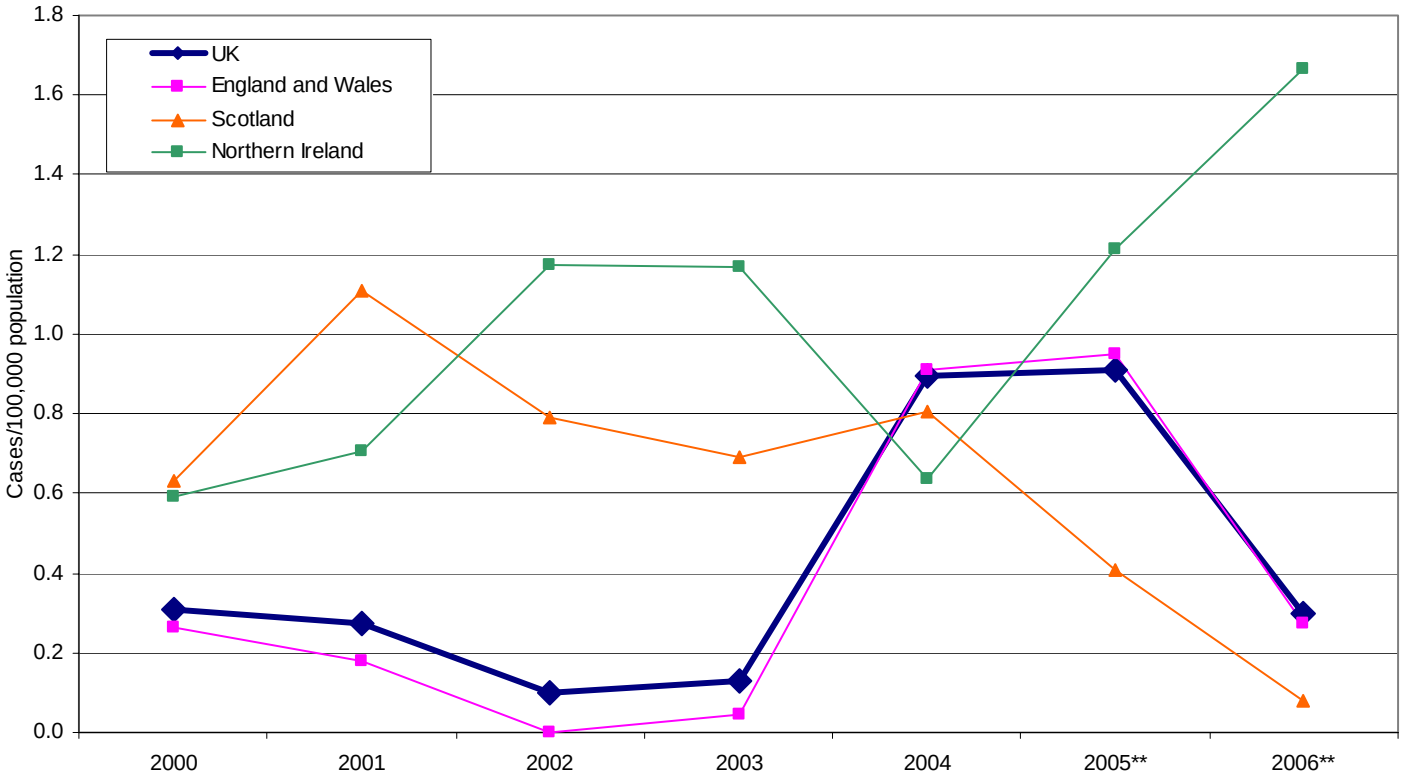
Listeria monocytogenes	**2000**	**2001**	**2002**	**2003**	**2004**	**2005****	**2006****	**change 05-06**
UK	0.19	0.26	0.27	0.40	0.39	0.37	0.36	-4.5%
England and Wales	0.19	0.27	0.26	0.43	0.41	0.36	0.36	-1.1%
Scotland	0.18	0.24	0.39	0.22	0.30	0.55	0.34	-39.3%
Northern Ireland	0.24	0.24	0.12	0.18	0.24	0.18	0.36	100.0%

UK Incidence rates for *L. monocytogenes* , 2000-06



Clostridium perfringens	**2000**	**2001**	**2002**	**2003**	**2004**	**2005****	**2006****	**change 05-06**
UK	0.31	0.27	0.10	0.13	0.89	0.91	0.30	-67.5%
England and Wales	0.27	0.18	0.00	0.04	0.91	0.95	0.27	-71.3%
Scotland	0.63	1.11	0.79	0.69	0.80	0.41	0.08	-81.0%
Northern Ireland	0.59	0.71	1.17	1.17	0.64	1.21	1.67	37.4%

UK Incidence rates for *Cl. perfringens* , 2000-06



TRENDS FOR KEY FOODBORNE PATHOGENS, 2006

Salmonella

2. The UK incidence of *Salmonella* increased in 2006 by 10.7% compared to 2005. UK incidence, which was stable from 2000-2003, declined between 2003 and 2005 since when it has again remained level.

3. There was an increase in 2006 in all UK countries except Scotland, where there was a small decrease. Incidence in Northern Ireland is considerably lower than in other UK countries and apart from an atypically high incidence in 2004, due to a number of large outbreaks, the trend in this country has been downward.

Campylobacter

4. Incidence of Campylobacter in the UK has been stable with the exception of a marked decrease in 2002, since when incidence has remained largely unchanged. There was negligible change between 2005 and 2006 following a small increase of 4.7% between 2004 and 2005.

5. Incidence in Scotland has remained consistently higher than other UK countries since 2000, though it has shown a similar trend to the UK, with increases of 4.5% and 6% since 2004. Incidence in Northern Ireland has been consistently lower than other UK countries, though it has shown increases in incidence each year since 2003.

E. coli O157

6. The incidence of *E.coli* O157 across the UK increased by 10.8% in 2006 compared with 2005. Although incidence fell in each year from 2000-2003, incidence has risen in each year since 2003 and is now slightly higher than it was in 2000.

7. Because of the low number of annual cases, incidence in Northern Ireland and Scotland shown considerable year-to-year variation (increases and decreases) due at least in part to the occurrence of large outbreaks.

Listeria monocytogenes

8. Incidence of *L.monocytogenes* in the UK increased sharply in 2001 and again in 2003. Although there have been small decreases in each of the past 3 years

incidence remains considerably higher than in 2000. Incidence in 2006 was 4.5% lower than in 2005.

9. Due to the small number of cases in Scotland and Northern Ireland each year, caution should be applied in identifying trends. Although incidence shows considerable year-to-year variation, both countries appear to be following a general upward trend in incidence.

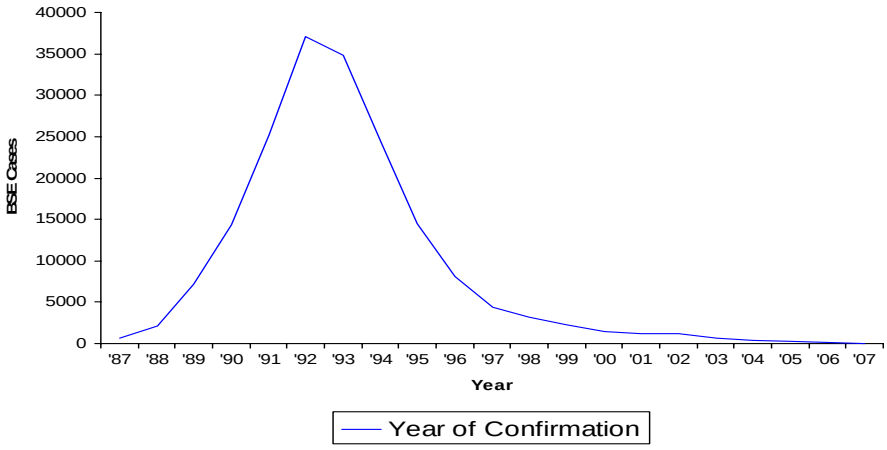
Clostridium perfringens

10. Incidence of Clostridium *perfringens* in the UK has been at a relatively consistent level since 2000 with the exception of 2004 and 2005 when incidence was considerably higher.

11. The annual number of cases is low and results mainly from outbreaks and so small increases in numbers (e.g. from more outbreaks or increased screening) can affect incidence disproportionately and may not reflect a real change in incidence.

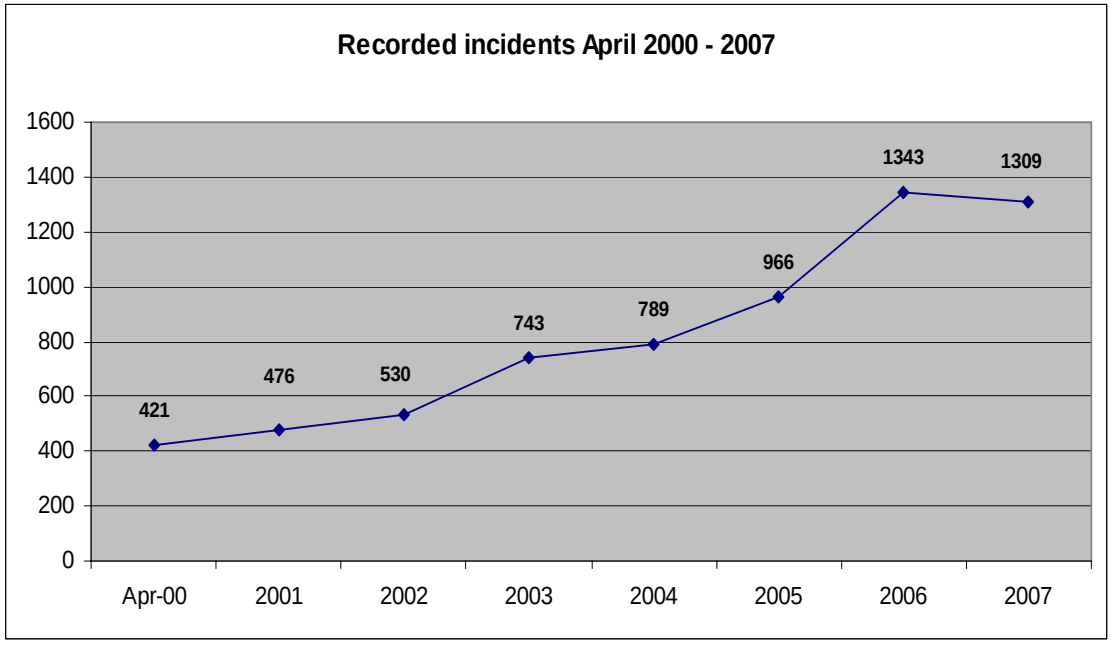
ANNEX 7

BSE Cases in United Kingdom

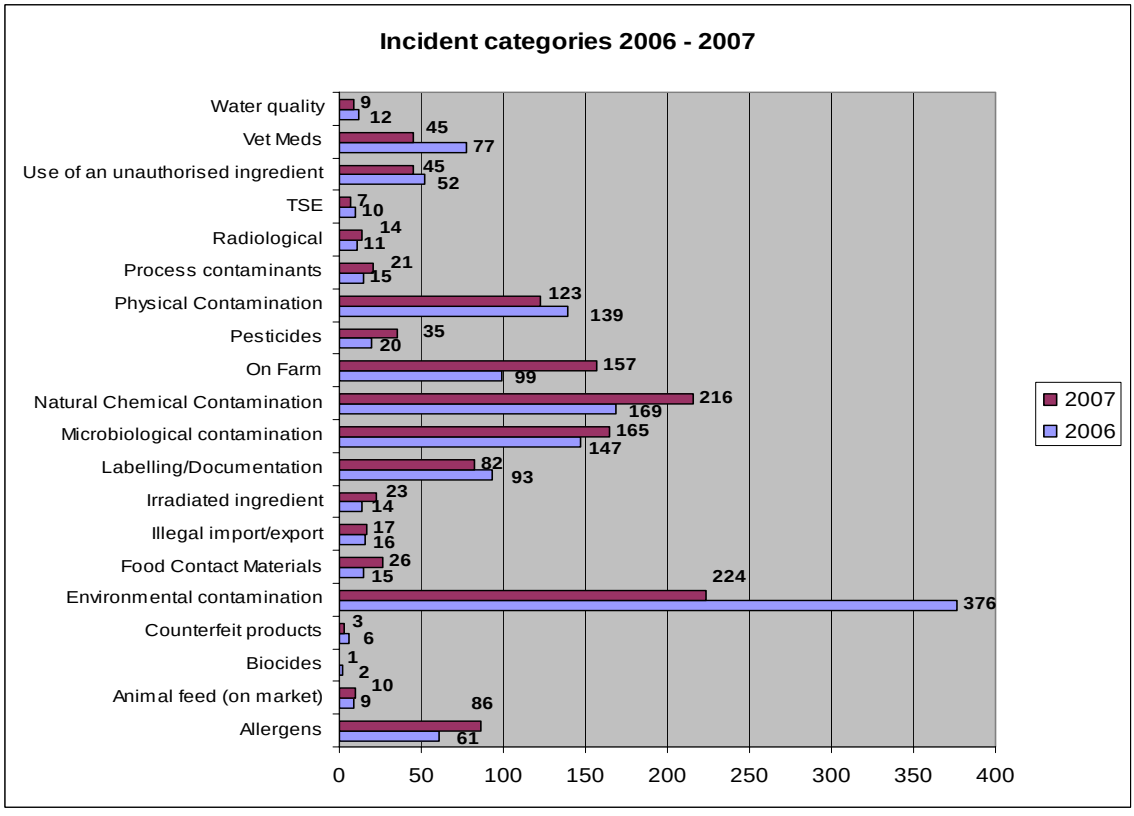


ANNEX 8

Graph 1



Graph 2



ANNEX 9

Table: Mouse savings achieved since the implementation of the HPLC screen in the statutory monitoring programme for paralytic shellfish poisoning (PSP) toxins (E & W & Scotland)

29/10/07- 28/05/07			
	No. of samples	% of samples	No. of mice
Screened by HPLC	1420		2840*
Negative by HPLC – Not tested by MBA	1037	73	768 (saved 2074 mice)
Further refinements 29/05/2007- 31/08/07			
Screened by HPLC	1035		2070*
Negative by HPLC – Not tested by MBA	828	80	414 (saved 1656 mice)
TOTAL 29/10/07- 31/08/07			
Total tested for PSP	**2569**	**100**	**5138***
TOTAL Negative by HPLC – Not tested by MBA	**1865**	**76**	**1402 (saved 3730 mice)** [g]

***** Number of mice used if screen was not implemented

[g] Northern Ireland has implemented a HPLC screen since December 2006 and has a reported mouse savings in the order of 612 mice (numbers from 1/12/06 to 31/08/07)