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FOOD POISONING

Cases of food poisoning in the UK increased significantly through the 1980s and 1990s. This trend has started to reverse in recent years but food poisoning remains a public health concern, with an estimated one in five people affected by infectious intestinal disease each year. The Government has set a target to reduce foodborne disease by 20% between 2001 and 2006. This briefing describes the trends in foodborne disease in the UK and examines options for meeting the Government target.

Background

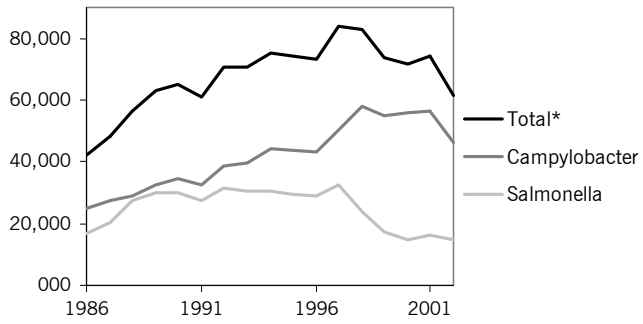
Food poisoning is any disease of an infectious or toxic nature caused by the consumption of food or water. The most common symptoms are diarrhoea, vomiting and abdominal pain. Such symptoms are common to most infectious intestinal disease (IID) and, while people will usually attribute their symptoms to recently consumed food, the micro-organisms that cause IID are also transmitted through other routes such as person-to-person contact and contact with animals. Of the estimated 10.5million cases of IID in England and Wales in 1995, it is thought that only 2.4million can be attributed directly to the consumption of food. It has been estimated that, at 1993-95 prices, IID in England costs some £750million/year.[1]

The Food Standards Agency (FSA) has set a target to reduce cases of food poisoning by 20% between 2001 and 2006. It has chosen to focus on the five major micro-organisms that cause food poisoning: Salmonella, Campylobacter and Clostridium perfringens, which are responsible for the greatest number of cases; and E.coli O157 and Listeria, which cause severe disease albeit in much smaller numbers. This briefing focuses on these five micro-organisms.

Levels of food poisoning

The Public Health Laboratory Service (PHLS) maintains a database of food poisoning cases across England and Wales. Campylobacter is responsible for most cases of food poisoning (see figure above) as well as the vast majority of GP visits and hospital referrals. Salmonella causes the greatest number of deaths (119 deaths in 2000).

Reported cases of food poisoning in England and Wales



*Source: PHLS. Figures for 2002 are provisional. * In 2001, 136 cases of Listeria were reported, 803 of E. coli O157 and 245 of Clostridium perfringens.*

However, most cases of food poisoning are not reported to the PHLS. For a case to be registered on the database an infected individual must consult their GP, the GP must arrange for a specimen (usually of faeces) to be tested in a microbiology laboratory, the laboratory needs to identify a micro-organism and then report the result to the PHLS. It has been estimated that on average only 1 in 136 cases of IID is reported to the PHLS.[1] This ratio varies between diseases: nearly all cases of E.coli O157, which causes very severe disease, are reported compared with 1 in 343 cases of Clostridium perfringens, which is difficult to detect in laboratory samples. In spite of this variation, laboratory reports are considered to be the most reliable indicator of food poisoning trends in this country and, compared with arrangements in other countries, are notable for their national coverage. The FSA is therefore using the laboratory reports to monitor progress in reducing the incidence of food poisoning.

Why did food poisoning increase?

The increase in food poisoning through the 1980s and 1990s also occurred in other European countries and the United States. This could be partly accounted for by greater reporting of food poisoning, linked to increased public awareness as well as advances in laboratory techniques enabling the micro-organisms to be identified more easily. However, it is widely agreed that there has been a genuine increase in food poisoning. It is likely that a combination of the factors below is responsible:

- **Changing social patterns**. The moves towards shopping less frequently and thus storing food for longer; the increasing use of pre-prepared dishes, which are not always stored or reheated appropriately; the trend towards eating out more often; and the increase in international travel.
- **Emergence of new diseases**. The first cases of E.coli O157 in England and Wales were reported in 1982.
- **Increasingly globalised food market**. The variation in standards of food safety between countries could allow micro-organisms to spread quickly across the globe.

Preventing food poisoning

Food can become contaminated with the micro-organisms that cause food poisoning at any stage of the 'farm to fork' food chain. While most micro-organisms can be destroyed by thorough cooking, it is generally accepted that consumers should not bear the burden of preventing food poisoning. The earlier in the food chain that the issue can be addressed, the lower the chance of contamination spreading more widely.

It is widely accepted that the most effective mechanism for minimising microbiological safety risks in food production is the Hazard Analysis Critical Control Point (HACCP) system. This aims to prevent contamination by identifying and controlling food safety hazards at every stage in a process. Butchers have had to implement HACCP since 2000 when a new requirement for them to be licensed was introduced in response to E.coli O157 outbreaks. Slaughterhouses have had to implement HACCP since 2002. This would be extended to all food businesses under draft EU legislation. Farmers would then be the only stage in the food chain not operating under HACCP: the European Commission (EC) has decided that Codes of Practice offered a more flexible and practical approach.

Farms

Salmonella and Campylobacter infection can be tackled at the farm level but consistent success has so far only been achieved with Salmonella. Chickens are the primary carriers of these micro-organisms, but pigs have also been highlighted as potential sources of infection.

Animals can be infected through contaminated feed, living areas and other infected animals (horizontal transmission). This can be minimised through a range of measures collectively known as 'biosecurity'. These include using non-contaminated food and water supplies and controlling disease carriers such as rodents. They are most effective where animals are kept indoors in controlled environments. The Department for Environment, Food and Rural Affairs (Defra) has published voluntary Codes of Practice for feed producers and farms on controlling Salmonella. Effective methods for controlling Campylobacter, which is ubiquitous in the environment, have not been defined, although it seems that a higher level of biosecurity can be effective.

In chickens, Salmonella can also be transmitted vertically (parent to offspring) through eggs. The presence of Salmonella in eggs gained a high public profile in 1988, resulting in government and industry action to control infection. As a result, cases of food poisoning due to Salmonella have now fallen back to the levels of the early 1980s (see box above and figure on page 1).

Slaughterhouses and cutting plants

Foodborne micro-organisms reside in the guts of animals and are rarely found in meat. They can, however, be transferred to the surface of meat during slaughter – from faeces on the coats of dirty animals, from spilt guts or from contaminated hands or equipment. Micro-organisms from one infected animal could therefore contaminate many other carcasses. It is not possible to identify contaminated carcasses by eye, so slaughterhouses are expected to implement systems that reduce the risk of contamination occurring. For example, in response to outbreaks of E.coli O157, a Clean Livestock Policy was introduced in 1997, which requires any animals that do not meet the required standard of cleanliness to be rejected for slaughter.

Food manufacturers and caterers

Since 1995, all businesses that produce or handle food have had to carry out hazard analysis and to act to reduce the risks of food contamination. However, it is thought that around half of food poisoning cases can be attributed to food consumed outside the home. The FSA has identified the implementation of basic food hygiene (see box on page 3) by caterers as a priority in their campaign to reduce food poisoning.

Controlling Salmonella in eggs

An increase in Salmonella related food poisoning in the 1980s was associated with chickens and eggs. Counter measures introduced in 1989 included the slaughter of any flock that tested positive for the two most common strains of Salmonella - enteritidis and tymphimurium. Since 1993, only infected breeding flocks have been slaughtered. This prevents vertical transmission and to control subsequent infection in production flocks by horizontal transmission, the Government published voluntary Codes of Practice outlining good practice in biosecurity. These Codes have been adopted by industry through farm assurance schemes such as the Lion Quality mark for eggs, launched in 1998.

In addition, all Lion Quality eggs come from flocks that have been vaccinated against Salmonella enteritidis. The use of the vaccine has been credited by some as the driver behind the reduction in Salmonella enteriditis infection. However, it alone cannot guarantee that eggs are not infected – in 2002 a Salmonella outbreak was traced to Lion branded eggs. Lion Quality eggs currently account for 75% of the UK retail egg market. Uptake has been slower in the catering sector.

Food hygiene

Cooking. Foodborne bacteria are usually found on the surface of food and are destroyed by cooking. The main exception is Clostridium perfringens, whose spores survive high temperatures. Thorough cooking is particularly important for minced meat, as bacteria can be mixed throughout the meat.

Storage. Most foodborne bacteria can grow in food at temperatures between 10-50°C (fridges should be kept at ~4°C). Food poisoning is caused only if a person is infected by more than a certain number of bacteria – ranging from tens of bacteria for E.coli O157 to over 1million for Clostridium perfringens. Food lightly contaminated with Clostridium perfringens could, if not chilled appropriately, become toxic overnight.

Cross contamination. Bacteria can spread to 'clean' food from contaminated food via direct contact, or via surfaces and equipment. It is a particular problem with foods such as salads, which are not to be cooked before consumption.

Cleaning and hand washing. Removing harmful micro-organisms from surfaces, equipment and hands stops them from spreading. A survey of catering staff carried out by the FSA in 2002 found that over a third did not wash their hands after visiting the lavatory while at work.

Animal surveillance data

The Veterinary Laboratories Agency (VLA), a Defra agency, collects and collates data from several sources.

- Government veterinary laboratories collate and analyse test results. Whether farmers or vets request tests in the first place is influenced by many factors including the level of awareness of a disease and its perceived importance, the value of the animal(s) affected and the general economic climate. A question therefore arises over the quality and consistency of the data.
- Defra commissions targeted surveillance, which gives a snapshot of the situation. For example, cattle, sheep and pigs at slaughterhouses were tested for Campylobacter and Salmonella over a 12 month period in 1999/2000. A similar survey is planned for 2003.
- Statutory surveillance collects continuous data for poultry breeding flocks, which are tested at regular defined intervals for Salmonella. The cost of this testing regime is borne by the farmers.

Data from other sources that is not reported to the VLA includes that collected by industry (for example as part of an initiative by the British Pig Executive to reduce the incidence of Salmonella in pigs) and by private vets.

In the home

The principles of food hygiene (see box above) also apply in the home. Little is known about how people store and prepare food but the FSA and others run campaigns to promote good practice. The FSA also advises on specific issues. For example, Listeria occurs naturally in the environment and thrives in foods such as some soft cheeses. Those vulnerable to infection, such as pregnant women, are advised not to eat these foods.

Issues

Monitoring levels of food poisoning

Monitoring the presence of food poisoning micro-organisms in animals and the occurrence of disease in humans should allow early detection of problems and enable control measures to be put in place.

Monitoring micro-organisms in animals

Most micro-organisms that cause food poisoning in humans have little, or no, effect on animals. Unless animals are proactively tested for these micro-organisms, they are likely to go undetected. Defra is responsible for veterinary surveillance and is currently consulting on a strategy for enhancing its work in this area.[2] The current system (see box above right) does meet international requirements and Defra considers the reporting of Salmonella, which is required by legislation, to be comprehensive. Nevertheless, Defra believes that an overarching strategy for surveillance is needed to allow priorities to be identified transparently, data from different sources to be integrated and better use made of the available data.

Monitoring food poisoning in humans

The FSA has policy responsibility for food safety. Its work is informed by the food poisoning monitoring that is currently carried out by the PHLS, which is funded by the Department of Health (DH). The PHLS collates data from local PHLS and NHS managed microbiology laboratories.

From April 2003, the main functions of PHLS will be taken over by a Health Protection Agency (HPA), which is being established as part of a DH strategy on infectious disease.[3] The management of most PHLS microbiology laboratories will be transferred to local NHS Trusts. HPA will retain some specialist laboratories and commission services and set standards for reporting from others.

PHLS has two main concerns about the transfer of responsibility for monitoring to HPA and the transfer of PHLS laboratories to NHS management:

- Priority. There are concerns that foodborne disease will be given a low priority by the HPA in commissioning services from laboratories. Further, that in responding to the needs of their NHS Trusts, laboratories may place low priority on supporting national data collection. However, the FSA believes that standards can be maintained by the use of service level agreements between themselves and the newly formed HPA (similar to the agreements currently in place between the FSA and the PHLS).
- Timing. The PHLS accepts that, in the longer term, there may be advantages in having all microbiology laboratories working to standards set and enforced by the HPA. However, it is concerned that the service level agreements, and the supporting inspection arrangements, may not be in place by April 2003, when the HPA takes over from PHLS.

Coordination across the EU

The European Food Safety Authority (EFSA) was created in 2002. It is independent of the EC. Its core tasks include establishing a network with similar bodies in Member States and providing independent scientific advice to the EC on food safety across the food chain. A priority will be to improve EU-wide monitoring and surveillance by integrating collection of data from different sources and making more use of the information. While EFSA will be responsible for identifying and assessing risks, the EC will retain

responsibility for developing policy and legislation to manage them. Some have questioned how this division of responsibility for risk assessment and management will work in practice.

Enforcement of EU food legislation is the responsibility of the EC's Food and Veterinary Office (FVO) which carried out some 200 inspections in 2002. These included inspections in non-EU countries, which must receive prior approval before exporting to the EU. Significant FVO resources are currently devoted to work with accession countries, with the aim that they should be compliant with food safety laws before EU enlargement. UK imports from non-EU countries are subject to border inspections and, in response to public concern, the FSA has agreed an action plan to improve current controls.

Most UK food laws are derived from EU legislation. Imports from EU countries are not subject to border controls on the assumption that this legislation is enforced equally across the EU. This is not always the case – a 2002 FVO inspection focussing on eggs in the UK highlighted several instances where requirements were not being met. On the other hand, the UK egg industry has promoted the use of a Salmonella vaccine, which goes beyond legal requirements, and claims that UK eggs are safer than those from other EU countries. This issue was highlighted in 2002, when several Salmonella outbreaks in the UK were linked to Spanish eggs. Draft EU legislation proposes setting targets for reducing Salmonella in eggs across the EU and restricting the sale of eggs from Salmonella infected flocks.

Developments in the UK

Meat Hygiene Service

The Meat Hygiene Service (MHS), an executive agency of the FSA, is responsible for the enforcement of statutory requirements in slaughterhouses in Britain. This includes hygiene and welfare standards as well as inspecting meat after slaughter. The MHS has a permanent presence in all slaughterhouses. However, the FSA points out that visual meat inspection cannot detect micro-organisms and that it is important that operators take responsibility for maintaining good hygiene standards – this should result from the new requirement to implement HACCP.

Following on from the introduction of HACCP, draft EU legislation proposes shifting the role of the MHS towards that of auditors rather than permanent supervisors. It would also allow some slaughterhouses to carry out their own meat inspection if they have, among other criteria, successfully operated HACCP for at least 12 months and received approval from the FSA. The FSA supports these developments, as long as it retains enforcement powers. Others have expressed concern that the move towards self-inspection could lead to lower hygiene standards.

Local Authorities

Local Authorities (LAs) are responsible for enforcement of food hygiene at all stages of food processing, manufacturing, distribution and retail. Apart from butchers, this does not extend to approving premises before they start operating. The Consumers' Association believes that such prior approval, including a requirement that staff should be appropriately trained in food hygiene, would prevent subsequent food safety problems. It is also concerned about the lack of transparency – LA food premises inspection reports are confidential.

Where premises do not comply with food law, LAs can take action ranging from issuing warnings to prosecution. There is a wide variation between LAs in their inspection regimes and in the levels of action taken. Overall, of 600,000 UK food premises, 64% were inspected at least once in 2000 – consistent with previous years. Caterers and restaurants were most likely to be prosecuted, usually for food hygiene reasons. However, overall prosecutions in 2000 fell by 30% compared with 1999. There is anecdotal evidence that some LAs have reduced their budgets for enforcement work, leading to calls for ring-fenced funding. In early 2003, the FSA is auditing the formal enforcement activities of 15 LAs, chosen to reflect a range of activity, with a view to analysing trends and informing policy.

Campylobacter

Campylobacter causes by far the greatest burden of foodborne disease, although initial figures suggest that there was a significant reduction in Campylobacter cases in 2001-02. It is not yet known what contributed to this and Campylobacter remains the primary cause of food poisoning. In response, the FSA is developing a specific strategy to reduce Campylobacter infection in intensively reared poultry. In the absence of an effective vaccine against Campylobacter, this will communicate good practice to farmers on maintaining good hygiene standards: Defra's voluntary Codes of Practice on biosecurity are not being implemented as FSA would like.

Overview

To achieve a reduction in food poisoning, measures will need to be taken across the food chain – from farms to slaughterhouses, food businesses, caterers, consumers and imported foods. Implementation of good hygiene practices and enforcement of legislation are crucial. Reductions in Campylobacter cases are likely to play a major part if the Government is to meet its target to reduce food poisoning by 20% between 2001 and 2006.

Endnotes

1 A Report of the Study of Infectious Intestinal Disease in England. *Infectious Intestinal Disease Study Executive Committee*, 2000. Research project funded by the Department of Health.
2 A proposed strategy for enhancing veterinary surveillance in the UK. *Defra*, 2002. Consultation closes on 4 March 2003.
3 Getting Ahead of the Curve: a strategy for combating infectious diseases. *Department of Health*, 2002.

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