

FOODBORNE DISEASE: FINAL REPORT ON DELIVERY OF THE 2001/2006 TARGET AND REPORT ON PROGRESS TO DELIVER THE 2005/2010 *CAMPYLOBACTER* TARGET

Executive Summary

1. This paper provides a final report on reduction in foodborne disease in the UK over the period 2001/2005 against the Agency's target to reduce foodborne illness by 20% by April 2006.
2. The provisional number of laboratory-reported cases of the foodborne pathogens monitored by the Agency in 2005 is 53,052. This represents a reduction of 19.2% compared with the baseline figure for 2000. Over the same period it is estimated that cases have been reduced by 1.5 million at a cost saving of £750 million, representing a considerable improvement in public health and significant economic benefits.
3. This paper also informs the Board of:
 - recent developments in the main Foodborne Disease Strategy work areas, including development of the new 4Cs strategy, which meets Strategic Plan target 8, and an evaluation of the Strategy's impact.
 - work to assess the burden of disease, meeting 2005/2010 Strategic Plan target 9, and the impact of the FDS; and
 - delivery of 2005/2010 Strategic Plan target 1 relating to implementation of the strategy for reducing *Campylobacter* in chickens and the agreed baseline of 70% contamination based on national surveys.

Board Action Required

4. The Board is invited to:
 - **note** the 19.2% reduction in foodborne disease compared to the 2000 baseline;
 - **note** that, in future, reductions in the burden/severity of foodborne disease and its costs, as well as the total estimated number of cases, will be used to assess the impact of the Strategy;
 - **note** the baseline that has been established for the target of reducing *Campylobacter* in chicken by 2010.

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FOODBORNE DISEASE: FINAL REPORT ON DELIVERY OF THE 2001/2006 TARGET AND REPORT ON PROGRESS TO DELIVER THE 2005/2010 *CAMPYLOBACTER* TARGET

Issue

1. This paper provides a final report on reduction in foodborne disease in the UK over the period 2001/2005 against the Agency's target to reduce foodborne illness by 20% by April 2006, including an evaluation of the impact of the Strategy.
2. The paper also reports on delivery of 2005/2010 Strategic Plan targets relating to the reduction of foodborne disease, particularly *Campylobacter* in chickens.

Strategic Aims

3. The Foodborne Disease Strategy (FDS) was developed to deliver the Agency's 2001 Service Delivery Agreement target to reduce the incidence of foodborne disease by 20% over 5 years by 2006.
4. The Strategy aims to secure further reductions in foodborne disease through delivery of 2005-2010 Strategic Plan targets 1, 2, 4, 8 and 9.

Reduction in Foodborne Disease: Progress Towards the April 2006 Target

5. The provisional number of laboratory-reported cases of the foodborne pathogens monitored by the Agency in 2005 is 53,052. This represents a reduction of 19.2% in UK acquired cases compared with the baseline figure for 2000¹. The Strategy has delivered substantial and significant achievements in a number of critical areas and a significant reduction in foodborne disease in the UK.
6. Data for the period 2000-2005 are shown in **Annex 1** and details of trends for individual pathogens are described in **Annex 2**.
7. Recent activities in the main areas of FDS work (Poultry, Slaughterhouse Hygiene, Food Safety Management systems, particularly for SMEs and the Food Hygiene Campaign) are described in **Annex 3**.

¹ Final figures for 2005 will not be available until the end of 2006. Whilst there may be a small increase in the final reported number of cases for 2005, the final decrease is expected to be close to the 20% target.

Evaluation

8. A preliminary evaluation of the impact of the FDS has been published². This concluded that the Strategy had addressed the areas most likely to have an impact on reducing foodborne illness; that the Food Hygiene Campaign initiatives targeting cross-contamination and thorough cooking had been successful in raising awareness and could well have contributed to reduction in the incidence of cases of *Campylobacter*; and that work with egg producers and on egg handling had been associated with a reduction in cases of *Salmonella*.
9. Priorities identified by the Report for future work (working with schools and through local initiatives) have been incorporated into the new 4Cs Strategy.

Disease Burden (Strategic Target 9)

10. Concerns had been expressed that foodborne disease was only monitored in numerical terms, without taking account of the severity of the cases. In response to these concerns, a risk matrix for foodborne disease now has been developed which builds on work on assessment of disease severity carried out by the Health Protection Agency (HPA). This brings together estimates of the number of cases, markers of disease severity (hospitalisation and death) and the associated economic costs for all cases of foodborne disease.
11. Consideration was given to the development of a weighted index to combine severity levels into an overall numerical measure of disease burden. However, this was discounted in favour of a risk matrix approach because there is a need to focus on reducing foodborne disease at each level of severity.
12. As well as providing a measure of the total burden, the risk matrix approach also allows risks to be ranked and supports the priority areas currently being addressed in the Foodborne Disease Strategy. *Campylobacter* is the highest ranked pathogen in terms of the total number of cases, hospitalisations and cost of illness. *Salmonella* is ranked second highest for hospitalisations, deaths and cost of illness. *Listeria* is responsible for the highest number of deaths. This approach has helped to refine prioritisation of future Strategy activities.
13. The risk matrix model has shown that, for each year where data exists, the estimated number of foodborne disease cases and hospitalisations has reduced compared with the 2000 baseline, although the estimated number of deaths has remained relatively constant. Estimates on health consequences of foodborne disease are summarised at **Annex 4**.

² <http://www.food.gov.uk/safereating/microbiology/fdscg/fdsevaluation>

14. The number of cases estimated by the HPA has decreased by a much greater amount than monitoring of the 5 key pathogens would suggest, due to a sharp decrease in cases of infectious intestinal disease reported to the RCGP scheme³ (47% reduction since 2000). However, this effect is largely confined to the number of cases and does not affect markers of severity such as hospitalisations and deaths.
15. Over the five years from 2000-05 these reductions represent over 1.5 million fewer cases of foodborne disease in England and Wales and 10,000 fewer hospitalisations as a result of foodborne disease, with a saving of almost 38,000 hospital bed days.

Costs and Savings

16. The Agency secured initial funding of £20m over a 3-year period in the 2000 Westminster Spending Review to deliver the Service Delivery Agreement target to reduce foodborne disease by 20%. To date expenditure attributed to FDS activities since 2001 is £21.1m. A breakdown of annual Strategy expenditure, including staff effort, is provided in **Annex 5**. The Scottish Executive provided FSA Scotland with further £4m⁴ and FSA Wales contributed a substantial part of its programme budget (£300k in 2002-03) to Strategy activities.
17. Most FDS interventions have involved working in partnership with stakeholders. The costs to industry and enforcers are currently being ascertained and do not at present feature in the cost estimates.
18. 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, presented in **Annex 6**, indicate that the cost has remained below its baseline level of £1.7 billion in 2000 throughout the subsequent period over which data is available (2000-2005). In 2005, the latest year for which incidence data is available, foodborne diseases are estimated to have cost the economy in England and Wales slightly less than £1.4 billion.
19. The resulting cumulative savings from the reduced disease burden outlined above amount to more than £750 million over the five years. This reduction can be broken down into £25 million in lower NHS costs, £150 million reduction in

³ The Royal College of General Practitioners' Weekly Returns Service is a sentinel system involving volunteer general practices, covering about 1% of the population of England and Wales. Participating practices are required to report a list of infections, including infectious intestinal disease (IID), on a weekly basis.

⁴ £2 million per annum from 2004 for implementation of HACCP and £0.7 million per annum from 2004 to 2006 for additional work on research and surveillance into *Campylobacter* and emerging and evolving pathogens in Scotland

lost earnings and direct expenses by those affected by the diseases, and £580 million reduction in the cost of pain, grief and suffering.

Campylobacter Strategy

20. *Campylobacter* is the most common cause of foodborne disease in the UK and poultry is a significant source of infection. We are therefore working in partnership with industry to achieve a strategic target of 50% reduction in the incidence of *Campylobacter* in UK-produced chickens by 2010. Following public consultation⁵ based on results from national retail chicken surveys that will be used to monitor the effectiveness of control measures, around 70% of chickens are contaminated with *Campylobacter*. Our challenge is to reduce this level to 35% by 2010.
21. The current focus of the *Campylobacter* strategy has been the promotion of biosecurity on poultry farms. We have worked closely with industry to develop and deliver the biosecurity campaign. Our presentations at national growers meetings and regional seminars have generated support at grass-roots level. We are currently working with Defra on further initiatives to raise awareness of biosecurity in the context of keeping out harmful diseases such as avian influenza (AI) as well as *Campylobacter*. Further details of recent activities are listed in **Annex 3**.
22. We intend to develop the strategy in the light of experience and the results of research to include not only on-farm controls but measures that can be taken in the slaughterhouse and beyond.

Conclusion

23. The Agency has achieved a reduction in UK acquired cases of foodborne disease of 19.2%, which is very close to meeting its five-year target to reduce the incidence of foodborne disease by 20%. The Foodborne Disease Strategy has delivered substantial and significant achievements in a number of critical areas and a significant reduction in foodborne disease in the UK.
24. Between 2000 and 2005, reductions in foodborne disease are estimated to have resulted in over 1.5 million fewer cases of foodborne disease in England and Wales, with 10,000 fewer hospitalisations accounting for 38,000 fewer hospital bed days. The cumulative economic saving is estimated to be more than £750 million.
25. A new strategy to promote the 4Cs food hygiene principles in the home has been developed, based on evaluation of earlier work and stakeholder input. Thus targets 8 and 9 in the 2005/2010 Strategic Plan have been met.

⁵ <http://www.food.gov.uk/Consultations/ukwideconsults/2005/camplobactertarget>

26. Work to reduce *Campylobacter* in UK-produced chickens continues and a baseline for measuring the 2010 target has been agreed.

Board Action Required

27. The Board is invited to:

- **note** the 19.2% reduction in foodborne disease compared to the 2000 baseline;
- **note** that, in future, reductions in the burden/severity of foodborne disease and its costs, as well as the total number of cases, will be used to assess the impact of the Strategy;
- **note** the baseline that has been established for the target of reducing *Campylobacter* in chicken by 2010.

UK FOODBORNE DISEASE DATA (2000 TO 2005)

1. CASES NOT THOUGHT TO HAVE BEEN ACQUIRED ABROAD

Number of laboratory reports	<i>Campylobacter</i>	<i>Salmonella</i>	<i>Clostridium perfringens</i>	<i>E. coli</i> O157	<i>Listeria monocytogenes</i>	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 (+0.7%)#
2002	43,158	12,719	60	761	159	56,857 (-13.4%)#
2003	41,281	13,271	78	777	239	55,646 (-15.2%)#
2004	39,791	11,791	527	818	232	53,337 (-18.7%)#
2005 ^	41,659	9,835	319	1,019	220	53,052 (-19.2%)#

2. ALL CASES

Number of laboratory reports	<i>Campylobacter</i>	<i>Salmonella</i>	<i>Clostridium perfringens</i>	<i>E. coli</i> O157	<i>Listeria monocytogenes</i>	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 (-19.1%)#

^ Provisional figures

Percentage difference compared to the baseline figure

RESULTS FOR INDIVIDUAL PATHOGENS 2000/2005***Campylobacter***

1. The number of UK laboratory reports of *Campylobacter* has decreased by almost 19% compared with the baseline year. Following a significant reduction in reported cases in 2003, recent trends indicate that the number of cases each year has plateaued. The reasons for the decrease are not entirely clear but the Food Hygiene Campaign and work to reduce levels of *Campylobacter* in poultry may have contributed to this reduction.

Salmonella

2. UK laboratory reports of *Salmonella* have decreased steadily by 25% since 2000. The continuing effects of industry actions to reduce *Salmonella* in both broiler and laying flocks are considered to have contributed to this reduction. Outbreaks associated with eggs, particularly of non-UK origin, have not had a significant impact on trends. Following the issuing of advice on to caterers and the general public on the safe handling of eggs, these outbreaks have largely disappeared.

***E.coli* O157**

3. Following an initial reduction in cases of *E.coli* O157 by 25% between 2000 and 2003, an upward trend in UK cases of *E.coli* O157 has been reported. Provisional data indicate that the number of cases in 2005 was comparable to that reported in 2000. Recent large outbreaks of *E.coli* O157 have had an impact on reported figures. Infections and outbreaks due to non-foodborne *E.coli* O157 make a significant contribution, of about 50%, to the figures.

Listeria

4. The number of cases of *Listeria* has doubled since 2003. The reasons for this increase have not been identified. The HPA has investigated these cases but has not been able to establish any specific reason for them. They will continue to study new cases and information as they arise and the ACMSF is also planning to review this topic.

Clostridium perfringens

5. There has been no clear trend in the number of cases reported since 2000. Laboratory reporting of *Cl. perfringens* cases is unreliable because few cases have samples taken and special investigations have to be carried out to confirm the diagnosis. Messages promoted by the Food Hygiene Campaign relating to cooking and chilling are highly relevant to the effective control of this organism.

MAIN AREAS OF FDS WORK- RECENT ACTIVITIES

Poultry

1. The Agency has worked very closely with stakeholders and the poultry industry to implement its strategy for reducing *Campylobacter* in UK-produced chicken. Practical advice on biosecurity on farms has been communicated orally at poultry growers meetings and regional seminars attended by over 600 farmers and promoted through a joint stand with Defra at the 2006 Pig and Poultry Fair and via trade journals.
2. A “Biosecurity for Housed Broilers”, advice booklet was published in May 2006 and over 3000 copies distributed. Evaluation of these initiatives indicates that they had been very successful in raising awareness and reinforcing basic biosecurity messages on farms.

Slaughterhouse Hygiene

3. To assist adoption of HACCP principles and standard microbiological testing in fresh meat premises, the Agency has provided guidance, training and resources to Meat Hygiene Service (MHS) veterinarians, meat plant operators and training providers. A national database⁶ has been established to allow UK meat plant operators to enter their microbiological test results, to monitor their own data set and compare with national trend data. The database also provides information on compliance with the microbiological criteria regulations.
4. Best hygiene practice in fresh meat production and presentation of clean livestock for slaughter has been promoted through guidance, publicity leaflets and presentations at agricultural events, on-farm information days, producer group meetings and via the FSA website⁷.

Food Safety Management Systems, particularly for SMEs

5. The Agency has developed a toolkit of guidance and resources to assist small catering businesses to comply with the new legislation on HACCP-based food safety management systems. These include *Safer Food Better Business* (SFBB), *CookSafe* and *Safe Catering* packages in England, Scotland in Northern Ireland respectively.
6. *Safer Food Better Business* (SFBB), which formed one of the key interventions of the FDS, was launched in England in November 2005 and has been very well received. To date over 156,000 packs have been distributed and further

⁶ www.ukmeat.org.uk

⁷ www.food.gov.uk/foodindustry/farmingfood/cleancattleandmeatsafety/

guidance has been adapted for very small retail businesses (such as convenience stores) and specific ethnic sectors.

7. To assist implementation of SFBB by local authorities in England, training for enforcement officers has been provided and a grant scheme has been established which has awarded 54 grants to 157 authorities to a total value of £5.5 million. A second round of grants will be made later in 2006.

Food Hygiene Campaign

8. A wide range of activities to promote food hygiene messages continued, including the re-screening of two national TV media campaigns on Christmas and summer eating in December 2005 and in June/July 2006 respectively. Both campaigns have been evaluated and, as with previous campaigns, have shown a high awareness of the campaign and recall of key messages.
9. A new strategy to promote safe handling of food in the home has been developed and published (Strategic Target 8)⁸. The approach builds on successes to date and has a particular focus on schools and providing support for local food hygiene initiatives. It was based on research and evaluation of the existing strategy and consultation with stakeholders at a series of UK workshops.

⁸ <http://www.food.gov.uk/safereating/microbiology/fdscg/4cstrategy>

DISEASE BURDEN (2005/2010 STRATEGIC TARGET 9)

Concerns had been expressed that foodborne disease was only monitored in numerical terms, without taking account of the severity of the cases. In response to these concerns, a risk matrix for foodborne disease now has been developed which builds on work on assessment of disease severity carried out by the Health Protection Agency (HPA). This brings together estimates of the number of cases, markers of disease severity (hospitalisation and death) and the associated economic costs for all cases of foodborne disease.

Consideration was given to the development of a weighted index to combine severity levels into an overall numerical measure of disease burden. However, this was discounted in favour of a risk matrix approach because there is a need to focus on reducing foodborne disease at each level of severity.

As well as providing a measure of the total burden, the risk matrix approach also allows risks to be ranked and supports the priority areas currently being addressed in the Foodborne Disease Strategy. *Campylobacter* is the highest ranked pathogen in terms of the total number of cases, hospitalisations and cost of illness. *Salmonella* is ranked second highest for hospitalisations, deaths and cost of illness. *Listeria* is responsible for the highest number of deaths. This approach has helped to refine prioritisation of future Strategy activities.

The risk matrix model has shown that, for each year where data exists, the estimated number of foodborne disease cases and hospitalisations has reduced compared with the 2000 baseline, although the estimated number of deaths has remained relatively constant. Estimates on health consequences of foodborne disease are summarised below.

The number of cases estimated by the HPA has decreased by a much greater amount than monitoring of the 5 key pathogens would suggest, due to a sharp decrease in cases of infectious intestinal disease reported to the RCGP scheme⁹ (47% reduction since 2000). However, this effect is largely confined to the number of cases and does not affect markers of severity such as hospitalisations and deaths.

Over the five years from 2000-05 these reductions represent over 1.5 million fewer cases of foodborne disease in England and Wales and 10,000 fewer hospitalisations as a result of foodborne disease, with a saving of almost 38,000 hospital bed days.

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Estimates of Health Consequences of Foodborne Disease in England and Wales

Data derived from foodborne disease risk matrix

Year	Total Cases	Hospitalisations	Deaths
2000	1,338,000	20,800	480
2001	*	*	*
2002	*	*	*
2003	843,000	17,200	440
2004	835,000	17,400	570
2005	765,000	17,300	470

Estimates have been rounded to nearest 1000 for total cases, 100 for hospitalisations and 10 deaths.

*Estimates for the total burden of disease in 2001 and 2002 are not available. In estimating the cumulative changes from 2000/2005 it has been assumed that the number of cases, hospitalisations and deaths remained at 2000 levels for these years.

These estimates are derived by HPA using the methodology described in Adak G K, Long S M, O'Brien S J. Gut 2002; 51:832-841.

FOODBORNE DISEASE STRATEGY - COSTS AND EFFORT

1. Staff time and actual expenditure for Foodborne Disease Strategy work since 2001

Financial year	Expenditure	Staff effort (estimated cost)
2001-02	£4.29m	n/k*
2002-03	£5.58m	£641k
2003-04	£3.85m	£731k
2004-05	£4.57m	£843k
2005-06	£2.85m	£413k
Total 2002-06	£21.14m	£2,601k

* Staff resource not known for 2001-02

2. Expenditure to date (£k) by major work areas

Work area	2001-02	2002-03	2003-04	2004-05*	2005-06	Total to date (£k)	% spend
Red Meat and Poultry	93	633	555	607	455	2,343	11%
HACCP Catering and Retail	27	102	1,487	1,552	30*	3,198	15%
Food Hygiene Education And Promotion	4,174	4,786	1,598	2,393	2,357	15,308	72%
Other **	0	58	211	23	11	303	2%

* From 2005-06, implementation funding provided from outside the FDS budget.

** e.g. milk/dairy, fish/shellfish, eggs, fresh produce.

ESTIMATED ECONOMIC COSTS OF FOODBORNE DISEASES IN ENGLAND AND WALES

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 updated 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 updated using the Consumer Price Index.
 - The lost earnings of the afflicted person and his or her carers. Here, the IID figures are updated 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. Firstly, 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). Secondly, 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 (2006 Q1 Constant Prices)			
	NHS	Lost earnings and other expenses	Pain and Suffering	Total Cost (England and Wales)
2000	£34m	£161m	£1,504m	£1,699m
2001	£34m	£161m	£1,504m	£1,699m
2002	£33m	£161m	£1,504m	£1,699m
2003	£23m	£107m	£1,207m	£1,337m
2004	£28m	£120m	£1,475m	£1,624m
2005	£25m	£107m	£1,248m	£1,379m

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 (2006 Q1 Constant Prices)			
	NHS	Lost earnings and other expenses	Pain and Suffering	Total Cost (England and Wales)
2001	£0	£0	£0	£0
2002	£0	£0	£0	£0
2003	£11m	£55m	£297m	£362m
2004	£5m	£41m	£29m	£75m
2005	£9m	£55m	£256m	£319m
Cumulative (2001-05)	£25m	£151m	£584m	£756m