

Review of the major outbreak of *E. coli* O157 in Surrey, 2009

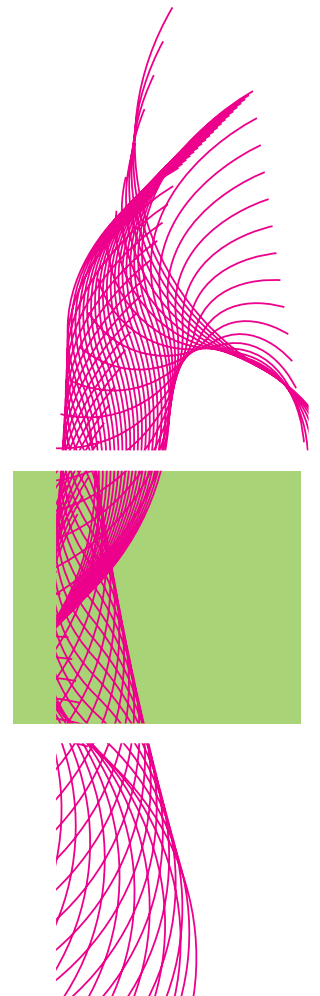
Report of the Independent Investigation Committee
June 2010



REVIEW OF THE MAJOR OUTBREAK OF *E. COLI* O157 IN SURREY, 2009

An Evaluation of the Outbreak and its Management, with a
Consideration of the Regulatory Framework and Control of
Risks Relating to Open Farms

Report of the *E. coli* O157
Independent Investigation Committee
June 2010



CONTENTS

Foreword	7
Statement from the Chair of the Independent Investigation	7
The Purpose of the Independent Investigation	8
Terms of Reference for the Investigation	8
The Investigation Team	9
The Conduct of the Investigation	9
Contributors to the Investigation	9
The Independent Investigation Website	9
Executive Summary	10
Outline of the Report	16

Part A: The Context

Chapter 1: *Escherichia coli* O157

1.1 The Organism	20
1.2 The Ecology of <i>E. coli</i> O157	20
1.3 Human Disease and its Management	22
1.4 Diagnostic Microbiology	24
1.5 Epidemiology of <i>E. coli</i> O157 Human Infections	25
1.6 References	35

Chapter 2: Standard Public Health Procedures for *E. coli* O157

2.1 Dealing with a Single Case of <i>E. coli</i> O157	42
2.2 Recognising and Responding to an Outbreak	45
2.3 References	51

Chapter 3: Open Farms

3.1 Types of Farms and Visits	54
3.2 Related Non-Regulatory Organisations	57
3.3 References	

Chapter 4: The Regulatory Framework for Open Farms

4.1 Regulatory Control of Open Farms	62
4.2 Current UK Legislation	64
4.3 Main Regulatory Bodies	67
4.4 Inspection Procedures	69
4.5 Standards for Farms Including Open Farms	70
4.6 References	73

Part B: The Outbreak

Chapter 5: The Outbreak

5.1 Godstone Farm	78
5.2 Timeline of the Outbreak	81
5.3 Investigation of the Outbreak	85
5.4 The Cause of the Outbreak	89
5.5 The Clinical Impact of the Outbreak	89
5.6 References	91

Chapter 6: The Views of Parents

6.1 Synopsis of Interviews	93
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Part C: Management of the Outbreak

Chapter 7: The Management and Control of the Outbreak

7.1 Local Arrangements for Outbreak Control	104
7.2 Recognising the Outbreak	105
7.3 Convening the OCT	106
7.4 Responding to the Outbreak	107
7.5 The Size and Nature of the Outbreak	110
7.6 After the Outbreak	112
7.7 References	113

Part D: The Challenge of Reducing the Risks

Chapter 8: Assessing and Managing the Risks

8.1	Risk Assessments	116
8.2	Risk Management	123
8.3	Existing Open Farm Guidance	125
8.4	Control of Infection Risks at Open Farms	126
8.5	Control of the Risks of Infection from Agricultural Animals	130
8.6	References	133

Chapter 9: Meeting the Challenges

9.1	Strengthening the Regulatory Regime	138
9.2	An Approved Code of Practice	139
9.3	Securing Compliance	141
9.4	Working Together	146
9.5	References	149

Part E: Conclusions and Recommendations

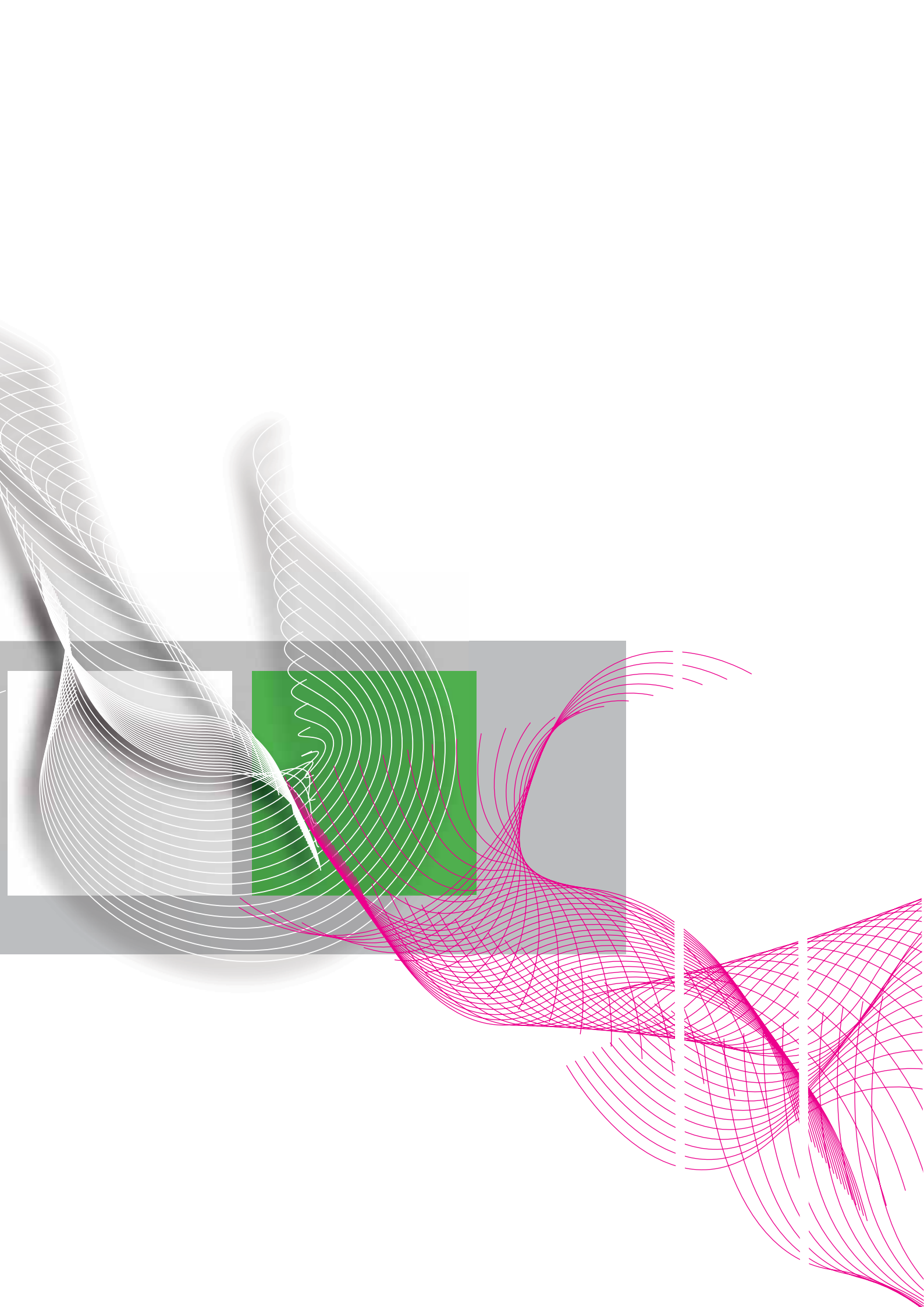
Chapter 10: Conclusions and Recommendations

10.1	The Outbreak in Perspective	152
10.2	Identification and Control of Outbreaks	152
10.3	Risk Perception, Risk Assessment and Risk Management	154
10.4	Regulation, Inspection and Standards	157
10.5	Awareness, Education and Training	159
10.6	Further Research	161
10.7	The Broader Context	163
10.8	References	164

Appendices

170

1:	The Independent Investigation Committee
2:	List of Contributors
3:	Organisations Involved in the Investigation and Management of Outbreaks Associated with Open Farms
4:	Non-Regulatory Organisations Relating to Open Farms
5:	HSE Agriculture Information Sheet 'Avoiding ill health at Open Farms – Advice to farmers (with teachers' supplement)' AIS23
6:	HSE Agriculture Information Sheet 'Common zoonoses in agriculture' AIS2
7:	Health Risks on Open Farms: Following the Enforcement Management Model (EMM)
8:	Collation of Reports from the Meetings with Parents and from Responses Received by Post
9:	Interim Views of the Committee on the Risks of Animal Contact at Open Farms
10:	List of Abbreviations
11:	Glossary of Terms



FOREWORD

Statement from the Chair of the Independent Investigation

The Godstone Farm *Escherichia coli* O157 outbreak in August/September 2009 was a failure of health protection and exposed a complex regulatory structure. Some 93 cases, the vast majority of whom were children, were affected by this devastating disease causing great pain, the requirement for intensive invasive medical support and immense family disruption. Of the 93 cases, 17 (all of whom were children) suffered the most severe complication of this infection, namely haemolytic uraemic syndrome (HUS), requiring intensive hospital renal and haematological support. Fortunately none of these children died, but they all suffered very severe disease.

The purpose of this Report is to analyse the handling of the outbreak and the regulatory framework surrounding prevention and response. The Investigation Committee is committed to the belief that the Report should be analysed carefully by the relevant bodies with a view to reducing risk to a minimal acceptable level and providing a structure which will reduce the risk of future outbreaks. The Open Farm industry needs help to restructure its operations and eventually assume more of a self-regulatory role alongside a strengthened regulatory scheme which will provide a basis for public confidence. The Committee is pleased that as a result of this investigation, the National Farm Attractions Network has already made progress towards developing an accreditation scheme for Open Farms. We urge all interested parties to give this initiative their full support in tandem with the strengthening of the regulatory system we have also recommended.

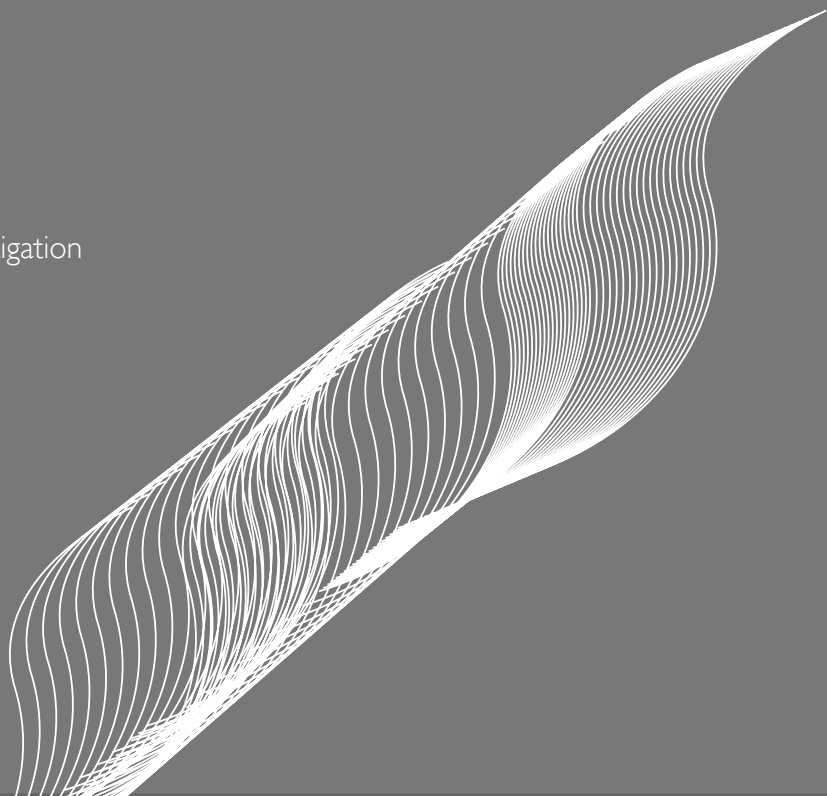
The Committee is fully aware that implementation of the recommendations in this Report will call for leadership, co-operation and clear thought between relevant agencies. We strongly advocate such an approach to safeguard public health.

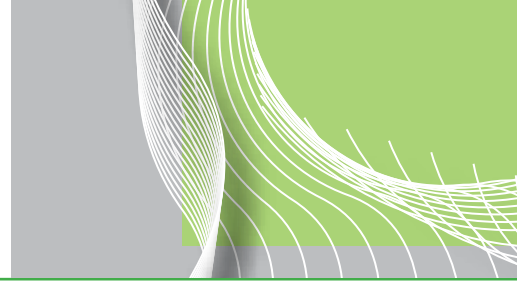


Professor George Griffin

Chair of the *E. coli* O157 Independent Investigation

June 2010





The Purpose of the Independent Investigation

In August and September 2009 an outbreak of *E. coli* O157 led to severe illness in a number of visitors to Godstone Farm in Surrey. The Health Protection Agency established an independent investigation of the outbreak, the factors that contributed to it and its subsequent handling. This was announced on 15 September 2009.

The purpose of the investigation was to make recommendations to reduce the risk of those who visit Open Farms contracting *E. coli* O157 and to improve the health protection response to future outbreaks of *E. coli* O157 infection. In the context of the investigation, an 'Open' Farm is defined as one that invites members of the public to visit and facilitates direct contact with the animals.

Terms of Reference for the Investigation

The Terms of Reference for the Independent Investigation agreed by the Board of the Health Protection Agency were to look at the factors which contributed to the cause of the Godstone Farm outbreak and to review its subsequent handling by the Health Protection Agency and others. This included but was not limited to:

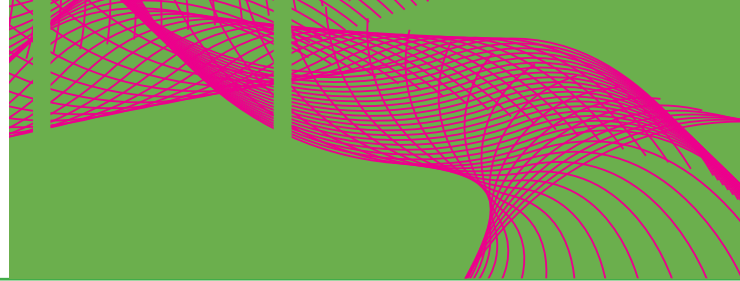
- a) The characteristics of *E. coli* O157 and factors affecting its transmission from animals to humans in the context of Open Farms
- b) The standards which apply to the operation of Open Farms (including relevant guidance and how this was made operational)
- c) The operation of Godstone Farm with reference to these standards
- d) The regulatory oversight of Open Farms in general and Godstone Farm in particular
- e) The responses to the outbreak from all those involved following the identification of illness in people who had visited Godstone Farm (including the advice given by the Health Protection Agency)
- f) The responses to other outbreaks of *E. coli* O157 which have been linked to similar Open Farm facilities

The Investigation would consider any lessons to be learned from the experiences and best practice of the devolved administrations, and relevant evidence from public authorities in other countries.

The Investigation would also ensure that the families of those affected by the outbreak were invited to have an input.

The Report of the Investigation would be presented to the Board of the Health Protection Agency and, once accepted, would be made public.

Pending the final report, any interim recommendations requiring urgent action to protect public health would be published as soon as possible.



The Investigation Team

Professor George Griffin was appointed Chair of the Independent Investigation by Mr Justin McCracken (the Health Protection Agency Chief Executive) following discussion with the Chief Medical Officer for England, Professor Sir Liam Donaldson. Professor Griffin is Professor of Infectious Diseases and Medicine at St George's, University of London, a practising infectious diseases Clinician and Chair of the Advisory Committee on Dangerous Pathogens.

Professor Griffin appointed five other members of the Investigation Committee on the basis of their area of expertise. See **Appendix I** for Committee membership. The Committee was supported by a full time scientific secretariat, a committee administrator and a legal advisor.

The Conduct of the Investigation

The Terms of Reference for the Investigation were established and a protocol for the Investigation Committee to gather evidence was agreed at the initial meetings of the Committee. Organisations or key individuals provided evidence or expert information. The Investigation also considered lessons to be learned from the practice of the devolved administrations, and relevant evidence from public authorities in other countries.

Relevant organisations involved in the outbreak were invited to specific meetings of the Investigation Committee and their representatives were briefed by the scientific secretariat. In some cases, the presenters provided supplementary documentation for the Committee. Notes from the meetings were agreed with the presenters for factual accuracy. The notes included a summary, the key messages and the points discussed with the Committee. The Committee also visited Godstone Farm Park and two other Open Farms. In addition, Professor Griffin, one member of the Committee and the scientific secretariat heard the views and concerns of some of the families affected by the outbreak. Each meeting was noted and these notes anonymised and then checked with the individual family for factual accuracy. Interim recommendations were provided to the Health Protection Agency in March 2010 and the draft Report of the Investigation together with recommendations was presented to the HPA Board on 26 May 2010.

Contributors to the Investigation

A list of organisations and individual experts who contributed to the Investigation is included in **Appendix 2**.

The Independent Investigation Website

The body of evidence relevant to the investigation, including source documents, can be accessed through the Investigation website www.griffininvestigation.org.uk

Copies of the Report can be downloaded from the website.

EXECUTIVE SUMMARY

Introduction

In August and September 2009 an outbreak of *Escherichia coli* O157 led to severe illness in a number of visitors to Godstone Farm in Surrey. The Health Protection Agency (HPA) established an independent investigation of the outbreak, the factors that contributed to it and its subsequent handling. The purpose of the investigation was to analyse the events of the outbreak, make recommendations to reduce the risk of those who visit Open Farms contracting *E. coli* O157 and to improve the health protection response to future outbreaks of this infection.

Escherichia coli O157

E. coli O157 infection is relatively uncommon but, because the illness it causes (bloody diarrhoea which can be complicated by haemolytic uraemic syndrome [HUS]) can be severe or fatal, it remains a serious public health issue.

E. coli O157 is a highly virulent organism; it can survive for long periods of time in the environment; ingesting just a few organisms, possibly between 10 and 100, can cause illness in humans; young children (particularly under five years of age) and older people (particularly over 75 years of age) are very vulnerable; the illness can be very serious and is sometimes fatal; after recovery from illness some people are left with permanent kidney or brain damage. There is currently no recognised, specific treatment other than good supportive care, but there are opportunities for new treatments.

E. coli O157 is commonly carried by animals and ruminants are considered the major reservoir of infection, although the organism has been found in a wide variety of animals. *E. coli* O157 causes no clinical signs of infection in animals, but may colonise the rectum of cattle and these colonised animals greatly increase the potential for spread of *E. coli* O157 in their faeces. There are no established on-farm control options, so all ruminants need to be considered as infected by *E. coli* O157.

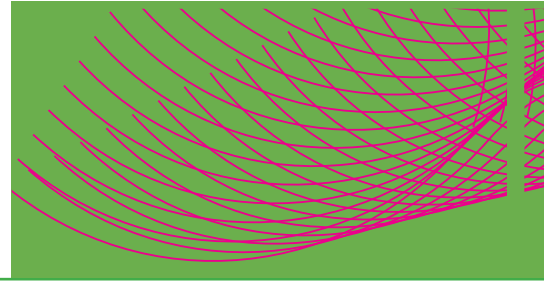
A variety of sources have been identified for *E. coli* O157 outbreaks in humans, including foodborne, waterborne, person-to-person spread and animal contact. The common link is that the organism is excreted in animal or human faeces and gains access to susceptible humans through ingestion. Agricultural and environmental exposures, particularly contact with ruminants, are well recognised causes of *E. coli* O157 human infections, both as outbreaks and sporadic cases.

Standard Public Health Procedures for *E. coli* O157

Each report of a presumptive *E. coli* O157 infection should be actively investigated and the risk of onward spread assessed. Enquiries relating to contact with animals or animal faeces should always be made. A general outbreak of *E. coli* O157 may be defined as two or more cases from separate households linked to a common source.

Early recognition of an outbreak requires careful investigation and documentation of individual cases, co-ordination and exchange of information between Health Protection Units (HPUs) and Local Authorities (LAs), and an efficient and sensitive national surveillance system. In outbreaks of a zoonotic infection such as *E. coli* O157, the HPA has overall responsibility for managing the outbreak. However, LAs are responsible for enforcement actions at Open Farms.

The specific objectives in the preliminary phase of an outbreak investigation are: to confirm the outbreak or incident is real; to quickly describe the nature and extent of the outbreak; to ensure



immediate steps are taken to identify those who are ill or at risk; to ensure those ill or known to be exposed receive appropriate treatment and care; to control the source and contain the infection; to decide whether the incident requires special arrangements for investigation and management; and to alert those who need to know at local, regional or national levels.

All outbreaks warrant a thorough epidemiological description and analysis.

Open Farms

The types of venue where the public may have animal contact are many and varied. Open Farm enterprises may be large scale and include attractions where animal contact is only one part of the visit. The age profile of visitors with an interest in animal contact is predominantly the under-10s and their parents or carers. There is no national list of Open Farms, but evidence gathered during our investigations suggests that there are several hundred Open Farm enterprises in the UK and that some have visitor numbers in excess of 200,000 per annum.

A variety of non-regulatory organisations are involved with the Open Farm sector. No 'badge' for Open Farms exists to provide the public with reassurance of their adherence to safety standards. Farming and Countryside Education (FACE) is a registered charity that has developed curriculum resources and encourages school visits to farms and other rural locations. The Countryside Educational Visits Accreditation Scheme (CEVAS) is run by FACE and exists for the accreditation of educational visits to farms.

Working agricultural enterprises participate in occasional public events, such as Open Farm Sunday, organised by Linking Environment and Farming (LEAF). LEAF and the National Farmers' Union (NFU) Business Guide Reference 058 offer health and safety advice for farms on open days.

The Regulatory Framework for Open Farms

The legal and institutional framework for protection of human health and the prevention of disease outbreaks in Great Britain is complex. The prevention of an outbreak involves different laws and regulatory authorities from those that are involved in the control of an outbreak of disease.

Separate regulatory frameworks have been set up by Parliament for animal health (including zoonoses), public health, food safety and occupational health and safety. Each regime is the responsibility of a different Government Department, with separate agencies and different mechanisms for delivery of the intended outcomes.

Four separate streams of legislation apply to health hazards that may be present at Open Farms, covering public health, food safety, animal health, and health and safety at work. Prevention of risks to human health arising at Open Farms is governed principally by food safety, and by health and safety law which covers risks to visitors and depends primarily on compliance by farm operators with statutory duties.

There is a wide range of regulatory options for the control of risks to health and safety. Options include prohibition, licensing, regulations, approved codes of practice and non-statutory guidance. Enforcement of health and safety law at Open Farms is the responsibility of LAs, who may seek advice from the Health and Safety Executive (HSE). Inspectors have powers to serve improvement or prohibition notices and to prosecute.



International comparisons show that there is no European Directive for Open Farms but we found some regulations and guidance in North American and Australian States. In addition, the Netherlands is currently strongly considering changing a guidance scheme into a structured enforceable scheme.

Description of the Outbreak

An outbreak of *E. coli* O157 occurred at Godstone Farm in August and September 2009. This is the largest outbreak of *E. coli* O157 linked to an Open Farm to have occurred in the UK. There were 93 people affected, of whom 76 (82%) were under 10 years of age. Of the 78 people with symptoms, 27 (35%) were admitted to hospital and 17 (22%), all of them children, were diagnosed with HUS. Eight of the children with HUS required dialysis, some of whom have been left with permanent kidney damage.

It is possible that some children with HUS will experience long term damage including hypertension and kidney failure. Children with reduced kidney function may need a kidney transplant at some stage in the future.

Laboratory investigations confirmed that there were clear microbiological links between nearly all the cases, since all the cases from whom isolates were available were infected with the same strain of *E. coli* O157. The similarity of human, animal and environmental strains of *E. coli* O157 indicates an outbreak with a common source.

Epidemiological investigations point to the main animal petting barn at Godstone Farm as the source of the outbreak. This is corroborated by the high proportion of faecal samples from animals from the main barn that tested positive. There was also evidence of environmental contamination at the Farm, suggesting that even without direct animal contact there was a risk of infection from contact with railings or soiled footwear.

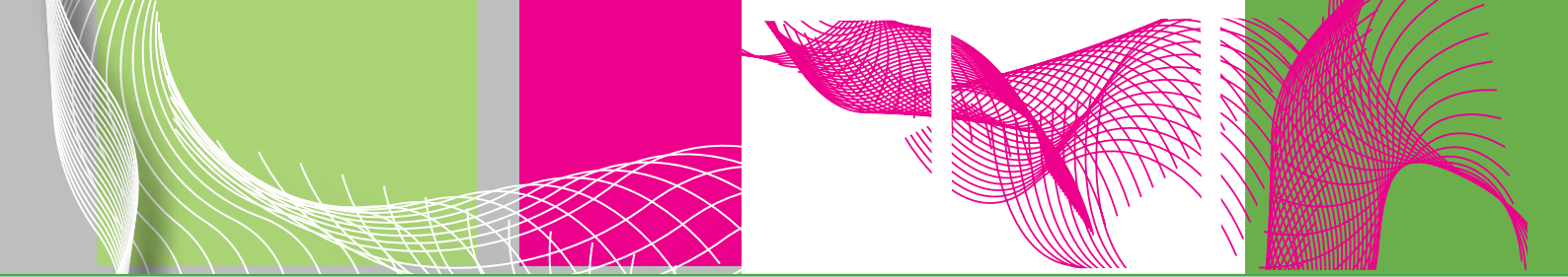
The outbreak ceased after the animal petting barns at Godstone Farm were voluntarily closed on Friday 4 September 2009.

The Views of Parents

The majority of the 20 families who wished to be interviewed were regular visitors to Godstone and said that their children enjoyed visits to the Farm. When asked if there had been anything different about their visit, some noted that the Farm was exceptionally busy. There had been a queue to get in and/or they had to wait to use the handwashing facilities.

All the parents said they were aware of the need to wash their children's hands. A number said they were very careful and had used hand gels. Several commented that the taps were difficult to use, particularly for the younger children, and at most of the sinks there was only cold water. Many of the families commented that there was little supervision by farm staff and considered that there should have been more staff supervision at handwashing and animal contact areas. Most families had noticed signs about handwashing at the Farm but some felt there should have been more.

The majority of parents had heard about *E. coli* but only three were aware of the association with animals and thought this was specifically a problem during pregnancy. None was aware of the association of *E. coli* O157 infection with animal faeces or animal contact in children, or the serious nature of this infection. Communication and advice received by the parents did not appear to be consistent.



Several of the parents made repeated visits to their General Practitioner's surgery or out-of-hours service before the potentially serious nature of bloody diarrhoea was recognised and stool samples were taken. Some decided to present to their local Accident & Emergency Departments and their children were then admitted as their clinical condition deteriorated rapidly.

Many of the families said their experiences had been so traumatic they would not visit an Open Farm with their children again. However, many recognised the value of an animal contact experience for children in general and thought that much more information should be made available so that parents could make an informed decision on animal contact.

Many of the families could not understand why the Farm had not closed earlier and did not realise that the HPA did not have the regulatory authority to implement closure. They felt this situation required changing.

The Management and Control of the Outbreak

There was delay in recognising the outbreak due to the fact that no one person in the HPU appears to have had a clear picture of how many cases of *E. coli* O157 with links to Godstone Farm had been reported. The Outbreak Control Team (OCT) was convened exceptionally late in the course of the outbreak. Had the OCT been convened earlier, there would have been a more timely assessment of the public health risks and almost certainly more effective control of the outbreak.

There was unacceptable delay in initiating strict control measures at Godstone Farm. Had a decision been made on the August Bank Holiday weekend (or even after it, on Tuesday 1 September) to stop all contact with ruminant animals, a substantial number of cases of *E. coli* O157 could have been prevented. There was also unacceptable delay in carrying out the systematic epidemiological investigation of the outbreak, particularly in commencing the case-control study.

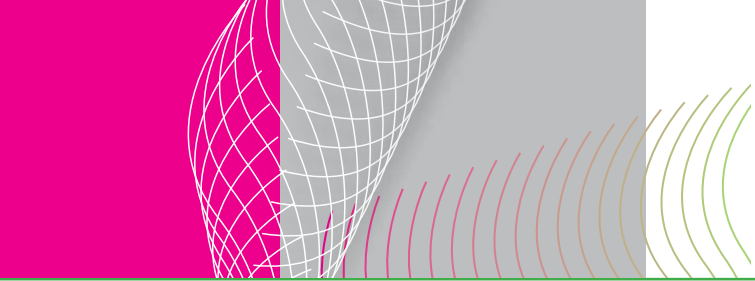
General Practitioners and hospital clinicians serving the catchment area of Godstone Farm, including paediatric renal unit staff, should have been alerted much earlier to the occurrence of the outbreak. There was unnecessary delay in reaching a decision about reopening Godstone Farm and in publishing the OCT final report.

Even with prompt action this would have been a big outbreak. Nevertheless, there was a lack of public health leadership and a missed opportunity to exercise decisive public health action and thereby restrict the size of the outbreak.

Assessing and Managing the Risks

The assessment of risk carried out by Godstone Farm was inadequate as it principally relied on the actions of the public, primarily through handwashing, to control the risks. The risk assessment process used by the LA did not facilitate the identification of hazards on the Farm and, despite a regular programme of inspections, the regulatory visits carried out by the LA were ineffective in preventing an outbreak occurring.

The HSE, in a joint statement of position with the Local Authorities Co-ordinators of Regulatory Services (LACORS), have confirmed that they continue to regard the risk of infection to visitors at Open Farms as 'low', and as such, not significant enough to warrant additional action. Due to the potential severity of *E. coli* O157 infection, we conclude that the level of risk on Open Farms is not acceptable and good practices in the industry should have been more actively pursued by the regulators.



It is currently very difficult for families to make their own informed decisions about the risk of visiting an Open Farm. In addition to public education on the risks of infection from *E. coli* O157, an accreditation scheme, led by the farming industry, would assist the public in understanding which farm premises were operated to a known and acceptable standard.

Farm operators must base their risk assessments and any preventative or remedial actions on the assumption that *E. coli* O157 is present on the farm. A risk management approach which relies primarily on handwashing to prevent risk of infection is, in our view, misdirected. Control measures should primarily focus on preventing visitor contact with animal faeces or faecal matter. Handwashing however remains the principal control measure available to the public and must be actively encouraged by the farm operator.

To minimise visitor contact with animal faeces or faecal matter, we have identified specific issues that should be addressed as a matter of urgency. These could form the basis of an agreed code of good practice within the industry. Farm layout and design are critical to reducing the risk of infection. The practice of 'deep bedding' should not be permitted in children-animal contact areas.

Meeting the Regulatory Challenges

The existing regulatory structure is not securing compliance with standards and is unlikely to reduce the risk of future outbreaks at Open Farms unless reinforced. Non-statutory, unenforceable guidance leaves room for doubt about standards of protection; simply revising guidance will not be sufficient to meet the challenge of improving public health protection.

A voluntary accreditation scheme for Open Farms is strongly recommended as helpful to both operators and regulators but we do not recommend making special regulations or licensing of Open Farms at this time. An Approved Code of Practice (ACoP) would provide clarity and certainty about standards, helping both operators and enforcing authorities.

A definition of an Open Farm is needed and a national register of Open Farms would help to target awareness raising, education and inspection programmes.

The HPA has no enforcement powers and is not an enforcing authority; the powers of the Consultant in Communicable Disease Control (CCDC) and LA inspectors to prohibit activities or close premises need clarification. The confidence and competence of Environmental Health Officers (EHOs) to inspect and enforce standards at Open Farms needs to be strengthened. There is a need for agencies to share information and work much more closely together in regulating Open Farms.

Conclusions and Recommendations

Even with the promptest of control measures, the Surrey 2009 outbreak would have been the largest *E. coli* O157 outbreak associated with animal contact ever reported in the UK. This emphasises the importance, not only of prompt identification and control of outbreaks, but also of measures to reduce the risk of acquiring *E. coli* O157 infection.

Prompt identification and control of outbreaks require implementation of existing HPA procedure and guidelines and clarity regarding the respective roles of the HPU and EHD. The HPU should provide public health leadership and the EHD should have both the competence and confidence to issue prohibition notices if a farm is suspected as the source of an outbreak of zoonotic disease. Animal contact, especially with ruminants, should be prioritised as the activity to be closed at the earliest suspicion of a farm-related *E. coli* O157 outbreak.



The time course of the Godstone Farm outbreak clearly demonstrates that handwashing alone cannot be relied upon to prevent outbreaks of *E. coli* O157 infection acquired by contact with animals or their faeces. Open Farm operators should ensure that visitor contact with animal faeces is minimised or eliminated.

There needs to be greater awareness of the risks of animal contact among farm owners, regulatory authorities and visitors to Open Farms. Public education on the risks of infections acquired by animal contact needs to be reinforced, both before and during the farm visit.

The content of all existing guidance touching on human health and safety at Open Farms needs to be reviewed, improved and clarified, where necessary. Regulatory authorities and industry representatives should pursue the development of an ACoP, and an associated national accreditation scheme for Open Farms.

The evident complexity of the regulatory regime relating to Open Farms requires a strategy of 'joined-up regulation' to provide more effective oversight of safety and opportunities for reducing the inspection burden.

Our enquiry focused on the larger scale Open Farms, as exemplified by Godstone Farm. However, the principles we recommend for reducing the risk of infection may also be applied to a wider range of farm premises and rural activities in which contact with ruminant animals or their faeces may occur.

Summary of Top Six Recommendations:

- Farm operators should ensure that the layout and design of public areas are such that visitor contact with animal faecal matter (particularly ruminant) is minimised or eliminated
- There is a need to raise public awareness of the potential infection risks when arriving at a farm attraction, emphasising the parent/carer's decision to allow children to have animal contact
- There should be a reassessment of the risk of *E. coli* O157 infection as 'low'. Its probability may be low but the impact is high and the consequences very severe
- An Approved Code of Practice (ACoP) should be developed for the Open Farm industry, involving relevant authorities and in close consultation with leading representatives of the industry to underpin the industry's initiative in establishing an accreditation scheme
- The regulatory agencies and others should explore ways of working together in regulating Open Farms clarifying roles, responsibilities and relationships
- Research should be pursued to assist clinicians in the rapid diagnosis of *E. coli* O157 and the identification of and treatment for children likely to develop severe complications of the infection. Research should also be undertaken aimed at preventing or limiting carriage of the organism in animals.

Outline of the Report



The purpose of our Investigation was to make recommendations so as to reduce the risk of contracting *E. coli* O157 in those who visit Open Farms and to improve the health protection response to future outbreaks of *E. coli* O157 infection.

Guided by the Terms of Reference, the Independent Investigation Committee requested evidence from key stakeholder organisations and a number of individual experts. The background evidence is brought together in four Chapters that comprise Part A (The Context) of the Report. This is followed by two Chapters in Part B (The Outbreak) that describe the outbreak of *E. coli* O157 at Godstone Farm with a synopsis of interviews with the parents of affected children. In Part C (Management of the Outbreak) we evaluate and analyse the management and control of the outbreak and in Part D (The Challenge of Reducing the Risks) we provide a critical assessment of the way in which the risks associated with *E. coli* O157 are assessed and managed and propose solutions to meet this challenge. Our recommendations and conclusions are gathered together in Part E.

From the outset of the Investigation we were presented with two fundamental issues. First, an Open Farm was defined for us by the Health Protection Agency as one that invites members of the public to visit and that facilitates direct contact with the animals. However, it became clear that venues which allow the public to have contact with animals are many and varied. To focus on the types of premises and the animal contacts that led to the outbreak of *E. coli* O157 at Godstone Farm requires us to define the type of premises that are the primary attention of our investigation and the target of our recommendations.

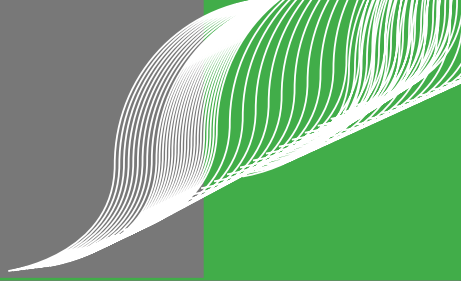
We therefore define Open Farms as 'those premises that maintain farm animals, actively attract visitors for leisure purposes, have visitor facilities and encourage, permit and allow animal contact, and such premises need not be open on a daily basis nor solely operating as commercial leisure activities'. Our recommendations for regulation, inspection and operational procedures are predominantly focused on Open Farms like these and are outlined in Parts D and E. However, the risks that may arise from all agricultural animal contact have been considered and appropriate risk management practices that should be made available are also commented on in Chapter 8 of Part D.

The second important issue for us was that public health is a devolved matter and there are significant differences in the structures and responsibilities in each of our devolved countries. The report has primarily described the situation in England but we have sought evidence from across Great Britain and Northern Ireland and have noted that in many aspects therein lies a considerable wealth of experience and knowledge. We have sought to make recommendations in Part E that are pertinent to England but we recommend that in view of the complex regulatory arrangements for Open Farms each devolved territory should initiate an examination of these recommendations to ensure their implementation for the protection of public health.

PART A THE CONTEXT

Chapter 1: *Escherichia coli* O157 sets out the nature of the organism *E. coli* O157, its pathogenicity and the range of clinical symptoms it can produce. A review of the epidemiology of *E. coli* O157 is included, together with the nature of sporadic cases versus outbreaks. Examples of other outbreaks of *E. coli* O157 associated with animal contact are also described.

Chapter 2: Standard Public Health Procedures for *E. coli* O157 discusses the process of controlling an outbreak, beginning with how an outbreak is recognised and the key organisations involved in outbreak control.



Chapter 3: Open Farms describes the wide range of Open Farm premises that offer educational visits and/or entertainment to the public. A summary of the functions of the many non-regulatory organisations related to the Open Farm industry is provided, together with an overview of the existing schemes for accreditation of educational visits to farms.

Chapter 4: The Regulatory Framework for Open Farms presents an overview and lists the main regulatory Bodies responsible for the inspection of Open Farm premises. Reference is made to the Guidance that is used to monitor and inspect standards at Open Farms. This chapter reviews the current UK legislation and compares the framework in the UK with that of Europe, the USA and other countries.

PART B THE OUTBREAK

Chapter 5: The Outbreak at Godstone is described in detail. A timeline setting out the main events during the outbreak is included, as well as details of the clinical impact of the outbreak.

Chapter 6: The Views of Parents is a synopsis of interviews with parents whose children were affected by the outbreak. A compilation of the interviews is included in Appendix 8.

PART C MANAGEMENT OF THE OUTBREAK

Chapter 7: The Management and Control of the Outbreak deals with how and how quickly the outbreak was identified and what was done to control it. This Chapter examines the work of the outbreak control team and reviews what was done to disseminate information about the outbreak.

PART D THE CHALLENGE OF REDUCING THE RISKS

Chapter 8: Assessing and Managing the Risks contains a critical assessment of the current levels of hazard and risk as applied to Open Farms. The perception of risk of *E. coli* O157 infection on Open Farms is also assessed and a view is presented on what additional prevention and control measures are needed in the light of the outbreak at Godstone.

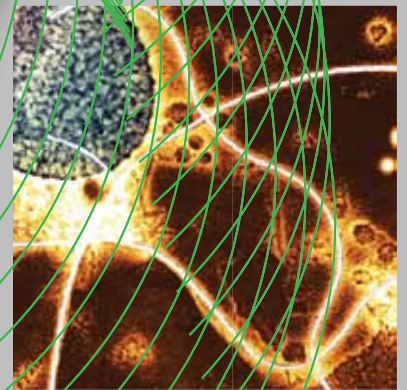
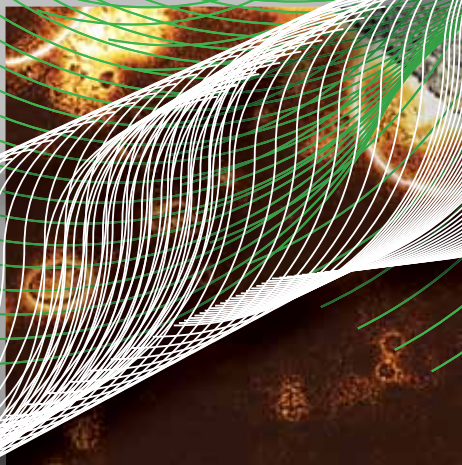
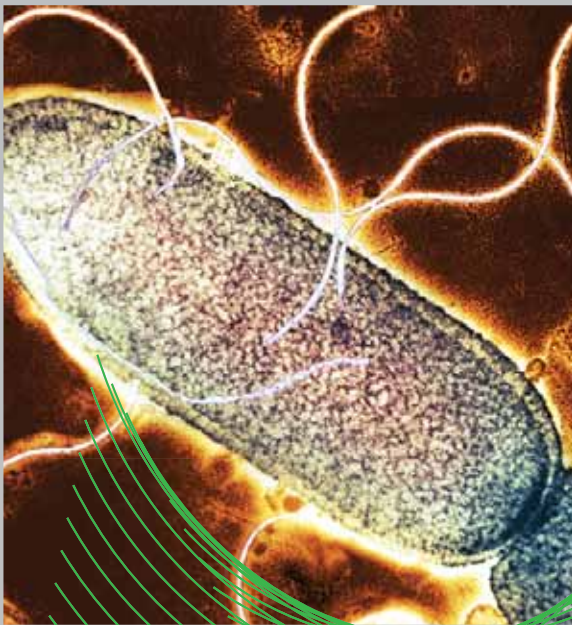
Chapter 9: Meeting the Challenges. In this Chapter, the Committee provides a critical assessment of the existing regulatory framework and presents a series of potential solutions to improve the regulatory structure.

PART E CONCLUSIONS AND RECOMMENDATIONS

Chapter 10: Conclusions and Recommendations brings together and puts into perspective the key points from all the separate strands of the investigation and presents the conclusions of the Investigation Committee. This chapter also combines the full set of recommendations from the preceding chapters.

PART A THE CONTEXT

Chapter I: *Escherichia coli* O157



Chapter 1: *Escherichia coli* O157

1.1 The Organism

1.2 The Ecology of *E. coli* O157

1.3 Human Disease and its Management

1.4 Diagnostic Microbiology

1.5 Epidemiology of *E. coli* O157 Human Infections

1.6 References

Key Points

E. coli O157 infection in humans is still relatively uncommon but, because the illness it causes can be severe or fatal, it remains a serious public health issue.

E. coli O157 is a particularly nasty and problematic organism because:

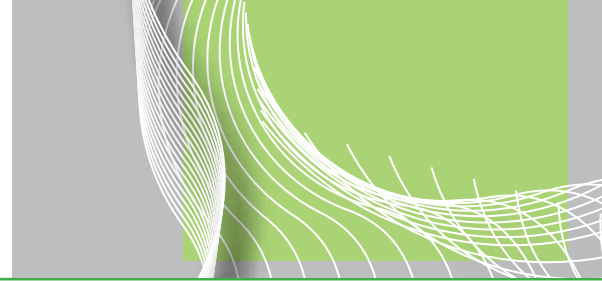
- It is highly virulent, producing potent toxins
- It can survive for long periods of time in the environment
- Ingesting a small number of organisms, possibly between 10 and 100, can cause illness
- Young children (particularly under five years of age) and older people (particularly over 75 years of age) are very vulnerable to it
- The illness can be very serious and is sometimes fatal. After recovery from illness some people are left with permanent kidney or brain damage
- There is currently no licensed specific treatment other than good supportive care.

E. coli O157 is commonly carried by animals and:

- Ruminants are considered the major reservoir of infection, although the organism has been found in the faeces of a wide variety of animals
- *E. coli* O157 causes no clinical signs of infection in animals
- *E. coli* O157 may colonise the rectum of cattle and these colonised animals greatly increase the potential for spread of *E. coli* O157 through faecal excretion
- There are no established on-farm control options
- All ruminants should be considered as colonised by *E. coli* O157.

Common features of *E. coli* O157 outbreaks in humans are:

- A variety of sources have been identified for outbreaks including foodborne, waterborne, person-to-person spread and animal contact (all of these relate back to faecal exposure)
- Agricultural and environmental exposures, particularly contact with ruminants faeces, are well recognised causes of *E. coli* O157 human infections and outbreaks.



1.1 The Organism

Escherichia coli are common Gram-negative bacteria that form a normal part of the gut flora of humans and animals. Most of the microorganisms are harmless and are an essential part of the digestive system. However, among the large number of genetic types of *E. coli* some cause human disease. These have been reviewed in detail elsewhere (1-3).

The most virulent of these pathogenic *E. coli* are the strains, first described in 1977, that produce toxins that kill vero cells in tissue culture (vero cells are a type of laboratory cultured African green monkey kidney cells) (4). The toxins produced by these bacteria are called verocytotoxins, and the bacteria that produce them are called verocytotoxigenic *E. coli* (VTEC). *E. coli* O157 is one such strain.

Some strains of O157, including serotypes O157:H7 and O157:H negative, have other virulence properties as well as producing verocytotoxins. They are classified as enterohaemorrhagic *E. coli* (EHEC) because of their association with bloody diarrhoea and haemorrhagic colitis (1-3). To avoid confusion the organism which is the subject of this review, will be referred to as *E. coli* O157 throughout this report.

E. coli O157 is a relatively newly described strain and was recognised as causing human infection in the 1980s (1). It first came to notice in 1982 in Oregon, USA, when it caused an outbreak of bloody diarrhoea linked to undercooked hamburgers from a national chain of fast food restaurants (5). Subsequently, an association between bacteria producing verocytotoxin and the childhood haemolytic uraemic syndrome (HUS) was found (6). *E. coli* O157 infection is now recognised as the main cause of childhood HUS in which there is acute renal failure and destruction of red blood cells causing anaemia.

The emergence of *E. coli* O157 is linked to its genetic evolution and the fact that it has acquired a variety of virulence factors likely through transmission of plasmids (small DNA fragments) between bacteria (1). These include a 60 MDa plasmid, a genetic locus that allows the organism to adhere to cells and cause attaching and effacing (A/E) lesions, as well as other genetic elements that produce verocytotoxins (1-3).

1.2 The Ecology of *E. coli* O157

1.2.1 Animal Carriage

The source of *E. coli* O157 can be traced back to the farm environment. Cattle, sheep, goats and other ruminants are considered important reservoirs of *E. coli* O157 although the organism may be found in the gut flora of many animals including pigs, cats, dogs, rabbits, chickens and other birds which are also potential sources of infection (1,7). The organism may multiply as part of the gut flora or it may be passively carried through the animal and so is present in faeces. Young cattle between two and 18 months of age are most likely to be excreting the organism but importantly, animals that are shedding *E. coli* O157 in faeces show no clinical signs and owners will be unable to identify colonised animals.

Many studies have shown that as a consequence of this excretion by animals, *E. coli* O157 is commonly found in farming environments. Bacteria present in animal manure can lead to contamination of soil and grass, farm buildings, fences, machinery and water courses. The organism is very hardy and may survive for months in animal faeces and soil.

Most of our understanding of the carriage of *E. coli* O157 comes from studies of cattle, although sheep and goats, which are important sources of infection on Open Farms, maintain *E. coli* O157 in the intestinal lumen in an essentially similar manner (8). Cattle vary considerably in the numbers of



E. coli O157 that they shed. Possible factors that affect shedding include age, diet and, probably, the time of year. However, the major factor is whether the animal is colonised by the bacterium. Colonisation particularly occurs in the rectum and colonised cattle are sometimes referred to as 'super-shedders' since they shed more organisms over longer periods of time, although this is not persistent (9). The organism is unequally distributed in the stool of colonised animals with most bacteria being found on the surface of the faeces. These colonised animals greatly increase the potential for spread of *E. coli* O157. They pose a significant risk of contaminating the environment, and also other animals within the group or herd. Bacterial counts are frequently higher than 3,000 organisms per gram of faeces (9,10) and this contributes greatly to the risk of human exposure (only 10 to 100 organisms are required for human infection). Since cattle spend time grooming by licking themselves and as they are often in environments contaminated by *E. coli* O157 the organism may be found in their saliva and on the animals' hides as well as in faeces (11,12).

The reported number of farms with positive cattle varies considerably (7,10). Although shedding in an animal or group is intermittent it is important to regard all ruminants as potentially infected since there are no clinical signs of infection. Although the epidemiology of *E. coli* O157 in cattle and other animals has been studied extensively, and further details are available in reviews (1-3,7,8,10), the routes of between-farm transmissions are not understood (10). Possibilities include the movement of cattle between farms, the movement of contaminated faeces or soil on farm personnel or equipment, the movement of contaminated feed or the movement of wildlife (eg, wild birds) on to farms.

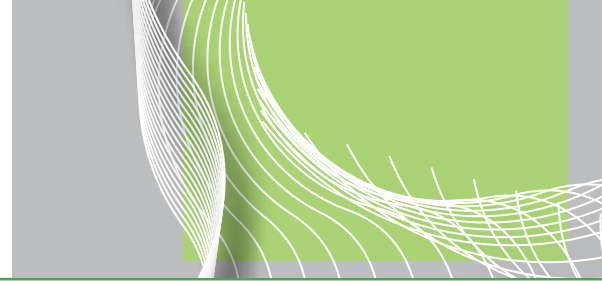
1.2.2 Control and Vaccination

Cattle are regarded as the major source of *E. coli* O157 infections for people, with an important control being the hygienic slaughter of animals to prevent faecal contamination of raw meat. However, on-farm control of the organism is more difficult as animals show no signs of infection and are therefore not easily detectable, and the organism may be commonly found in the environment of colonised animals. Additionally, no production losses are associated with infection and controls are therefore necessary only to prevent human infection.

Few farm management procedures have been shown to be effective as on-farm control options. However, super-shedding has an important theoretical implication for the control of *E. coli* O157 on farms and, indirectly, in reducing the risk of human infection. To date, control options for *E. coli* O157 in cattle have not taken super-shedding into account. Identifying super-shedding animals would allow control strategies to be targeted at removing or eliminating high-level faecal excretion and to greatly reducing the prevalence of the organism. Possible strategies include the detection and removal of super-shedding cattle, testing before movement of individual animals and treatment of colonised animals at the farm. In the medium term, vaccination to restrict the likelihood of colonisation may become a possible strategy.

Vaccination of cattle with bacterial antigens has the potential to reduce both the number of colonised cattle and the levels of organism excreted by colonised animals. This would help minimise infection of animals and exposure of humans to *E. coli* O157. We are aware of companies that market vaccines targeted at the control of *E. coli* O157 in cattle in North America and of a UK research project under Defra-LINK (LK0666). There are also published trials validating these vaccines (13-16). However, we have no knowledge of any *E. coli* O157 vaccine currently commercially available in the UK or indeed licensed for use.

Major issues for any veterinary *E. coli* O157 vaccine are cost, how it is paid for and what are the regulations for its use. Since cattle do not exhibit signs of *E. coli* O157 infection, vaccination conveys no direct benefit to the farmer. In addition, the authorisation of veterinary medicines in the EU is complex.



A product authorised in the USA cannot automatically be authorised in the EU. Although there are means of gaining permission to use USA-authorised products in the UK, these are restricted to very specific situations. It is also possible for a veterinary surgeon to apply for a special treatment certificate to allow them to import an authorised product from a third country, but data must be provided to show that the product is safe and that no other options are available for treatment of individual animals.

1.3 Human Disease and its Management

1.3.1 Sources of Infection

E. coli O157 is spread to humans by swallowing material contaminated with *E. coli* O157 from faecal sources. People can become infected with *E. coli* O157 through consuming contaminated food or drink, through direct contact with contaminated animals, or by contact with an environment contaminated with animal faeces. Direct spread from person to person also occurs, particularly in families and in childcare facilities. Infection is through a person's mouth and this may occur by contact between the mouth and hands, if hands have been contaminated. The infectious dose is considered to be very low and ingesting just a few organisms, possibly between 10 and 100, can cause illness (1,2).

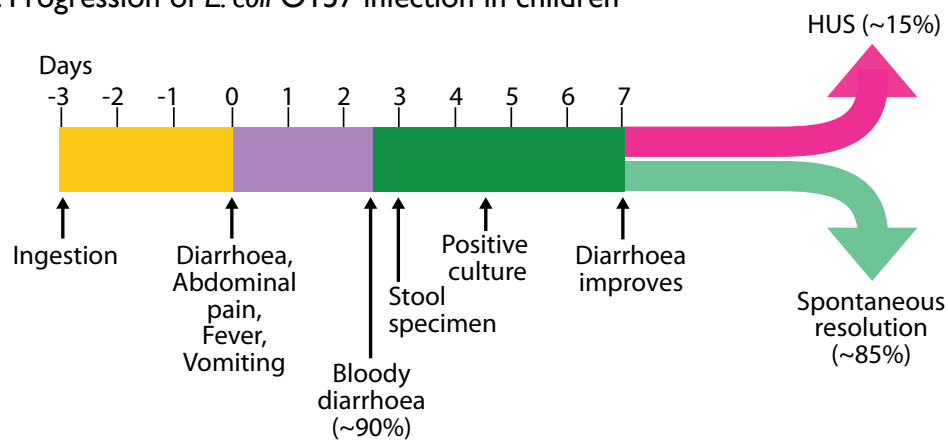
After ingestion, the bacteria travel through the gut and attach themselves to the inside surface of the large intestine. The bacteria produce toxins that destroy the cells lining the colon and cause inflammation of the intestine. The toxins may be absorbed and travel in the blood stream to other parts of the body. The toxins can damage cells lining blood vessels (endothelium) and this damage can lead to bleeding, blockage of vessels by thrombosis and produce profound inflammation. This can happen not only in the intestine, but also to the small blood vessels of other organs, such as the kidney or brain, causing severe pathophysiology.

The incubation period for infection with *E. coli* O157, ie, the period between ingesting the organism and the onset of symptoms, is between two and 12 days and most commonly around three or four days (17).

Handwashing is one of the most important ways of preventing the spread of infection. Proper handwashing means:

- Using soap and running water; warm or hot water is best
- Wetting hands thoroughly and lathering with soap
- Rubbing hands vigorously for at least 10 to 15 seconds while washing
- Paying attention to the back of hands, wrists, between fingers and under fingernails
- Rinsing hands well under running water
- Drying hands with a disposable paper towel, clean towel, or air dryer
- Turning off the tap with the paper towel, if used.

Figure 1.1: Progression of *E. coli* O157 infection in children



Source: Adapted from *Lancet* 2005; 365:1073-86 (17)

1.3.2 Clinical Presentation

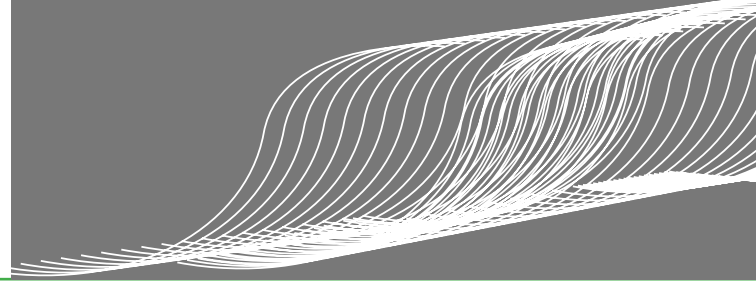
Symptoms of *E. coli* O157 infection include diarrhoea, abdominal pain, headache, nausea and vomiting. Typically, the infection starts with one to three days of non-bloody diarrhoea that may be preceded by bouts of severe abdominal pain (Figure 1.1). In up to 90% of cases the diarrhoea becomes bloody and the patient often suffers severe abdominal cramps (17). Severe cases are sometimes described as 'all blood and no stool'. Bloody diarrhoea prompts patients and their families to seek medical attention from their general practitioner (GP). The spectrum of disease ranges from asymptomatic infection (showing no symptoms) in about 10% of cases, or mild diarrhoea, through haemorrhagic colitis to HUS, thrombotic thrombocytopenic purpura (TTP) and death (18). HUS is most often seen in young children and TTP occurs mainly in older adults. Around 15% of infected children under 10 years of age develop HUS (1,17). Children with asymptomatic infection do not require treatment but may excrete the organism in their stool and may spread infection to others. Following resolution of symptoms the organism can be excreted in stools for several weeks and cultures are required to ensure that excretion has ceased.

1.3.3 Treatment and Care

Acute bloody diarrhoea is a medical emergency, particularly in children (17,19). The diagnosis of *E. coli* O157 infection should be considered in any infant or child with bloody diarrhoea. GPs should refer such patients to hospital as soon as possible as the clinical consequences are likely to be severe, particularly for *E. coli* O157 (17,19-21). Furthermore patients with *E. coli* O157 infection are also highly infectious, and admission to hospital with isolation can prevent spread to others, particularly within the household (17,19,21).

Early identification of *E. coli* O157 infection is vital and faecal samples should be taken for laboratory diagnosis at the first possible opportunity. There is currently no specific treatment for *E. coli* O157 and effective management of patients therefore relies on excellent supportive care. Antibiotics should not be given to patients with suspected *E. coli* O157 infection since they may increase the risk of developing HUS. Anti-diarrhoeal medicines, non-steroidal anti-inflammatory medicines and opioids are also best avoided.

In most people the symptoms resolve spontaneously in about a week, but some will develop HUS. This is a complex syndrome, caused by the *E. coli* O157 verocytotoxins, that results in haemolytic anaemia (destruction of red blood cells caused by shearing resulting from sticking to inflamed endothelium), thrombocytopenia (caused by rapid removal of platelets from blood during activation of clotting), and acute kidney failure (6,18). HUS usually develops five to 13 days after the onset of diarrhoea and in



severely affected children it is life-threatening. *E. coli* O157 is the major cause of HUS in UK and Ireland and patients require treatment in specialist paediatric nephrology centres (22).

If kidney function deteriorates, the body is unable to excrete fluid and waste products. Toxins accumulate, the body's fluid/electrolyte balance is affected, and supportive treatment with peritoneal dialysis or haemodialysis becomes essential. This requires surgery either to insert a peritoneal dialysis catheter into the abdomen or to insert vascular catheters into major veins. Both of these procedures carry significant risks and are very challenging to patients and their families. Dialysis can be life-saving and may allow kidney function to be restored. Treatment may take several weeks, and in some cases the kidneys recover so that dialysis can be stopped, although some patients may die, particularly in the early stages of illness. Some patients may also have permanent kidney damage and later develop chronic kidney failure where dialysis or kidney transplantation is needed. It is therefore crucial that all patients with kidney damage have long term clinical follow-up to monitor kidney function and blood pressure.

Although conventional antibiotic treatment is contraindicated for *E. coli* O157 infections, novel treatment strategies to reduce the toxic effects of the verocytotoxin have been explored using monoclonal antibodies (23) and a variety of means to block the toxin and the clinical efficacy of these treatments have been reviewed (24). However at the moment there is no way to predict which children will develop acute renal failure and therefore are likely to benefit from prophylactic toxin blockade using monoclonal antibody.

1.4 Diagnostic Microbiology

The National Standard Method for investigation of faecal specimens for bacterial pathogens recommends that primary clinical laboratories routinely screen faeces from patients for campylobacter, salmonella, shigella and *E. coli* O157 on all diarrhoeal (semi-formed or liquid) faeces (25).

In the UK, *E. coli* O157 is presumptively identified in clinical laboratories by the isolation of non-fermenting organisms on Sorbitol MacConkey medium often containing cefixime and tellurite (a selective indicator medium: CT-SMAC). These suspect colonies are tested by commercial latex agglutination kits and identified biochemically as *E. coli* O157 (26). The designation of O157 indicates the serotype of the O antigen on the surface of the organism and is discrete for this organism. This is the principal primary test for supporting the clinical diagnosis in the individual patient. The turnaround time for presumptive identification is around two working days.

Some commercial identification and serotyping systems may misidentify *E. coli* O157, so all presumptive *E. coli* O157 from human and non-human sources are referred to specialist laboratories for confirmation. In England, Wales and Northern Ireland, confirmation and sub-typing is carried out by the Gastrointestinal Infections Reference Unit (GIRU) of the Laboratory for Gastrointestinal Pathogens (LGP) at the Health Protection Agency Centre for Infections (HPA CfI), Colindale, London. In Scotland isolates are referred to the Scottish *E. coli* Reference Laboratory (SERL) at Edinburgh Royal Infirmary. At the reference laboratory the isolates are confirmed biochemically as *E. coli*, serotyped, phage typed and tested by polymerase chain reaction (PCR) for the presence and type of verocytotoxin gene. The published turnaround and reporting times for these definitive tests is eight days (27, 28).

LGP and SERL routinely phage type all confirmed cases of *E. coli* O157 infection. Further characterisation at LGP is by multi locus variable number tandem repeat analysis (VNTR/MLVA) supported by pulsed field gel electrophoresis (PFGE). The MLVA sub-typing takes three working days.



This strain typing is by fragment analysis on a DNA sequencer to give a numeric 'fingerprint' for each strain. The purpose of the typing is principally for epidemiological studies to determine the relationship of cases (and environmental and animal isolates) in the outbreak.

1.5 Epidemiology of *E. coli* O157 Human Infections

1.5.1 Data Sources

Three main sources of routinely collected data are used to build a picture of the pattern of *E. coli* O157 infections in people in the UK (29):

- Statutory notifications of cases of food poisoning by doctors
- Voluntary reports of laboratory confirmed infections from diagnostic laboratories to HPA
- Outbreak report forms submitted by Health Protection Units (HPUs) on general outbreaks of infectious intestinal disease (IID).

In addition, from 1 January 2009, the HPA introduced an enhanced surveillance scheme for *E. coli* O157 infections in England.

a) Statutory notifications

Food poisoning is a statutorily notifiable disease. In England and Wales, the Public Health (Control of Disease) Act 1984 requires that the doctor attending the patient notifies the 'proper officer' of the local authority (LA) of any suspected case. Similar legislation applies in Scotland and Northern Ireland. A consultant in communicable disease control (CCDC) based in the local HPU is usually appointed as a 'proper officer' by the LA for this purpose.

The term 'food poisoning' is not defined in legislation but a definition was circulated to all UK doctors by the Chief Medical Officer in 1992 (30). This defines food poisoning as: 'any disease of an infectious or toxic nature caused by or thought to be caused by the consumption of food or water'.

At the time of the Godstone outbreak, *E. coli* O157 infection was therefore notifiable if it was considered to be caused by consumption of food or water; but not if it was acquired by direct animal contact, from the farm environment, or by person-to-person spread. A study of primary and secondary cases of *E. coli* O157 gastroenteritis revealed that around 20% of cases could be identified as due to secondary spread (31).

From 6 April 2010, infectious bloody diarrhoea and HUS both became notifiable diseases in England under Schedule 1 of The Health Protection (Notification) Regulations 2010 (see Chapter 2). In addition, from October 2010 isolation of *E. coli* O157 by diagnostic laboratories becomes notifiable.

b) Voluntary reports from diagnostic laboratories

Laboratory reporting underpins the national surveillance system. All public health laboratories and reference laboratories, most NHS laboratories and a small number of private laboratories throughout England and Wales report weekly, mostly via electronic links to the HPA CfI (see Chapter 2).

c) Surveillance scheme for general outbreaks of IID

This is a voluntary scheme run by HPA CfI that collects data on general outbreaks of IID, including *E. coli* O157. A general outbreak is defined as 'an outbreak affecting members of more than one private

residence or residents of an institution'. Similar arrangements exist in Scotland and Northern Ireland. When Cfl becomes aware of a possible general outbreak (referred to hereafter as an outbreak), a structured questionnaire is sent to the appropriate CCDC for completion when the outbreak investigation is finished. Data collected include information about the number of people who were hospitalised or died, at the time of the outbreak. There are several potential reporting biases, eg, outbreaks at social functions affecting a defined cohort of people are more likely to be identified and investigated than those in which cases are widely dispersed in the community. The reporting individual also decides the probable mode of transmission and the factors likely to have contributed to the outbreak.

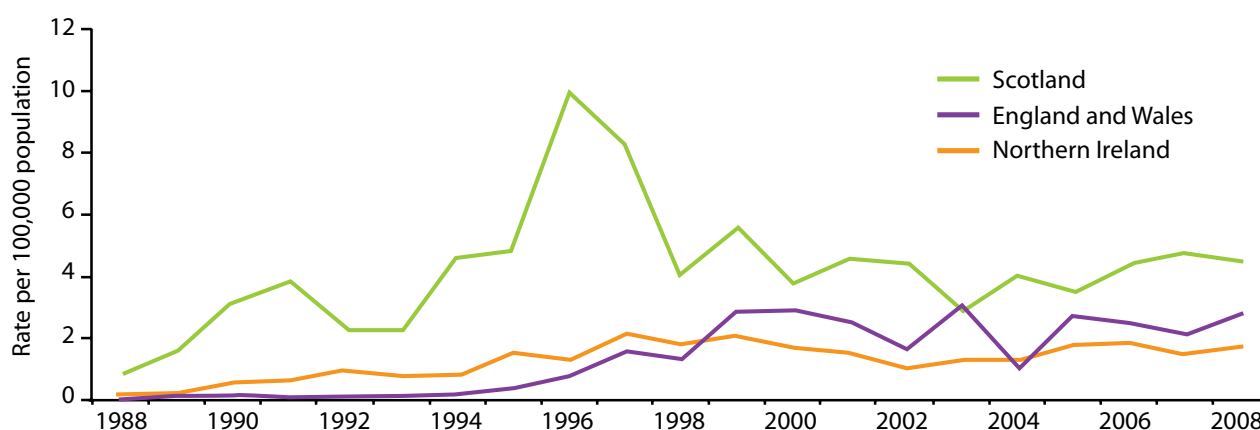
d) Enhanced surveillance scheme for *E. coli* O157

Since January 2009, Cfl has operated an enhanced surveillance scheme for *E. coli* O157 in England (see Chapter 2). The objectives are to collect a standard minimum dataset on cases in order to identify linkages that are not immediately apparent, to improve outbreak recognition and investigation, to better understand the epidemiology, and to quantify the health impact of *E. coli* O157 (32). The questionnaire is completed by asking the patient, or family, direct questions aimed at identifying the potential source of infection. Local HPU's are required to complete a standard questionnaire on each case of *E. coli* O157 and forward it to Cfl within seven days. Similar schemes have existed in Scotland and Wales for several years.

1.5.2 Disease Incidence and Trends

The first documented report of *E. coli* O157 in England and Wales was in 1982 and in Scotland in 1984. Across the UK reported cases increased considerably during the 1980s and 1990s. The number of reported cases in the UK is currently just over 1,000 cases per year. In 2008, there were 1,237 laboratory confirmed cases of *E. coli* O157 infections in the UK, compared with 1,113 in 2007 (32). Currently the most common phage type (PT) of *E. coli* O157 in the UK is PT21/28.

Figure 1.2: Laboratory reports of confirmed *E. coli* O157 infections, 1988-2008



Source: UK Zoonoses Report 2008 (Defra) (33)

The number of cases of *E. coli* O157 infection varies considerably between the four UK countries (Figure 1.2). Scotland has a consistently higher incidence than elsewhere in the UK (around five infections per 100,000 population in Scotland compared to two infections per 100,000 population in England and Wales). Large outbreaks of *E. coli* O157 may also have a considerable influence on annual infection rates.



E. coli O157 infection is seen worldwide. The highest incidence of human infection has been reported in parts of Canada, the USA, Japan and Scotland. The UK has a higher incidence of *E. coli* O157 infection than most European countries. This might be due to differences in laboratory testing and reporting procedures between countries or to a more efficient laboratory surveillance system in the UK. The most recent report of the European Food Safety Authority (EFSA) (34) shows the UK rate of VTEC (including *E. coli* O157 and other *E. coli* serogroups) to be 1.9 human cases per 100,000 population compared to the overall European rate of 0.7 infections per 100,000 population.

1.5.3 Risk Factors for Sporadic Human Cases

The majority of *E. coli* O157 infections occur between July and September each year and reporting rates are highest in children under five years of age (mean incidence 6.1 per 100,000 per year; 2000-2008). Most cases of *E. coli* O157 are classed as sporadic (not associated with outbreaks) and it is often difficult to confirm a source of infection in these cases.

However, a review of the published literature shows that there is accumulating evidence that contact with farm animals or the farm environment is an important risk factor for becoming infected with *E. coli* O157 (Table 1.1). The table shows the location and size of each study including both the number of *E. coli* O157 patient cases studied and (in brackets) the number of unaffected controls, ie, healthy persons used to make comparisons about likely sources of infection.

Table 1.1: Published studies of farm-related risk factors for sporadic *E. coli* O157 infection

Type of study	Country	Date	Cases (controls)	Risk factors for <i>E. coli</i> O157	Reference
Case investigation	Wisconsin, USA	1992-99	1,333	Exposure to farm environment	35
Case control	FoodNet, USA	1996-97	196 (372)	Exposure to farm environment Contact with animals (cattle)	36
Case control	Wales	1994-96	85 (142)	Visiting a private farm Contact with animals	37
Case control	England	1996-97	369 (511)	Exposure to farm environment	38
Case control	Scotland	1996-99	183 (545)	Contact with animal faeces	39
Case control	FoodNet, USA	1999-00	283 (534)	Contact with animals (cattle)	40
Case control	Germany	2001-03	202 (202)	Contact with animals (ruminants)	41

Three independent case-control studies in England, Scotland and Wales have investigated risk factors for sporadic *E. coli* O157 infection. All demonstrated that people with *E. coli* O157 infection were significantly more likely to have had farm animal contact than healthy controls (37-39). The Welsh study (37) examined sporadic infections between March 1994 and February 1996. Cases were significantly more likely to have visited a private farm or to have a household contact whose occupation involved contact with farm animals, and these risk factors were estimated to account for around 20% of all sporadic cases.

The study in England (38) also found a significant association for infections from contact with the farm environment, including visits to Open Farms, holidaying on farms and work-related visits. In Scotland, cases were more likely to report contact with animal faeces, such as may occur during visits to farms or recreational use of animal pasture (39). In a further study in South West England between November 1994 and October 1997, 23 of 69 sporadic cases noted possible recent contact with farm animals; in seven of these there was microbiological confirmation for the animal as the source of infection (42). More evidence comes from a Scottish study correlating cattle and sheep densities with rates of sporadic human infections (43). In Grampian Region, 63% of *E. coli* O157 cases occurred in rural area postcodes compared to 37% in urban areas, after correcting for population differences. The study concluded that 26% of Scottish cases may originate from animals or from the rural environment (43).

1.5.4 The Pattern of *E. coli* O157 Outbreaks

E. coli O157 outbreaks have been associated with a wide variety of contaminated foodstuffs including fresh and cured meats, milk, cheese, salad vegetables, melon, apple juice and water (1,2). To date, the largest outbreak occurred in Osaka, Japan, in 1996 (44). There were 2,746 microbiologically confirmed cases, mostly in school children, 121 cases of HUS and three deaths. The source was traced to radish sprouts served at school meals. In May 2000, an outbreak in Walkerton, Ontario, Canada, caused by a contaminated water supply affected 2,300 people leading to 27 HUS cases and four deaths (45). Major outbreaks of *E. coli* O157 in the UK have been related to foodborne infection, particularly from cooked meats (46,47).

Surveillance schemes for outbreaks of IID provide data on the trends in *E. coli* O157 outbreaks (Table 1.2). Between 1992 and 2008, 195 outbreaks of *E. coli* O157 were recognised by HPA and its predecessor organisation, the Public Health Laboratory Service in England and Wales, involving a total of 1,534 laboratory confirmed cases which were associated with a range of suspected types of transmission. The majority (84 outbreaks) were linked to the consumption of contaminated foods, 58 were through person-to-person spread, mainly in nurseries and other institutions, 27 were due to animal contact (including Open Farms) and four outbreaks were considered to be waterborne. Since 1999, Health Protection Scotland (HPS) has carried out enhanced surveillance of all microbiologically confirmed cases of *E. coli* O157. Between 1996 and 2008 112 outbreaks of *E. coli* O157 were recorded in Scotland. Many of the outbreaks (47 outbreaks) were related to animal contact, 33 were food-related, 15 involved person-to-person spread. Seventeen were classed as 'other' outbreaks.

Table 1.2: Outbreaks of *E. coli* O157 by suspected source

Suspected source	England and Wales 1992-2008	Mean number of cases per outbreak (England and Wales)	Scotland 1996-2008
Foodborne ^a	84	13.9	33
Waterborne ^b	4	9.8	0
Animal contact ^c	27	5.1	47
Person to person	58	9.0	15
Other ^d	2	10.5	17
Unknown	20	6.4	0
Total	195	10.3	112

Source: HPA CfI and HPS

^a Includes drinking water

^b Excludes drinking water

^c In England and Wales, includes exposure to mud or slurry

^d In Scotland, includes contact with faeces, environment or contaminated water

1.5.5 Outbreaks of Human Infection Associated with Animal Contact

Animal contact is a recognised cause of *E. coli* O157 outbreaks that first became apparent in the early 1990s (48,49). In the USA, the first outbreak ascribed to animal contact occurred in 1996 (50). Between 1996 and 2002 animal contact was thought to be responsible for 11 outbreaks in the USA: five on farms, two at county fairs, two at petting zoos, one at a barn dance and one at a camp (50). Direct or indirect cattle exposure was noted in all 11 outbreaks, mostly occurring in summer and autumn, and outbreak size ranged from two to 111 cases. During the past 10 years, an increasing number of outbreaks of *E. coli* O157 (and other gastrointestinal infections) linked with animals in public settings such as Open Farms and county fairs has been reported in the USA (51). These have included transmission associated with both direct and indirect contact with animals or with their environment.

In the UK, farm outbreaks have arisen from direct animal contact or contact with animal faeces, bathing in contaminated water, or contact with land contaminated with faeces (38,39).

We carried out a comprehensive review of published studies that implicated animal contact as a cause of outbreaks of human *E. coli* O157 infection (Table 1.3). The table indicates the number of outbreak cases included in each study and, if a case-control study was carried out, the number of healthy controls, ie, unaffected persons used to make comparisons about likely sources of infection.

The ages of cases are not shown in Table 1.3, but it should be noted that the great majority of *E. coli* O157 infections related to animal contact occur in children.

Table 1.3: Published studies of *E. coli* O157 outbreaks related to farms and agricultural fairs

Country	Year of outbreak	Cases (controls)	Suspected source	Reference
England	1994	7	Contact with animals (cattle, goats)	49
England	1997	3	Contact with animals (cattle, goats)	52
England	1997	5	Contact with animals (goats and cow)	53
Wales	1999	16 (36)	Consumption of ice cream and candy floss (on farm)	54
Ohio, USA	2000	22 (51)	Consumption of water (attending agricultural fair)	55
Pennsylvania, USA	2000	51 (91)	Contact with animals (dairy) Exposure to farm environment	56
Washington, USA	2000	5	Contact with animals (cattle, goats)	57
Scotland	2000	20	Exposure to farm environment (camp-agricultural showground)	58
England	2001	12	Exposure to farm environment (wild rabbit source)	58
Ohio, USA	2001	23 (53)	Exposure to farm environment (showground barn)	60
Ohio, USA	2001	27	Contact with animals (cattle, rabbits)	61
Oregon, USA	2002	72	Contact with animals (goats, chickens)	61
Canada	2003	45	Contact with animals (goats)	62
Texas, USA	2003	25	Exposure to farm environment (fair livestock area)	63
N Carolina, USA	2004	45 (188)	Exposure to farm environment, (goats, sheep)	64, 65
Florida, USA	2005	22	Visiting animal fairs (goats, sheep, cattle)	65
Arizona, USA	2005	2	Exposure to farm environment	65
Florida, USA	2007	7	Contact with animals (goats)	66
England	2007	5	Contact with animals (dogs on farm)	67



We were advised by the HPA that 23 outbreaks of *E. coli* O157 were linked to visits to open/petting farms in England and Wales between 1994 and 2008 (Table 1.4). In total, these affected 116 people (109 laboratory confirmed cases) and resulted in 46 hospital admissions, but no deaths. The largest outbreak occurred in North Wales in 1999, and affected a total of 24 people with illness due to *E. coli* O157 PT 21/28. A case-control study of 16 primary cases (and 36 controls) carried out as part of the outbreak investigation found that cases were more likely to have eaten ice cream and candy floss than controls. The authors suggested that sticky fingers may have been more likely to become contaminated and/or that the children were cleaning their fingers by licking (54).

The HPS provided information for Scotland. It informed us that animal contact accounted for the largest single category of *E. coli* O157 outbreaks reported from 1996 to 2008. In total, these affected 220 people; the largest outbreak involved 22 people. Outbreaks occurred on private farms, in visitors to holiday accommodation, at campsites, through contamination of private water supplies and after visits to Open Farms. Suspected sources included direct animal contact as well as contact with livestock faeces, environmental exposures and contamination of water by animal faeces. Companion animal exposure was not implicated. The higher number of outbreaks attributed to animal contact in Scotland than in England and Wales may be due to differences in classification or more accurate attribution of outbreaks in the Scotland as a result of the enhanced surveillance scheme.

The Public Health Agency for Northern Ireland provided information for Northern Ireland. It informed us that 10 outbreaks of *E. coli* O157 were identified between 1995 and 2008. The largest of these, in 2008, involved both animal contact and secondary person-to-person spread, and resulted in 17 microbiologically confirmed cases.

Veterinary investigations at Open Farms associated with outbreaks have consistently found *E. coli* O157, with the highest proportion of positive samples being found in cattle and sheep, and on larger farms compared with smaller farms (68). However, further research is required to determine the duration of infection in different species other than cattle and sheep and in particular, quantitative carriage needs to be ascertained throughout the range of species. In this respect it is important to ensure that advice and precautions are adopted for other species on Open Farms in addition to ruminants.

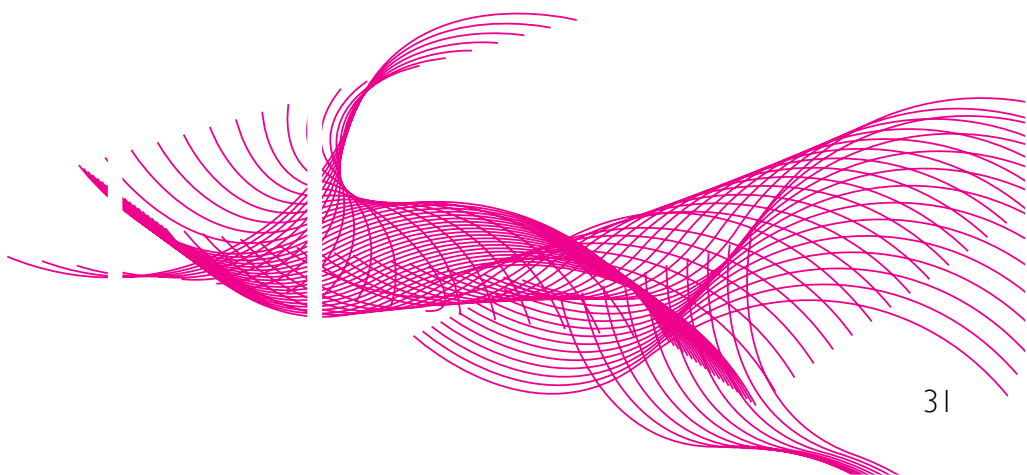


Table 1.4: Outbreaks of *E. coli* O157 associated with animal contact reported in England and Wales, 1994-2008

Year	Number of outbreaks	Region	Number of ill people	Number of laboratory confirmed cases	Number admitted to hospital*	Number of deaths*
1994	2	East Midlands	7	6	5	0
		Mid Wales	2	1	0	0
1997	4	East of England	3	3	2	0
		Yorkshire and the Humber	2	2	0	0
		East Midlands	3	3	2	0
		East of England	5	5	3	0
1998	1	East Midlands	6	4	0	0
1999	3	North Wales	24	21	10	0
		North Wales	2	2	0	0
		East Midlands	2	2	0	0
2000	3	South East	8	8	5	0
		North East	2	2	1	0
		East Midlands	4	4	1	0
2001	2	East of England	12	12	4	0
		South West	4	4	2	0
2002	1	South West	3	3	0	0
2003	1	North East	2	2	2	0
2005	2	East of England	7	7	4	0
		South East	5	5	1	0
2006	1	Yorkshire and the Humber	2	2	0	0
2007	1	East of England	3	3	2	0
2008	2	West Midlands	5	5	0	0
		South East	3	3	2	0
Total	23		116	109	46	0
per annum	1.5		7.7	7.3	3.1	0

* Includes only hospital admissions and deaths at the time of the outbreak

Source: Original data provided by HPA CfI

1.5.6 Outbreaks Associated with Open Farms in 2009

During 2009, there was a considerable increase in the number of *E. coli* O157 outbreaks associated with Open Farms reported in England and Wales (Table 1.5). Six outbreaks were associated with Open Farms compared to an average of one or two outbreaks per year over the previous 15 years. Additionally, more people were affected in 2009 than in all previous outbreaks. Possible reasons that were suggested to us for this increase in outbreaks and persons affected include:

- Improvements in identification of outbreaks linked to Open Farms
- Increases in the shedding of *E. coli* O157 by animals on Open Farms
- A strain of *E. coli* O157 previously uncharacterised in the UK
- Changes to the intensity of contact between visitors and farm animals
- Increase in visitor numbers
- An increasing reliance on hand gels rather than handwashing with soap and water
- Change in survival of *E. coli* O157 in the prevailing climate conditions.

Table 1.5: Outbreaks of *E. coli* O157 associated with animal contact reported in England and Wales, 2009

Year	Number of outbreaks	Region	Number of ill people	Number of laboratory confirmed cases	Number admitted to hospital	Number of deaths
2009	1	South West	7	7	1	0
	1	North West	9	9	3	0
	1	South East	93	93	27	0
	1	East of England	3	3	2	0
	1	East Midlands	3	-	-	0
	1	Yorkshire and the Humber	8	-	-	0
Total	6		123	112	33	0

Source: Data provided by HPA CfI

In addition to examining the report of the Godstone Farm outbreak (see Chapter 5) (South East Region in Table 1.5), we also reviewed reports made available by the outbreak control teams (OCTs, see Chapter 2) that investigated three other large outbreaks of *E. coli* O157 infection that occurred in 2009.



Outbreak 1 – North West Region (Table 1.5)

This outbreak comprised three primary cases, all children under two years of age, and six secondary cases. All were infected with *E. coli* O157 PT 21/28, and three cases developed HUS; all subsequently recovered. The OCT visited the farm and found visible faecal contamination of the outdoor grassed play and picnic areas and reports of goats escaping regularly to eat visitors' food. Several cross-infection and animal husbandry issues were identified, including indoor pens that were deep-littered with straw and completely emptied only once per year; a high density of faeces in outdoor paddocks and pens, and rabbit hutch areas that could not be easily cleaned. The farm closed voluntarily while improvements to the farm environment were made and extra handwashing facilities were installed. The OCT made a general recommendation that animals on Open Farms should be kept in pens and not permitted to roam in public areas.

Outbreak 2 – South West Region (Table 1.5)

This outbreak involved three primary cases each with different strains of *E. coli* O157 (PT34, 54 and 21/28). All were children under five years of age who had visited the farm within a three-week period. There were also some secondary cases among family members. Samples from animal faeces at the farm yielded *E. coli* O157 of phage types 34 and 54 but not 21/28.

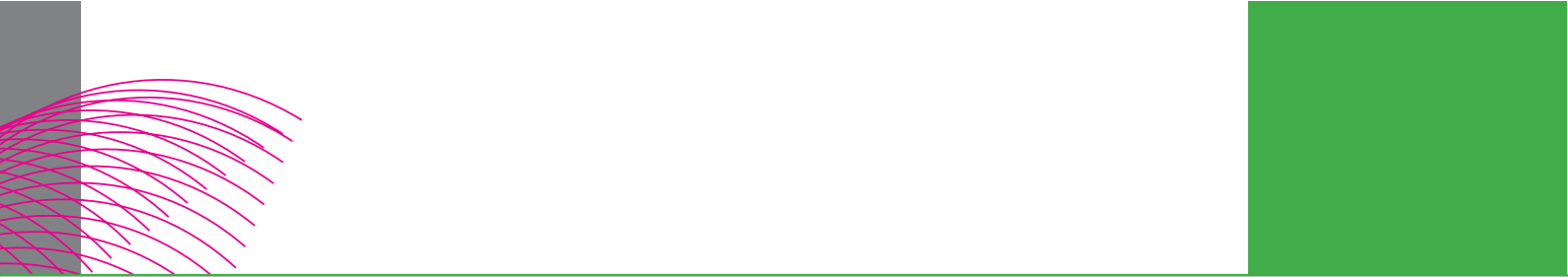
The farm was visited by members of an OCT who considered that there was generally a good standard of practice at the farm and compliance with Health and Safety Executive (HSE) guidance. The main area of concern was the petting barn, where visitors were able to interact freely with the animals and could potentially walk on relatively high concentrations of animal faeces. The team asked the farm to close voluntarily the animal area. No formal improvement or prohibition notice was issued.

The OCT made the following general recommendations:

- There should be an easily accessible database to record details of each case of *E. coli* O157
- The HPA should issue a single advisory document on the investigation of cases of *E. coli* O157 rather than the multiplicity of national and regional documents currently available
- Good practice guidelines for Open Farms need to be clearer
- There need to be clear standards for re-opening a farm after closure.

Outbreak 3 – Yorkshire and the Humber Region (Table 1.5)

There were eight cases of *E. coli* O157 (PT 8, 33, and 21/28) in this outbreak. They were mostly children, including two sibling pairs, who had visited the farm over a period of 12 weeks. Farm closure was advised at the initial meeting of the OCT, although subsequently this was amended so the separate play-barn and go-kart areas could remain in operation as these could be treated as entirely separate premises and operated safely with the cleaning and operational measures that had been implemented. All cases reported activities that involved contact with animals known to be positive with the same strain of *E. coli* O157. There was sufficient evidence to identify the pig washing and calf feeding as the activities most likely to have been the source of infection.



The OCT identified several deficiencies in infection control practices on the farm, including poor staff biosecurity and hygiene, inadequate handwashing facilities, and a lack of public advice and supervision of tours. They also commented on the different perspectives of the HPA and the LA and the difficulty in matching the assessment of risk to the enforcement powers available under health and safety legislation. They also noted that HPA staff were not familiar with the implementation of this legislation.

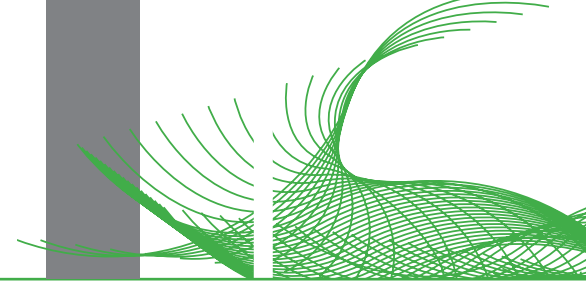
The OCT made several specific recommendations and the following general recommendations:

- Training on relevant legal aspects should be available to HPA staff
- There should be a national investigation of the pathway from risk assessment, and implementation of advice to the enforcement powers available to LAs
- There should be a national system for tracking microbiological samples related to outbreaks
- Environmental health officers (EHOs) should have better support across LA boundaries
- Partner organisations should be better aware of Veterinary Laboratories Agency (VLA) expertise in disinfection advice in farm and animal settings.

It is to be noted that two new cases of *E. coli* O157 associated with this establishment were reported in May 2010 in a group of supervised primary school children.

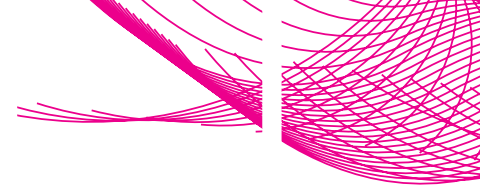
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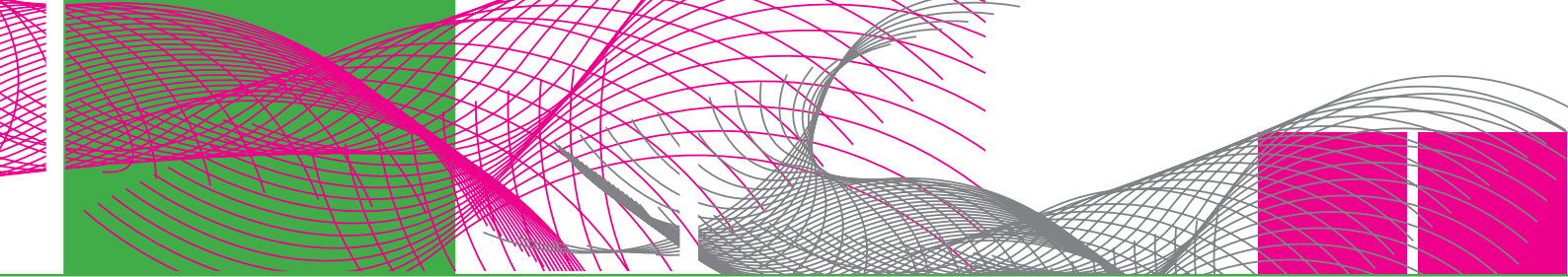
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Chapter 1: *Escherichia coli* O157

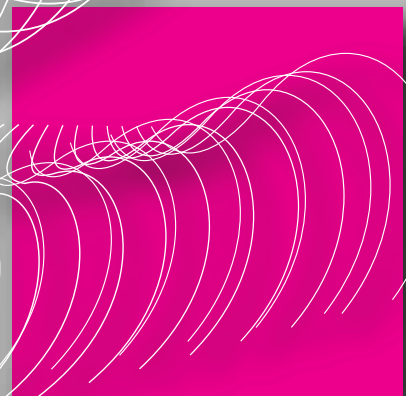
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Chapter 2:

Standard Public Health Procedures for *E. coli* O157



Chapter 2: Standard Public Health Procedures for *E. coli* O157

2.1 Dealing with a Single Case of *E. coli* O157

2.2 Recognising and Responding to an Outbreak

2.3 References

Key Points

- Each report of a presumptive *E. coli* O157 infection should be actively investigated and the risk of onward spread assessed
- Enquiries relating to contact with animals or animal faeces should always be made
- A general outbreak of *E. coli* O157 may be defined as two or more cases from separate households linked to a common source, although the outbreak may initially start as several cases linked in time and place without an identified source
- Early recognition of an outbreak requires careful investigation and documentation of individual cases, effective co-ordination and rapid and organised exchange of information between Health Protection Units (HPUs) and Local Authorities (LAs), and an efficient and sensitive national surveillance system
- The statutory responsibilities, duties and powers that relate to notifiable infectious diseases are as set out in the Public Health (Control of Diseases) Act 1984. These powers relate to individual cases of notifiable infectious disease
- There are no statutory requirements that specify how outbreaks should be managed
- The Health Protection Agency (HPA) does not have statutory powers to enforce legislation; however it works closely to support other agencies that do, such as LAs and the Health and Safety Executive (HSE)
- The specific objectives in the preliminary phase of an outbreak investigation where a common source has been identified are:
 - To confirm the outbreak or incident is real
 - To quickly describe the nature and extent of the outbreak
 - To ensure immediate steps are taken to:
 - Identify those who are ill
 - Identify those at risk
 - Ensure those ill or known to be exposed receive appropriate treatment and care
 - Control the source
 - Contain the spread of infection
 - To decide whether the incident requires special arrangements for investigation and management
 - To alert those who need to know at local, regional or national levels
- All outbreaks warrant a thorough epidemiological description and analysis.



Chapter 2: Standard Public Health Procedures for *E. coli* O157

2.1 Dealing with a Single Case of *E. coli* O157

2.1.1 Reporting procedures

E. coli O157 is detected and diagnosed in NHS and HPA diagnostic microbiology laboratories, usually around 48 hours after receipt of the stool specimen. As a matter of good practice, laboratories that identify presumptive *E. coli* O157 infections should report cases urgently by telephone or fax to the local HPU (1). This became a notification requirement under the 2010 regulations.

Primary laboratories agree with their local HPU, usually in a Memorandum of Understanding, how the HPU is informed of organisms of public health importance. A presumptive identification of *E. coli* O157 should be reported as soon as possible after the organism has been identified, preferably at the same time as the laboratory report is being issued to the requester (2). A report is made to the local HPU for rapid investigation, usually by telephone. A report is also made for surveillance purposes either electronically or by paper form to the HPA Centre for Infections (CfI) via the HPA regional unit, usually on a weekly basis.

The reference laboratory sends a report of confirmatory laboratory tests and typing results to the source laboratory by post unless telephone confirmation is requested. The source laboratory should then report the updated information to the local HPU and to the HPA regional unit.

At the time of the Godstone Farm outbreak, *E. coli* O157 was notifiable only if it was considered to be due to food poisoning.

There was no statutory requirement for laboratories to notify causative agents of infectious disease. However, all clinical laboratories in England and Wales (HPA, NHS and Private) should refer the isolate of presumptive *E. coli* O157 to the CfI Laboratory of Gastrointestinal Pathogens for testing for verocytotoxin production and characterisation. The Department of Health's Inspector of Microbiology has issued guidance to NHS diagnostic microbiology laboratories indicating that they also are considered to have core health protection functions including contributing to surveillance of infectious diseases by timely reporting of infections to HPUs and LAs. (3).

There was no statutory requirement on doctors to report cases of *E. coli* O157 either, unless the illness was considered to be due to food poisoning (4) (see Chapter 1). However, as a matter of good practice, doctors should report urgently any case of haemolytic uraemic syndrome (HUS) preceded by diarrhoeal illness (1).

2.1.2 The New Health Protection Regulations 2010

In April 2010, new Health Protection Regulations for England came into force. These include The Health Protection (Notification) Regulations 2010 which make changes to the requirements for notification of infectious diseases (5).

From 6 April 2010, a registered medical practitioner must notify the 'proper officer' of the LA (usually a Consultant in Communicable Disease Control (CCDC) based at the local HPU) if she/he has reasonable grounds for suspecting that a patient has either infectious bloody diarrhoea or HUS (5). Infectious bloody diarrhoea is most commonly caused by campylobacter or salmonella infection, and a minority are due to *E. coli* O157 (6). Most cases of HUS are caused by *E. coli* O157 (7).

From 1 October 2010, the operator of a diagnostic laboratory must notify the HPA if the laboratory identifies a specified causative agent in a human sample. The schedule of causative agents specifies verocytotoxigenic *E. coli* (VTEC), including *E. coli* O157 (5).

2.1.3 Health Protection Units (HPUs)

The HPA operates through a network of 26 local HPUs (see **Appendix 3**). These are staffed by CsCDC, health protection practitioners and other specialist practitioners who work directly with primary care trusts (PCTs), acute hospital trusts and LAs in their area to deliver local health protection services. The HPU continuously monitors health issues in the local area and is able to respond to incidents around the clock. Furthermore, the HPA Regional Microbiology Network is involved in the diagnostic microbiology of clinical specimens in each of its Regional Laboratories (see **Appendix 3**).

Each HPU is supported by one of nine regional offices that comprise a director, regional management team, and specialists in epidemiology, microbiology and health emergency planning. The regional team co-ordinates the activities of HPUs in their area and together they form the Local and Regional Services (LaRS) division of the HPA.

2.1.4 Investigation

Advisory guidelines for the control of infection with *E. coli* O157 were drawn up by the Public Health Laboratory Service (a predecessor organisation of the HPA) in 2000 (1). These recommend that public health authorities should take steps immediately to investigate the source of infection for every patient with *E. coli* O157 and to assess and prevent any risk of onward spread. In England, this is the responsibility of the local HPU, in collaboration with the LA Environmental Health Department (EHD). The patient (or a parent/guardian) will be interviewed by a public health nurse from the HPU or by an Environmental Health Officer (EHO) as soon as possible (usually within 24 hours of receipt of the report) either by telephone or face to face. Each report of a presumptive *E. coli* O157 infection should be actively investigated, even if the report is delayed and some time has elapsed since the case became ill.

In addition to taking a detailed food history, enquiries relating to contact with animals or animal faeces should always be made (Figure 2.1) (1).

Figure 2.1: Checklist for investigation of animal contact in sporadic *E. coli* O157 cases

- Recent visit to premises where animals are kept, including farms, zoos, horse riding and pet shops
- The presence of pets in the household, particularly if the pets have access to farmland and/or farm animals
- The occupation or hobbies of all members of the household, especially if they have close contact with farm animals or manure
- Recent contact with manure, or soil likely to contain manure
- Recent camping on farm land.

Source: Advisory Committee guidelines (1)

If there is reasonable suspicion that farm animals may have been the source of *E. coli* O157 infection, the guidelines recommend that the following action should be considered (Figure 2.2) (1).

Figure 2.2: Procedures to consider if farm animals may be the source of infection

- Inform the local authority and/or the HSE
- Contact the farm owner to discuss suspicions and to emphasise the risks posed by *E. coli* O157
- Contact the VLA Regional Laboratory and discuss the possibility of carrying out an investigation, including rectal swabs and faecal specimens from animals
- Take milk samples in farms with dairy herds
- Take faecal samples from fields or other areas where the patient may have come into contact with animals or manure.

Source: Advisory Committee guidelines (1)

Details of any identified risk premises or activities outside the area of the HPU are forwarded immediately to the relevant HPU.

Every case is logged by the HPU, although practices vary. Some HPUs use paper forms while others make use of electronic systems such as HPZone. This is a web-based support tool designed to provide staff at the local HPU with timely and comprehensive information on threats and incidents. It helps with handling routine enquiries, case management and contact tracing, and the management of outbreaks. It is currently being rolled out by the HPA to all local HPUs. There are also other health protection management systems in development, most notably HPVista, a regional overview based on local HPZone systems.

2.1.5 Follow-up of Cases and Contacts

Certain groups of people pose a special risk of spreading *E. coli* O157 infection. These include food handlers, health care staff, children under five years of age, and older children and adults who are unable to implement good standards of personal hygiene (1). Prolonged excretion of *E. coli* O157 can occur, especially in young children, who may excrete the organism for an average of four weeks (1).

Children with *E. coli* O157 infection should not attend day care or preschool nursery until two consecutive negative faecal specimens, taken after recovery and at least 48 hours apart, have been obtained. It is also advisable to exclude from work, school, or childcare any household contacts in these special risk groups, until microbiological clearance has been obtained (1). The HPA has also issued guidance on infection control in schools and other childcare settings, and this has recently been revised (8).

2.1.6 Enhanced Surveillance

Since January 2009, the HPA CfI has operated an enhanced surveillance scheme for *E. coli* O157 in England (see Chapter 1), and involves the use of a standard investigation questionnaire.

The objectives are to collect a standard minimum dataset on cases in order to identify linkages that are not immediately apparent, to improve outbreak recognition and investigation, to better understand the epidemiology and to quantify the health impact of *E. coli* O157 (9). Local HPUs are expected, as a matter of good practice, to complete a standard questionnaire on each case of *E. coli* O157 and to



forward it to CfI within seven days. The questionnaire has sections on personal details, symptoms of illness and food history, water exposure, animal contact and environmental exposure in the seven days before onset of symptoms. It includes specific questions on visits to a farm, petting zoo or bird reserve: handling or bottle-feeding animals, contact with soil, manure or sewage and washing hands before eating or leaving the premises.

The scheme should make it easier to identify and investigate disseminated or national outbreaks of *E. coli* O157 infection.

2.2 Recognising and Responding to an Outbreak

2.2.1 Outbreak Definition

Defining an outbreak and deciding on the appropriate response is not always straightforward. For practical purposes, a general outbreak of *E. coli* O157 is defined by the HPA as two or more cases from separate households linked to a common source (1,10), although the outbreak may initially start as several cases linked in time and place without an identified source.

2.2.2 Outbreak Recognition

Recognising an outbreak can also be difficult, for a variety of reasons. First, most cases of *E. coli* O157 are sporadic and it is often not possible to determine how the person was infected. Second, individual cases may have multiple possible sources. For example, during school holidays children may participate in a range of activities or have visited several different attractions during the incubation period. A popular visitor attraction may be mentioned by more than one case simply because it attracts large numbers of visitors. Third, a popular visitor attraction may attract visitors who live in different parts of the country and cases may therefore be investigated by several different HPUs. Finally, because of the relatively long incubation period of *E. coli* O157, an outbreak may take some time to become apparent. At the beginning of an outbreak HPU staff will not know if an individual case of *E. coli* O157 is a sporadic case or the first case in an outbreak. The extent of an outbreak may not become apparent for up to two weeks after the first case is reported.

Early recognition of an outbreak thus requires careful investigation and documentation of individual cases, effective co-ordination and rapid exchange of information between HPUs and LAs, and an efficient and sensitive national surveillance system.

When linked cases of *E. coli* O157 are recognised an outbreak is declared. Prompt and effective action is essential because the infection causes such serious health effects, particularly in young children. The aim of effective outbreak control is to protect the health of the public by identifying the source of infection, acting swiftly to reduce or remove the risk and then considering what lessons need to be learned in order to prevent a future recurrence.

2.2.3 The Legal Framework for Outbreak Control

The statutory responsibilities, duties, and powers that related to notifiable infectious diseases at the time of the Godstone Farm outbreak were set out in the Public Health (Control of Disease) Act 1984 and the Public Health (Infectious Diseases) Regulations 1988. These powers are vested in an LA and relate to individual cases of notifiable infectious disease.

There are no statutory requirements that specify how outbreaks should be managed. Doctors are expected to report every case of a notifiable infectious disease to the proper officer, and as a matter of good professional practice to report if they suspect an outbreak (11). The NHS and LAs are also expected, according to joint guidance from the Department of Health and the (former) Department of the Environment, to have up-to-date joint plans covering the structures and procedures for managing communicable disease control in their areas, both on a day-to-day basis and if an outbreak occurs (12). In practice, outbreaks are managed jointly by the HPA, the appropriate LA(s), the NHS, and other relevant partners by means of a multi-agency outbreak control team (OCT) and in accordance with the local outbreak plan.

Specific guidelines for the investigation of zoonotic disease (infection acquired from contact with animals) was issued by the HPA, the Department for Environment, Food and Rural Affairs (Defra), Veterinary Laboratories Agency (VLA) and Animal Health (AH) in April 2009 (13). This indicates that an OCT should be formed for significant outbreaks of zoonotic disease, and that the HPA has overall responsibility where outbreaks involve human infections in which a zoonotic source is possible. The guidance recommends that standard principles for managing outbreaks should be followed.

2.2.4 Outbreak Control Plans

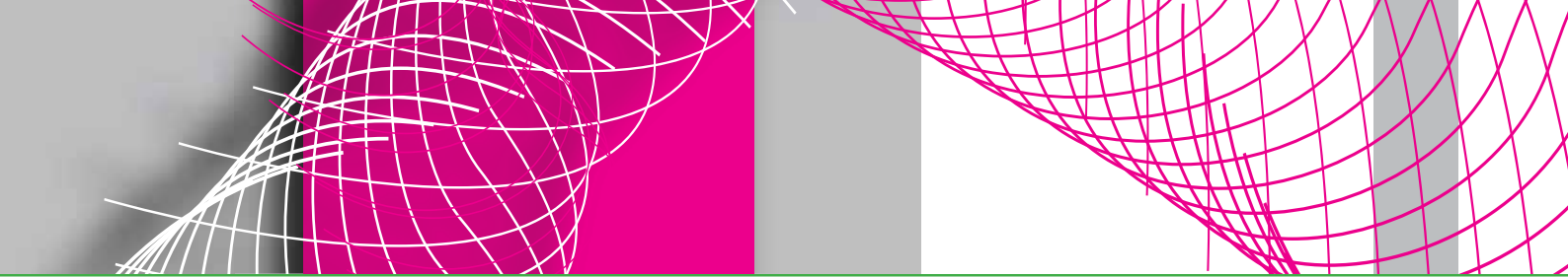
The local Outbreak Control Plan is drafted jointly by the HPA, the LA and the local PCT. Plans are regularly reviewed and should be tested at least every two years if they have not been used (14).

The Outbreak Control Plan details the terms of reference and membership of the OCT, identifies actions to be taken, and sets out the agreed roles and responsibilities of the organisations involved (12). The contents of the plan are outlined below (Figure 2.3).

Figure 2.3: Content of the Outbreak Control Plan

- Arrangements for creating an OCT
- Objectives and duties of the OCT
- Support available to the OCT, including out-of-hours arrangements
- Roles and responsibilities of the organisations which may participate in the OCT
- Arrangements for informing the HPA Regional Unit, HPA Centre for Infections and the Department of Health
- Arrangements for involving neighbouring HPUs and LAs.

Source: Public health: responsibilities of the NHS and the roles of others. HSG(93)56 (12).



It is the responsibility of the CCDC and/or the Chief Environmental Health Officer (CEHO) to declare an outbreak. If an outbreak is declared, an OCT is formed. The OCT is a multi-agency team, normally chaired by the CCDC, the members of which contribute their knowledge and expertise to help manage the outbreak. It is the collective responsibility of the OCT and its chairman to ensure that appropriate control measures are identified and implemented, and that no potential continuing source of infection remains (10).

The OCT will normally include staff from the local HPU, an EHO from the LA and a representative(s) from the local PCT. Depending on the nature and size of the outbreak, other agencies may need to be involved.

2.2.5 Key Organisations in Outbreak Control

In circumstances where human infection involving animal contact is possible, the HPA has overall responsibility for managing the outbreak (13). Although the HPA does not have statutory powers to enforce legislation, it works closely to support other agencies that do, such as LAs and the Health and Safety Executive (HSE).

The HPA will field a number of staff with expertise in different areas of outbreak management to support the OCT. These may include:

- CCDC based at the lead HPU
- Health Protection Practitioner, also based at the lead HPU
- Media relations officer to deal with media enquiries relating to the outbreak
- Epidemiologist from the regional HPU who will advise on the epidemiological investigation
- Other HPA representatives, as required:
 - Director of the lead HPU
 - Regional Microbiologist
 - Regional Director
 - CfI Epidemiological Services
 - HPA Food, Water and Environmental (FWE) Microbiology Laboratory.

Representatives from a variety of other organisations may be co-opted to the OCT as required. In an outbreak associated with animal contact, the VLA will be closely involved, and the OCT may also take advice from the HSE and from the Defra and/or AH. A more detailed description of the roles of these organisations, and others that may be involved, can be found in **Appendix 3**.



Table 2.1: Key organisations in the control of an outbreak of *E. coli* O157

Organisation	Main roles
Health Protection Agency	Provides a wide range of services at local, regional and national levels, including • Surveillance to identify other linked cases • Alerting partners • Investigating and managing outbreaks • Evidence-based specialist health protection advice on control – covering microbiology, epidemiology and interventions • Specialist and reference microbiology services
Local Authorities	Responsible for the control of food poisoning and notifiable infectious disease in their areas. Undertake environmental investigation and sampling. Responsible for enforcement actions in food premises and at Open Farms
Primary Care Trusts	Responsible for the health of their local population and for commissioning health services including diagnostic microbiology services
Healthcare Providers	Provide care and treatment. Include NHS Direct, primary healthcare providers, eg, GPs, hospitals and out-of-hours services
Veterinary Laboratories Agency	Carries out sampling and testing of animals and gives advice on farm management

2.2.6 Responding to an Outbreak

The HPA has developed a detailed framework for the investigation, management and control of outbreaks, published in 2004 (10). It sets out the key objectives in outbreak control (Figure 2.4) and the steps that should be followed to achieve them.



Figure 2.4: Key objectives in controlling an outbreak

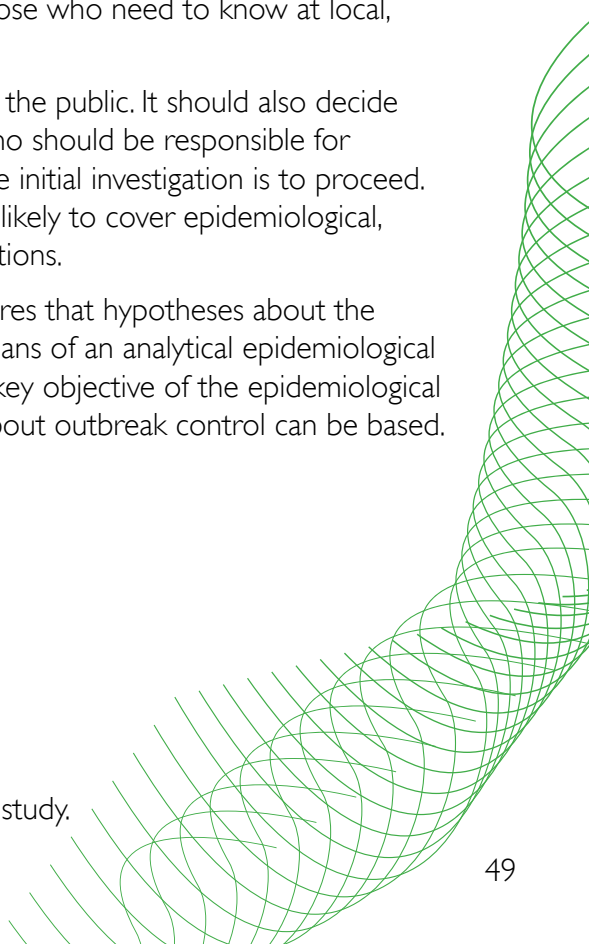
1. To ensure rapid treatment and effective care of those affected
2. To determine the cause of the outbreak
3. To reduce to the minimum the number of primary cases. This involves recognising the outbreak early and identifying and controlling the source
4. To reduce to the minimum the number of secondary cases. This involves identifying cases and taking prompt action to prevent further spread
5. To prevent further cases by identifying any continuing hazards and eliminating them or minimising the risks they pose
6. To provide timely information and advice to all those involved in the outbreak including the general public
7. To constantly review the outbreak and respond accordingly
8. At the end of the outbreak to ensure an audit is undertaken and any relevant lessons are learned and disseminated.

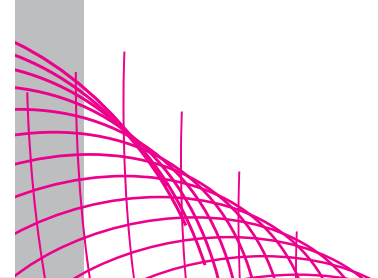
Source: HPA. The investigation, management and control of outbreaks and incidents involving infectious diseases (10).

The main objectives during the preliminary phase of an outbreak are to quickly describe the nature and extent of the outbreak, to identify those who are ill or at risk and ensure they receive appropriate care, and to control the infection. It is also important to assess whether special arrangements may be required to investigate and manage the outbreak, and to alert those who need to know at local, regional or national levels.

The first OCT meeting should specifically assess the ongoing risk to the public. It should also decide what relevant and immediate control measures are available, and who should be responsible for ensuring they are implemented. The OCT should also agree how the initial investigation is to proceed. In *E. coli* O157 outbreaks involving animal contact, investigations are likely to cover epidemiological, microbiological (human and environmental) and veterinary investigations.

The OCT supervises the outbreak investigation. The OCT also ensures that hypotheses about the source and spread of infection are tested, where appropriate, by means of an analytical epidemiological investigation and that this is carried out as a matter of urgency. The key objective of the epidemiological investigation is to provide reliable information on which decisions about outbreak control can be based. The main elements in an epidemiological investigation are to:

- Establish a case definition
 - Define the population at risk
 - Search for cases
 - Collect detailed information on cases
 - Formulate a hypothesis about the cause of the outbreak
 - Test the hypothesis using an analytical study, eg, case-control study.
- 



Local and regional HPUs provide advice on the appropriate use of epidemiological methods.

All outbreaks warrant a thorough epidemiological description and analysis. For major outbreaks this evidence is needed in order to determine the true cause. This is vital if lessons are to be learned to prevent the occurrence of similar outbreaks and it is also important in the event that legal action follows.

2.2.7 Resources for Managing Outbreaks

The commitment required to manage and control an outbreak will depend on its severity and scale. It may include additional manpower, laboratory capacity, logistics support and financial resources.

In recognition of this, the HPA has developed an incident classification to guide the level of response required from within the organisation (Table 2.2). Incidents are categorised according to five levels, with Level 1 indicating a small, local incident and Level 5 indicating a catastrophic, national incident.

Table 2.2: HPA incident classification

Level	Impact	Expected resource commitment
1	Limited local impact	Managed within single HPU
2	Wider local impact	Managed within local or regional resources
3	Significant impact	Resources from at least one HPA region with support from Specialist Divisions
4	Severe impact	National command and control Likely to involve more than one region
5	Catastrophic impact	National command and control Response at all levels of the HPA

2.2.8 After the Outbreak

The OCT declares the outbreak to be over at an agreed juncture. This will usually be when all public health actions have been implemented and no new cases of infection have arisen during the maximum incubation period for the infection (10). A statement to this effect is then made and communicated to the public and all appropriate agencies.

A debriefing meeting of the OCT follows in order to consider lessons learned and to recommend further preventive action if required. Each member of the OCT contributes to the outbreak report which is produced promptly, ideally within three months of the conclusion of the outbreak (14).

The report is agreed by the OCT and then circulated to appropriate individuals and organisations. Depending on the nature of the outbreak and the extent of new learning the report may be shared more widely, for example at relevant regional or national committees, on a website, and/or in a scientific article.

The way lessons are followed up depends on the nature of the lesson. If specific action is required then either the organisation responsible or the OCT chair will take ownership. Locally, there will be ongoing partnership arrangements between the main stakeholders to make sure that improvements are made and changes are implemented. Outbreak investigations are routinely audited. The HPA has produced a set of standards which can be used for this purpose (14).

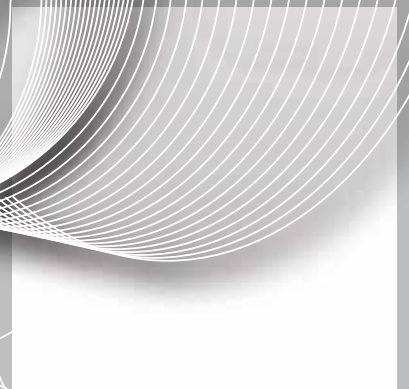
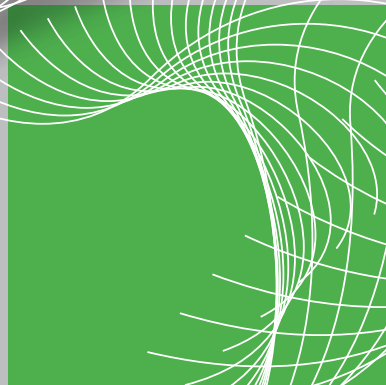


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Chapter 3:

Open Farms



Chapter 3: Open Farms

3.1 Types of Farms and Visits

3.2 Related Non-Regulatory Organisations

3.3 References

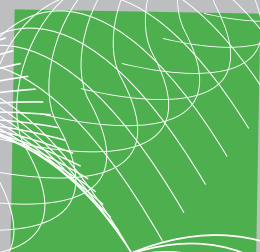
Key Points

The types of venue where the public may have animal contact are described.

- Open Farm enterprises may be large scale and include attractions where animal contact is only one part of the visit
- The age profile of visitors with an interest in animal contact is predominantly the under-10s
- There is no single, comprehensive and accurate list of Open Farms in England, Scotland and Wales
- Evidence gathered during our investigations suggests that there may be more than 200 Open Farm enterprises in the UK and that some have visitor numbers in excess of 200,000 per annum.

A variety of non-regulatory organisations are involved with the Open Farm sector:

- No registration, accreditation, quality assurance, 'badge' or similar scheme for Open Farms exists (whether voluntary or compulsory) to provide the public with reassurance of their adherence to safety standards
- Farming and Countryside Education (FACE) is a registered charity that has developed curriculum resources and encourages school visits to farms and other rural locations
- The Countryside Educational Visits Accreditation Scheme (CEVAS) is run by FACE in partnership with key interest groups and exists for the accreditation of educational visits to farms
- Working agricultural enterprises participate in occasional public events, such as Open Farm Sunday, organised by Linking Environment and Farming (LEAF)
- LEAF and the National Farmers' Union (NFU) Business Guide Reference 058 offer health and safety advice for farms on open days.





Introduction

To focus on the types of premises and the animal contacts that led to the outbreak of *E. coli* O157 at Godstone Farm requires us to consider the type of premises that are the primary attention of our investigation. However, it is clear that the venues which allow the public to have contact with animals are many and varied. To understand the background better we visited Open Farms and heard evidence from a series of stakeholders which was recorded; the agreed minutes are available through the Investigation website. Despite the diversity of farm contacts for members of the public we heard that there is a low level of understanding of the risk of infection from contact with farm animals or the farm environment. This view is supported by work carried out by the University of Aberdeen through interviews with countryside visitors in different parts of the UK. The specific regulation of farm premises and activities is discussed in greater detail in Chapter 4.

3.1 Types of Farms and Visits

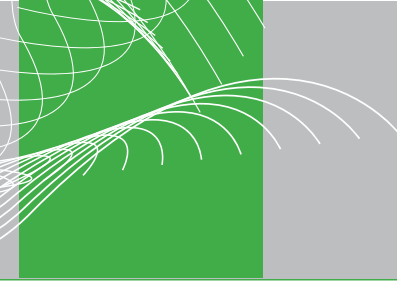
Situations where the general public may be brought into direct contact with agricultural animals vary considerably and are described below.

Open Farms. There is no universally agreed, consistent definition as to what constitutes an Open Farm, although it is generally accepted that Godstone Farm is an Open Farm. The Health and Safety Executive (HSE) has advised that it considers Open Farms to be commercial operations whose primary purpose is leisure/entertainment at which visitors are encouraged to have hands-on contact with animals. The responsibility for enforcing health and safety legislation is allocated between local authorities (LAs) and the HSE under the provisions of the Health and Safety (Enforcing Authority) Regulations 1998. Under the regulations, the allocation of responsibility is determined by reference to the main activity being carried on. The following features in isolation or combination are relevant:

- The farm attraction is open to the public by direct access
- The farm attraction is visited on a daily/throughout-the-year basis
- Provision of fixed facilities for visitors including handwashing
- Provision of animal petting areas
- Provision of food and picnic facilities
- Provision of rides and play amusements/facilities.

This definition is inconsistent with the definition provided in our terms of reference and we return to what constitutes an Open Farm in Chapter 9 of Part D. However, through our investigations it is clear to us that farms that are seeking to provide entertainment to the public may be of very considerable scale and we are aware that Godstone Farm was itself attracting more than 200,000 visitors per year and had grown considerably in recent years. We were also told by the Veterinary Laboratories Agency (VLA) that Open Farms they have examined may have an average of 150,000 visitors per annum (i).

The Open Farm premises typically include attractions where animal contact is only one part of the visit, with activity areas for children and a programme of family events also offered. We gathered from our visits to Open Farms that the age profile of visitors with an interest in animal contact is predominantly the under-10s and it is clear from advertising literature that many of these farms are directing their attraction towards young children. Open Farm premises may also have shops and food outlets.



Animal Health (AH), an agency of the Department for Environment, Food and Rural Affairs (Defra) reported to us that they maintain a listing of Open Farms on a region-by-region basis but no national list is held (ii). The information is obtained by the Trading Standards Inspectors and environmental health officers (EHOs) and the list may include very small enterprises such as public houses with a garden for animals, although these do get missed. In the South East there are 42 premises listed as Open Farms. We understand that a farm that intends to diversify its business and open to the public as an attraction should apply to the LA for 'change of use' planning consent and, if providing food outlets, will have to register with the Food Authority (ie, the LA) to comply with EU regulation 852 2004.

However there is no requirement for a farm intending to become an Open Farm to register or apply for a licence, nor does it need to demonstrate that it meets any conditions for controlling risks to health and safety before it introduces animal contact to the general public.

The scale of the Open Farm industry in the UK is therefore somewhat obscure; we have received anecdotal evidence during our visits to Open Farms suggesting that there may be more than 200 such enterprises in the UK and this is supported by our own research of the Open Farm industry. Some individual Open Farm businesses have visitor numbers in excess of 200,000 per annum. It was noted during our visits that Open Farms often employ large numbers of casual staff in peak periods such as school holidays.

While the majority of Open Farm businesses appear to have been started as farm diversification enterprises, the industry has shown significant growth in the last decade. Visitor numbers have been shown to be increasing steadily and there have been new entrants to the industry in recent years.

City Farms. These farms typically operate from more restricted premises and are often community managed. City farms may have limited space for additional entertainment facilities but they open their premises to the public and offer animal contact as an attraction. Any distinction between City Farms and Open Farms is fundamentally in the scale of the enterprise, although City Farms may be less likely to be in private ownership. City Farms operate within the same regulatory framework as Open Farms.

Working Farms. HSE has referred to these working farms as commercial agricultural undertakings whose primary purpose is agricultural activity and for which visitor access for recreational, leisure or educational purposes is secondary or incidental. Any visitor attraction will not be a separate business nor will it have been dissociated from the management of the main farm. There are working agricultural enterprises which participate in occasional public events, such as Open Farm Sunday, organised by LEAF (see below). We were told that this event started in June 2006; in June 2009 a total of 425 farms opened their doors to the public with 140,000 visitors enjoying activities that possibly included opportunity for animal contact (iii). We were additionally told of working farms that may open to the public for a few days each year specifically for a particular farming activity, eg, during the lambing season. HSE identified in its advice to LAs that working farms visited by school parties where the visits are occasional activities, or that open for specific seasonal events, eg, during lambing or as part of the national Open Farm Sunday scheme are not considered to be visitor farm attractions as the visits are incidental to the main farm business.

Working farms may also have facilities for camping and caravanning, rent out holiday cottages on their land or allow/encourage visitors to have occasions for animal contact, such as pony or llama trekking. The NFU informed us (iv) that it maintains no records of working farms that open to the public but the NFU has produced guidance on health and safety advice for those that occasionally open to the public (NFU Business Guide Ref 058 *Health and safety advice for farm open days*). This advice includes an assessment of the risks of *E. coli* O157.

Farms Hosting School Visits. We heard of the educational value of farming (v). At this meeting we were told of a newly introduced diploma that gives schoolchildren an opportunity for vocational training (including agriculture, environmental and land-based studies). The take-up for the diploma is small thus far but all schools will have to provide opportunities for this qualification route by 2013. Educational visits may also be arranged to premises operated in conjunction with LAs, farm trusts or private individuals. Visits by schoolchildren are regulated by education authorities and broadly concentrate on developing an understanding of farms and farming. The animal contact is most likely to be controlled and there is also enforcement of the adult:child ratio (age-related). We heard that schools and farm owners are more likely to have referred to HSE guidelines in preparation for the visit and accreditation schemes for educational visits are available (see CEVAS below).

We also learned of 65 school farms across the UK (vi) able to provide direct vocational training where these farms follow the same guidance as commercial farms, complying with all relevant legislation and inspected by HSE. School farms range from those undertaking horticultural work only to some keeping ruminants. Such school farms may exist within school grounds, providing access for pupils and students to farm livestock. The majority of school farms are associated with secondary schools, but it was reported that some primary schools are interested in establishing small farm units (vii).

Agricultural Shows and Country Fairs. Animals are brought to agricultural shows primarily for exhibition and competition but there may also be opportunities for some animal contact by the public. Public visits to agricultural shows fall outside our definition of visits to Open Farms if the visitors are not encouraged, permitted or allowed direct contact with agricultural animals.

Mobile Animal Petting Enterprises. Animals may be brought to events and venues to allow people to see, feed, touch and hold the animals. Some of these enterprises operate purely as entertainment at summer fetes, parties, corporate functions or family events at shopping centres, etc. Some apparently restrict themselves to educational events in schools or nurseries. Defra's Animal Health Agency (AH) informed us (viii) that agricultural livestock cannot legally be moved to unregistered premises without a performance licence issued by themselves, to ensure awareness of the location of livestock in case of a disease outbreak. However, it is possible that some animal movements may occur through ignorance of the legal position and hazards/risks involved.

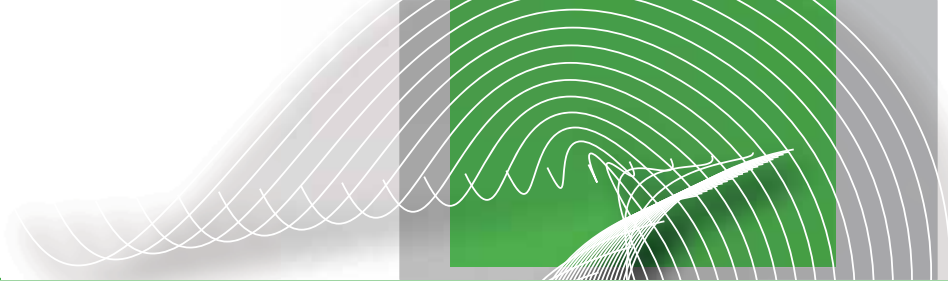
Zoos. Zoos which open to members of the public for seven or more days a year require a licence from the LA, following satisfactory inspection by a specialist zoo inspector appointed by AH. While some established zoos incorporate animal petting areas for children, an Open Farm that meets the definition of a zoo must also comply with the terms of the Zoo Licensing Act, irrespective of how the business is described to customers.

A zoo is defined by the Zoo Licensing Act 1981 as *'any permanent establishment where living, wild animals are on display to the public for seven or more days a year'*

The definition of 'wild' is not provided within the Act but Defra Circular 02/2003 provides guidance on the issue.

Defra advises that for Open Farms or farm parks, *'if wild animals are integrated into the domestic collection, and not separated in a meaningful way, then the domestics have to be included in the inspection'*.

Both Tandridge District Council and Epsom and Ewell Borough Council have obtained dispensations from Defra for Godstone Farm and its sister farm, Horton Park Children's Farm, respectively. We understand that Horton Park holds a zoo licence, but Godstone Farm does not.



Others. Additionally, we were told by the NFU (ix) of circumstances where farms do not invite the public to have animal contact, but where animal contact may be incidental, such as:

- Farms that rent out their land for camping or similar recreational activities
- Farms that have public rights of way running through their property
- Non-agricultural premises such as stables or riding establishments.

3.2 Related Non-Regulatory Organisations

A considerable variety of organisations relate to Open Farms and a number of them presented their details to us. A more complete list and descriptions with website links is provided in **Appendix 4**.

The National Farmers' Union (NFU) (x) represents 55,000 commercial farm businesses, the majority of which are small enterprises. Its central objective is to promote successful and socially responsible agriculture and horticulture. Similar representative bodies in Scotland and Northern Ireland are the NFU Scotland and Ulster Farmers Union. We were told by NFU that Open Farms are a relatively small part of its remit but farms that open to the public once a year (such as on Open Farm Sunday) tend to be commercial working premises and are therefore likely to be NFU members. The NFU has produced advice (Business Guide Reference 058) that offers health and safety advice for farms on open days but NFU does not monitor adherence to this guidance.

NFU communicates regularly with its members by email, post and text messaging and is able to circulate urgent advice.

NFU Mutual is a separate company to NFU but they share Group Secretaries to sell memberships and it is able to provide public liability insurance. The Group Secretaries have direct liaison with farmers, and support from regional offices.

Farming and Countryside Education (FACE) is a registered charity that presented to us on the educational value of farms (xi). FACE aims to educate children and young people about food and farming in a sustainable countryside. NFU was a founding member and co-funder, with the Royal Agricultural Society. FACE covers England and Wales with a similar initiative, Royal Highland Education Trust (RHET), covering Scotland. FACE and RHET have developed curriculum resources and encourage school visits to farms and other rural locations. FACE, through an umbrella organisation **Access to Farms**, promotes more and better quality visits to farms (xii) with around 2,000 farms offering educational visits to schools. The Access to Farms network comprises organisations with an interest in educational visits to farms and includes Defra, HSE, Natural England, Linking Environment and Farming (LEAF) and the National Farm Attractions Network (NFAN). Under Access to Farms there is the Countryside Educational Visits Accreditation Scheme (CEVAS) which is for educational visits accrediting the individual working with school groups and also endorsing the farm premises as being suitable for school visits (xiii).

Access to Farms offers training for farmers and their staff with certification available through the Open College Network, providing access to higher education diplomas, where a level 2 qualification is equivalent to a pass at GCSE; 1,300 farmers have been trained with 1,000 premises accredited. The training involves two one-day sessions (xiv). We learned that the FACE contact at HSE also produced a specific item in *Farmers Weekly* of 27 November 2009 to reinforce advice about prevention of *E. coli* O157 infection on farms (xv) and this article suggested that approximately one million children had visited a farm during the Year of Food and Farming (2007/08).



We understand that CEVAS was part-funded through the Vocational Training Scheme in the England Rural Development Programme (2000-2006). However responsibility for funding moved to the Rural Development Agencies (RDAs) under the new Rural Development Programme for England (2007), and we have been told by Defra (xvi) that the RDA declined to provide further funding. CEVAS funding is now obtained through donations from Access to Farms member organisations plus charges to trainees. The Access to Farms 'Farm Inspected' Scheme focuses on the procedures and facilities on the site where the educational activities are being undertaken; farms pay for an inspection (it was noted that in 2009 agreement was reached with Natural England for part of the support funding that farms may receive to be spent on training). Farms mostly self-inspect, with 10% of farms visited by inspectors per year.

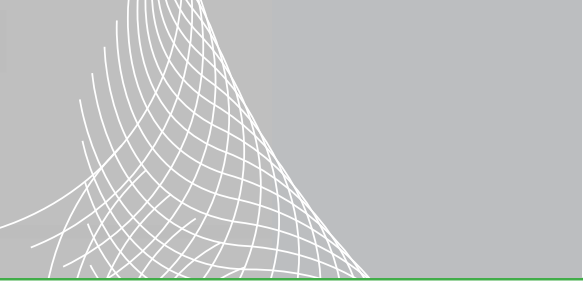
The **Council for Learning Outside the Classroom** (LOtC) runs a scheme (xvii) supported by Government (funded by the Department for Children, Schools and Families [DCSF] but independently organised). This scheme aims to encourage more and better quality school visits. Farmers are awarded the LOtC quality badge through the completion of CEVAS. Ninety-five farms have the LOtC award (a quality badge). Visit www.lotc.org.uk for more details.

Linking Environment and Farming (LEAF) (xviii) offers general guidance to farmers on making farm visits educational and memorable (ref: *Farm Walks and Talks*) and runs a series of workshops to assist farmers in preparing events for Open Farm Sunday. LEAF produces model risk assessments, guidance and checklists for farmers to use when planning activities and events for visitors available from the LEAF website: www.farmsunday.org/ofs/home.eb.

National Farm Attractions Network (NFAN) presented to us (xix). It formed to promote rural tourism in general and it provides a pool of knowledge and expertise to its 400 members, with membership open to but not specifically for specialised Open Farm operators. NFAN was part-funded through the Rural Enterprise Scheme which ended in 2006. It provides help and guidance through an annual conference, fact sheets, workshops, seminars and expert panels. It also operates an in-house audit club to audit premises (xx). This is an internal accreditation scheme which is newly formed and is being developed. A panel of NFAN members carry out the audit with a Chartered Health and Safety Practitioner on the inspection panel and additional liaison with HSE (xxi). The fee is £100 and a badge is awarded for attractions that undergo audit. In 2001 NFAN undertook a study with NFU and the National Tourism Council which found there were 10 million visitors to farms; at that time there were 1,000 countryside attractions. NFAN has arranged a partnership arrangement with Marsh and Company (an independent leisure insurance broker) for a bespoke insurance package for Open Farms and at the 2010 NFAN annual conference timetabled a debate on attraction regulators with input from the HSE, LACORS, Marsh and Co, and Godstone Farm.

We were told of a code of practice for farm visitor attractions and an accreditation scheme administered by Visit England, the **Visitor Attraction Quality Assurance Scheme (VAQAS)**. However we were informed that the inspection remit is broad and not specific to farming (xxii). An approved attraction may display the Code of Practice, the Rose sign and the VAQAS certificate at the front of its premises.

The **Growing Schools** initiative is part of the UK Government's DCSF that we have identified through their support web pages, see: www.growingschools.org.uk. There is an extensive database of farms that help schools select farms to visit that suit their needs. *Get Your Hands Dirty* has information on keeping cattle, alpaca and pigs in schools, see: www.growingschools.org.uk/Resources/Resource.aspx?id=298. Less obvious is any detail on health hazards from animal contacts and the health and safety material is primarily from other sources.



Reference was also made to us about the **Royal Northern Countryside Initiative** (RNCI), which operates in North East Scotland to increase countryside awareness through education and the **Countryside Classroom on Wheels** in which a network of volunteer farmers bring a selection of farm animals to school playgrounds (xxiii).

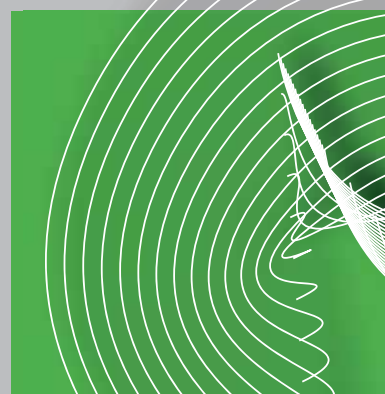
Haemolytic Uraemic Syndrome Help (HUSH) is a charity founded in 1997 to raise awareness of *E. coli* O157. It presented to us (xxiv) and described its work in supporting families affected by HUS through one paid staff member and an annual meeting. The charity received telephone calls from a number of the families affected by the Godstone outbreak and also helped Open Farms which wanted information and free posters for display.

3.3 References

Independent Investigation Documents available at www.griffininvestigation.org.uk

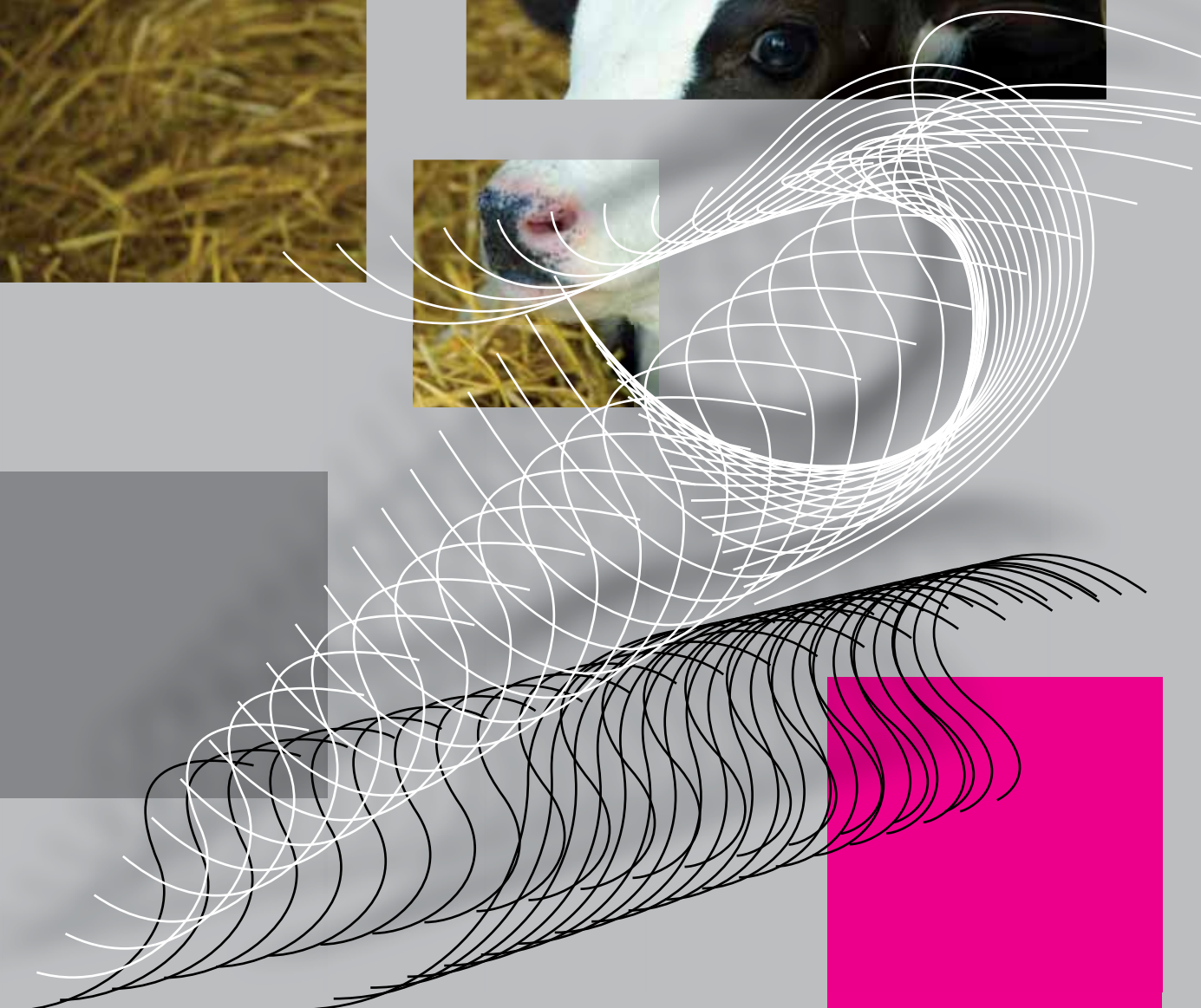
i – xxii refer to points in the notes from meetings of the Independent Investigation Committee as follows:

- | | | | |
|-------|-----------------------------|-------|---------------------------|
| i | 17 November 2009 – point 40 | xxiii | 26 January 2010 – point 9 |
| ii | 8 December 2009 – point 51 | xxiv | 26 January 2010 |
| iii | 13 January 2010 – point 10 | | |
| iv | 13 January 2010 – addendum | | |
| v | 8 December 2009 – point 1 | | |
| vi | 8 December 2009 – point 7 | | |
| vii | 8 December 2009 – point 7 | | |
| viii | 8 December 2009 – point 50 | | |
| ix. | 13 January 2010 – point 10 | | |
| x | 13 January 2010 | | |
| xi | 8 December 2009 | | |
| xii | 8 December – point 12 | | |
| xiii | 8 December – point 14 | | |
| xiv | 8 December – point 15 | | |
| xv | 8 December – point 17 | | |
| xvi | 13 January 2010 – point 32 | | |
| xvii | 8 December – point 21 | | |
| xviii | 13 January 2010 – point 8 | | |
| xix | 13 January 2010 | | |
| xx | 13 January – point 23 | | |
| xxi | 13 January – points 23, 24 | | |
| xxii | 13 January 2010 | | |



Chapter 4:

The Regulatory Framework for Open Farms



Chapter 4: The Regulatory Framework for Open Farms

- 4.1 Regulatory Control of Open Farms
- 4.2 Current UK Legislation
- 4.3 Main Regulatory Bodies
- 4.4 Inspection Procedures
- 4.5 Standards for Farms including Open Farms
- 4.6 References

Key Points

- The legal and institutional framework for protection of human health and the prevention of disease outbreaks in Great Britain is complex. The prevention of an outbreak involves different laws and combinations of regulatory authorities from those involved in the control of an outbreak of disease
- Separate regimes have been set up by Parliament for animal health including zoonoses, public health, food safety and occupational health and safety. Each regime is the responsibility of a different Government Department, with separate agencies and different mechanisms for delivery of the intended outcomes
- Four separate streams of legislation apply to health hazards that may be present at Open Farms, covering:
 - Public health
 - Food safety
 - Animal health
 - Health and safety at work
- Prevention of risks to human health arising at Open Farms is governed principally by food safety, and by health and safety law which covers risks to visitors and depends primarily on compliance by farm operators with statutory duties
- There is a wide range of regulatory and enforcement options for the control of risks to health and safety. Options include prohibition, licensing, regulations, approved codes of practice and non-statutory guidance
- Responsibility for enforcing the law at farms is shared between the Health and Safety Executive (HSE) and the local authorities (LAs), depending on the kind of activity at each farm. Inspectors have powers to serve improvement or prohibition notices and to prosecute
- International comparisons show that there is no European Directive for Open Farms but we found some regulations and guidance in individual European countries, plus North American and Australian States. The Netherlands is currently strongly considering replacing its current guidance system with an enforceable statute in view of the risk of zoonotic infection.

Chapter 4: The Regulatory Framework for Open Farms

4.1 Regulatory Control of Open Farms

Different kinds of farm-related activity are regulated in different ways and by different authorities, as set out in detail in a paper by Weightmans Solicitors commissioned by the Health Protection Agency (HPA) (i). Prevention of outbreaks of disease at Open Farms involves laws and a combination of regulatory authorities that differ from those involved in investigation and control of an outbreak.

Prevention depends on compliance by farm operators with duties laid down in food safety, and in health and safety laws. Food safety law is enforced by LAs whereas responsibility for enforcing health and safety law is shared between LAs and the national health and safety regulator, the HSE, depending on the kind of activity at each farm. The HSE inspects the vast majority of agricultural premises but enforcement of health and safety law at Open Farms is the responsibility of LAs, for the reasons described below.

The HSE and LAs maintain a joint liaison committee (HELA) (1), set up in 1975 to provide effective liaison between enforcing authorities. HELA seeks to ensure that health and safety legislation is enforced consistently among LAs and between LAs and the HSE. It provides a national forum for discussion and exchange of information, and issues guidance on enforcement of legislation to the HSE's inspectors and LAs, whose Environmental Health Officers (EHOs) carry out health and safety inspections as well as performing other functions such as food hygiene inspections at Open Farms.

The allocation of enforcement responsibilities under the Health and Safety (Enforcing Authority) Regulations 1998 in respect of farm-related activities is fragmented, as can be seen below in an extract from an administrative circular (2) interpreting the 1998 regulations. Issued to LAs by HELA, it contains an A-Z guide explaining the allocation of responsibility for enforcement at various kinds of premises including agricultural, entertainment and leisure activities (see extracts in Table 4.1).

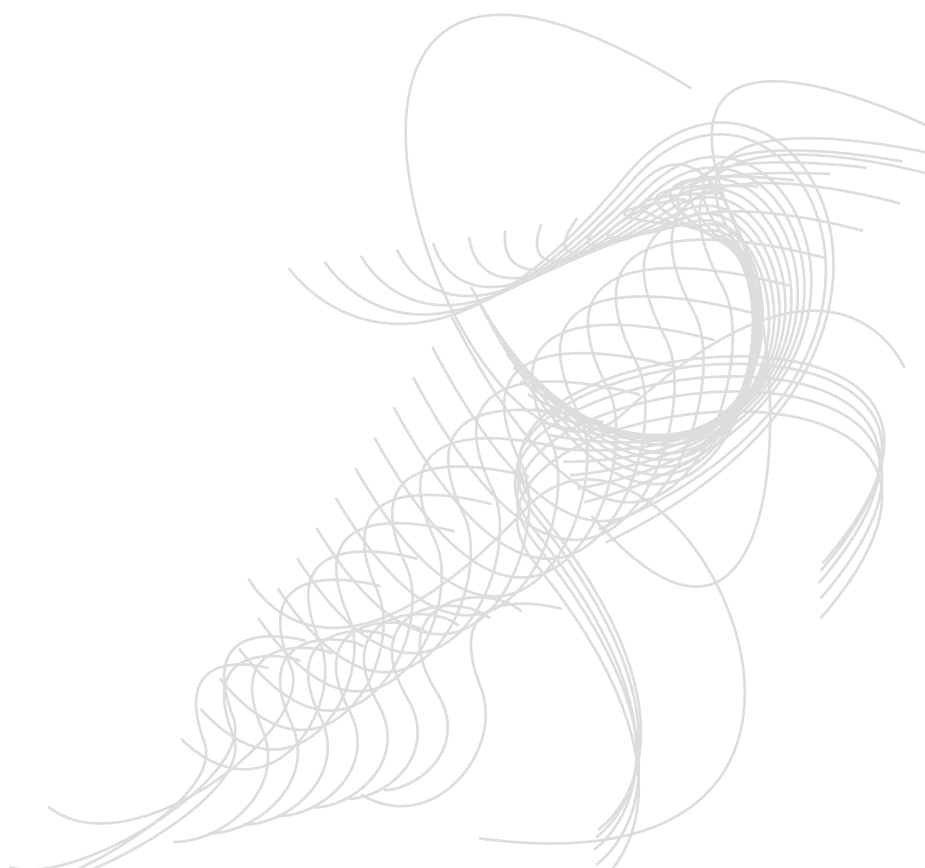
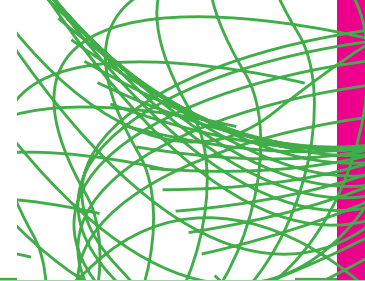


Table 4.1: Responsibility for health and safety enforcement at premises for agricultural, entertainment and leisure activities

Type of activity	Agency responsible	Scope of responsibility
Agricultural activities	HSE	Reg.2(1)(a) defines this as including horticulture, fruit growing, seed growing, dairy farming, livestock breeding and keeping, including the management of livestock up to the point of slaughter or export from Great Britain, forestry, the use of land as grazing land, market gardens and nursery grounds and the preparation of land for agricultural use. (Sch 2 para 7). But these activities are not defined as 'agricultural activities' when carried out at a garden centre or other shop. (Reg. 2(1)(b)). LA enforced. For this purpose 'livestock breeding and keeping' does not include activities the main purpose of which is entertainment. (Reg 2(1)). Thus 'Open Farms' visited by the general public would be LA enforced.
Agricultural shows	HSE	Any activity at an agricultural show which involves the handling of livestock or the working of agricultural equipment. (Sch 2 para 7). Horses do not fall within definition of 'livestock' unless used for any agricultural activity, eg, ploughing. LA where no agricultural activity, unless part of a farm and not a separate legal entity.
Animals, birds or other creatures	LA	In connection with the care, treatment, accommodation or exhibition except as below.
	HSE	Where the main activity is horse breeding or horse training at a stable, or is an agricultural activity or veterinary surgery (Sch 1 para 11). Handling of livestock (Sch 2 para 7), fish, maggot and game breeding except in a zoo (Sch 2 para 10). Research.
Education	HSE	
Entertainment (public)	LA	HSE has responsibilities where the LA is the duty holder and for specific Sch 2 activities in premises, eg, fairgrounds, broadcasting, recording, filming, and any activity at an agricultural show which involves the handling of livestock or the working of agricultural equipment.
Leisure/cultural activities	LA	Sch 1 para 9 allocates a wide range of premises to LAs, for example sports facilities, cinemas, circuses, racecourses, riding schools, etc. Cultural activities will include non-educational pursuits such as dance schools, other than those attached to schools.
	HSE	Where the main purpose of the premises is educational or vocational training similar to that provided in the mainstream educational system, such premises will remain with HSE including their evening use for leisure purposes.
Pony trekking	LA/ HSE	The enforcing authority will depend on the main activity. May be subject to the Adventure Activities Licensing Regulations 1996.
Zoos	LA	(Sch 1 para 11).

Source: HELA administrative circular LAC 23/15



'Open Farms' are not specifically defined by the 1998 Regulations but as their main purpose has been identified by HELA as 'entertainment' they are the responsibility of LAs (Table 4.1). These arrangements mean that the national health and safety regulator is responsible for, say, 100,000 agricultural holdings throughout Great Britain (3), including farms that open only occasionally to the public, whereas a few hundred Open Farms are inspected by LAs. In practice, most LAs will each have only one or two Open Farms to inspect.

Regulation 5 of the Regulations allows enforcement responsibility for any particular premises or activity to be transferred from the HSE to the LA, or vice versa.

4.2 Current UK Legislation

The legal and institutional frameworks for protection of human health and the prevention of outbreaks are complex. Over time, separate regimes have been set up by Parliament for animal health (including zoonoses), public health, food safety and occupational health and safety. Each regime is the responsibility of a different Government Department, with separate agencies and different mechanisms for delivery of the intended outcomes.

England and the devolved administrations in Scotland, Wales and Northern Ireland have each established their own regulatory institutions and pursue their own policies for public health, animal health and food safety, whereas health and safety at work has not been devolved but remains reserved to the Westminster Parliament. These complicating factors have relevance to the issues we have been asked to address.

4.2.1 Prevention – Health and Safety Law

There is no European or international regulatory standard for Open Farms. Thus health and safety law applies for the prevention of risks to human health from activities at Open Farms in Great Britain.

Health and safety law was reformed in the early 1970s after Parliament decided that Britain's performance in preventing work-related injuries and ill health was unsatisfactory. The Health and Safety at Work etc Act 1974 (HSWA), based on the common law duty of care, has replaced the previous prescriptive and outdated requirements that had accumulated over the years in the Factories Acts. HSWA applies across the whole of Great Britain. It is 'goal-setting' in the sense that it requires an outcome to be achieved rather than being 'prescriptive' in setting out rigidly what has to be done.

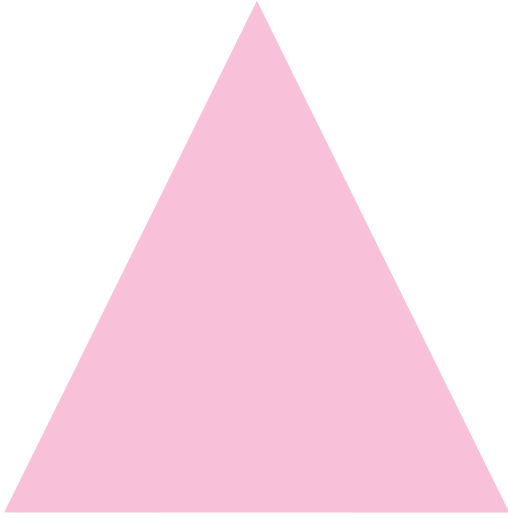
Sections 2 to 7 of the Act contain the so-called 'general duties' of employers and others for ensuring the protection of human health and safety. These general duties always apply, whether or not additional measures are specified. Essentially, they require employers to ensure the health and safety of employees 'so far as is reasonably practicable' (SFAIRP). The term 'so far as is reasonably practicable' has been the subject of interpretation by the Courts. In the decided case of *Edwards v National Coal Board* (4), Lord Asquith said:

"'Reasonably practicable' is a narrower term than 'physically possible' and seems to me to imply a computation must be made by the owner in which the quantum of risk is placed on one scale and the sacrifice involved in the measures necessary for averting the risk (whether in money, time or trouble) is placed in the other, and that, if it be shown that there is a gross disproportion between them – the risk being insignificant in relation to the sacrifice – the defendants discharge the onus on them."

Section 3 of the Act is particularly relevant to businesses such as Open Farms or fairgrounds which invite members of the public into their premises, as it requires ‘every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not thereby exposed to risks to their health or safety’. Risks to the health of visitors from activities such as arise in the running of an Open Farm are thus clearly covered by Section 3.

In addition to these general duties, the Act allows a range of other regulatory options. These may be described as a hierarchy of regulatory controls that may be applied to risks ranging from high to low as illustrated by Figure 4.1.

Figure 4.1: The hierarchy of regulatory controls that may be applied to risks

Risk	Tolerability	Regulatory options
Extremely high	Intolerable	Bans, proscriptions
High		Licensing, permits
		Notification, registration
Medium		Special regulations
		Approved Codes of Practice (ACoPs)
Low	Insignificant	Guidance
Very low		Ignore

A very dangerous substance or activity may be banned. However bans are unusual as much can often be done technically or through safe systems of work to eliminate or considerably reduce the hazard and so remove or reduce the risk. For high risks which are not banned the law expects the maximum effort in terms of time, trouble and expense in order to reduce them to a level as low as reasonably practicable. A licence to operate may be required to which conditions may be attached (eg, for the safe operation of nuclear power stations, for stripping of asbestos from buildings or for businesses running adventure activities). Alternatively a safety case might have to be submitted for acceptance by the regulator before operations may begin (as in the case of offshore oil and gas installations).

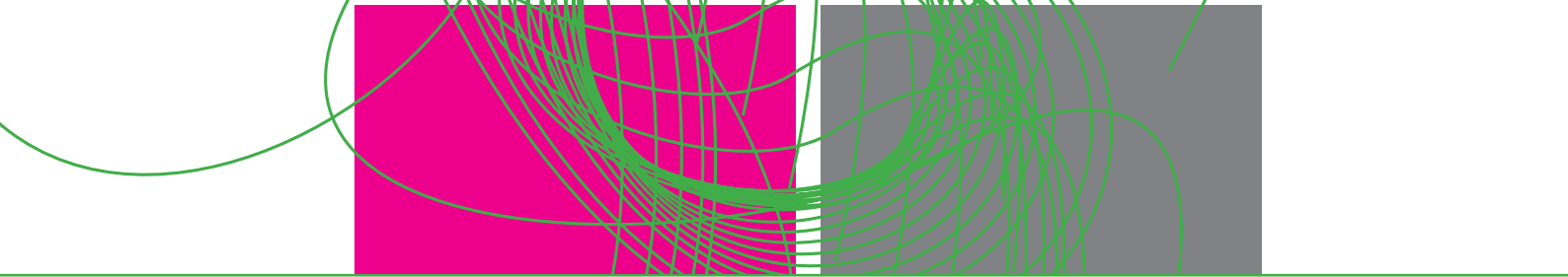
Chapter 4: The Regulatory Framework for Open Farms

Special regulations may be made under the Act to deal with a particular hazard (eg, lead, asbestos, electricity) and may apply either to all or certain industries. Many apply to Open Farms and some with particular relevance to this Investigation are:

- The Management of Health and Safety at Work Regulations 1999 (5) which make more explicit the general duties contained in HSWA, require among other fundamental provisions that employers appoint a competent person and carry out a risk assessment and (if more than five persons are employed) record significant findings
- The Health and Safety (Enforcing Authority) Regulations 1998 (6) which allocate responsibility for enforcement of health and safety legislation (HSE) at different kinds of premises and activities between HSE and LAs. These are set out in Schedules to the regulations
- The Control of Substances Hazardous to Health Regulations 2002 (COSHH) (7) extends to microbiological risks. The regulations impose duties on employers and require among other things that they do not carry out work which is liable to expose any employees to any hazardous substance unless they have made a suitable and sufficient assessment of the risk and of the steps that need to be taken to meet the (other) requirements of the regulations. The duties on employers extend to other persons (including members of the public) who may be affected by their work activities.

4.2.2 Great Britain's National Strategies for Health and Safety

In 2000 the HSE agreed a strategy (8) with the Government for 'Revitalising health and safety at work', in which targets were set to reduce the incidence of injury and ill health and the number of days lost from work; to be achieved by 2010. A key element of this strategy was to reduce the incidence of ill health at work. Following a review, HSE announced in September 2004 that delivery of these targets would in future be addressed by two strategic programmes 'Fit for work, fit for life, fit for tomorrow' (9) and 'Major Hazards'. Subsequently, HSE and the local authorities entered into a Partnership Agreement through which they committed to working more closely together in future. In June 2009 and following a public consultation exercise, HSE launched a new strategy, 'The Health and Safety of Great Britain: Be part of the solution' (10) and a joint Statement of Commitment, agreed by HSE and the Local Authorities Co-ordinators of Regulatory Services (LACORS) to further embed and consolidate partnership working, see: www.hse.gov.uk/lau/statement.htm.



4.3 Main Regulatory Bodies

It is not only the legal framework that is complex. A multifaceted administrative network exists, comprising several separate departments, agencies and authorities with responsibilities or interests touching on Open Farms to a greater or lesser extent. Principal among these in England and Wales are the following:

For public health:

- Department of Health (DH)
- HPA – reports to DH
- LAs
- Department for Environment, Food and Rural Affairs (Defra) and Veterinary Laboratories Agency (VLA), an agency of Defra

For animal health:

- Defra
- Animal Health (AH), an agency of Defra
- VLA
- LAs

For food safety:

- Food Standards Agency (FSA)
- LAs
- Defra

For health and safety at work

- Department of Work and Pensions (DWP)
- HSE
- LAs.

LACORS is part of the Local Government Association Group. It is not a regulatory body or authority but regards itself as part of the regulatory structure, being a council funded organisation that has a long established role in supporting various council regulatory services including health and safety, food safety and animal health.

Northern Ireland has its own arrangements for the above functions. Scotland and Wales have made their own arrangements under devolved powers with the exception of health and safety at work (the HSE's remit covers Great Britain but not Northern Ireland). We heard evidence from devolved administrations about their approaches to prevention and control of outbreaks of *E. coli* O157 and took this into account in our analyses in Parts C and D.

Figure 4.2 The regulatory framework as it relates to Open Farms

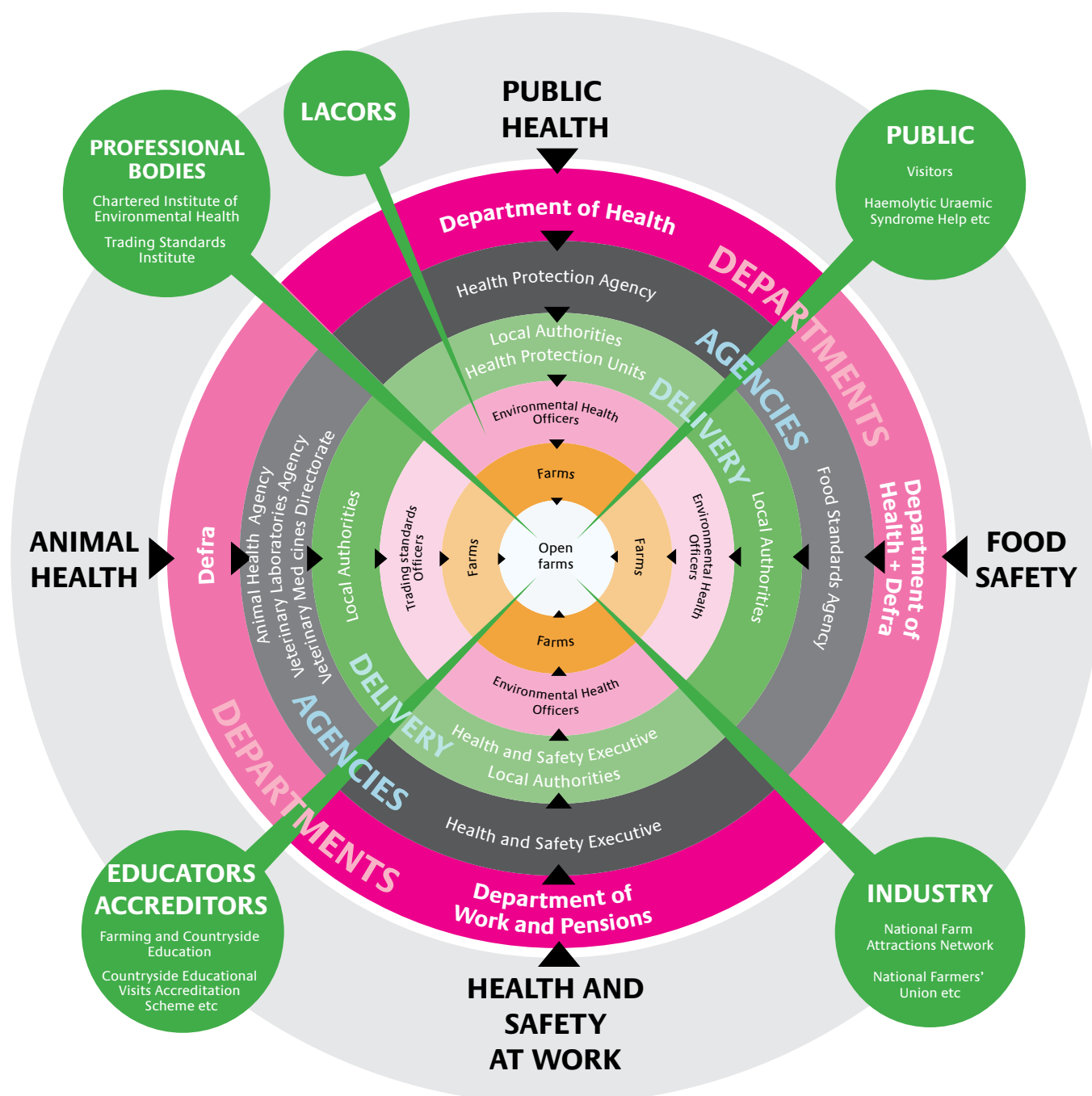
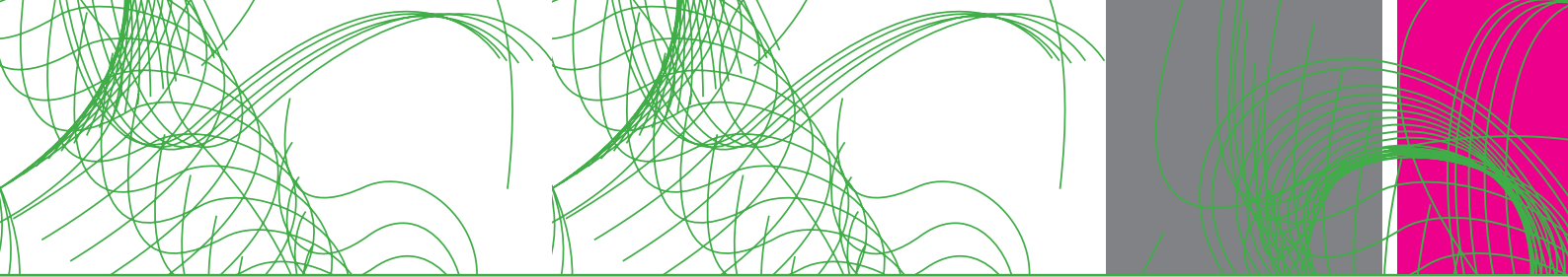


Figure 4.2 illustrates the main departmental bodies and layers of administration involved in regulating public health, food safety, animal health and human health and safety at Open Farms. Some of the principal stakeholder groups are also shown, for example those representing industry, professions, public, and local authority interests. Major delivery agencies such as the Health Protection Agency, Food Standards Agency, Animal Health and the Health and Safety Executive and their enforcement arms are included but for the sake of simplicity other elements of the system are not, such as advisory committees discussed elsewhere in the report.



4.4 Inspection Procedures

Since the 19th Century independent regulatory inspection of how businesses are complying with their legal duties and meeting their responsibilities has been a fundamental part of the UK's health and safety system. Regimes for public health, food safety and animal health and welfare have developed in parallel but separately. Each has its own procedures and standards for inspection.

Some years ago the HSE developed a method to enable its inspectors to prioritise health and safety inspections of businesses according to the degree of risk and management's competence to control it. Known as the Inspection Rating System, it was described in a circular LAC 67/1 (Revised 3) issued to LAs in July 2003.

Enforcement decisions under health and safety legislation are made by reference to the HSE's Enforcement Policy Statement (11) which is consistent with the principles set out in the Crown Prosecution Services' code for Crown Prosecutors, ie, principles of consistency, transparency, targeting and proportionality. Further information on the code can be found at:

www.cps.gov.uk/publications/code_for_crown_prosecutors/index.html

In support of the statement, HSE has developed an Enforcement Management Model (EMM) which helps inspectors decide on what would be appropriate enforcement action in the particular circumstances. The EMM is not intended to fetter inspectors' discretion when making enforcement decisions or direct enforcement in any particular case. Rather, it seeks to promote consistency and proportionality in enforcement by confirming the parameters that need to be considered and the risk-based criteria against which decisions are made. In 2004 the HSE and LACORS on behalf of LAs entered into a formal partnership agreement (12) and a joint report in 2009 (13) includes consideration of the progress made in joint planning and joint working that followed an independent evaluation conducted by PA Consulting in May 2008 (14).

The HSE developed and shared with LAs an Enforcement Management Model (EMM) in 2003 to help inspectors make decisions about taking actions that will be in line with the policy and proportionate to risks. Depending on what they find, inspectors may decide to exercise their enforcement powers under HSWA (15). Actions may range from prosecution to giving oral advice during an inspection, and include serving an improvement notice if in the inspector's opinion a person is contravening a legal requirement. The notice may require the contravention to be remedied and will usually include a schedule setting out what needs to be done. There is an appeal procedure.

A prohibition notice may be served where the inspector is of the opinion that 'activities' being carried on (or likely to be carried on) involve or will involve a risk of 'serious personal injury'. The notice may stop the activity immediately or at the end of a specified period. Again, there is an appeal procedure.

Prosecutions are few in number compared with notices served. They may follow egregious breaches of law, particularly if death or injury has been caused.

Under their Partnership arrangements, further efforts have been made by the HSE and LAs to work together and to record enforcement procedures in instructions shared by their inspectors. The HSE and LAs have a duty under Section 18 of HSWA to make 'adequate arrangements' for enforcement. In 2008 they developed a 'Section 18 Standard' (16) setting these out, including common measures to ensure their inspectors are competent to undertake regulatory activities. An Annex to the circular LAC

67/1 (Rev 3) contained guidance to the HSE's staff and LAs about actions that may be appropriate in different circumstances. That circular was under review at the time of the Godstone outbreak and was replaced in October 2009 by new 'Priority Planning Guidance'. The guidance is described as providing 'the necessary detail to help LAs comply with the S18 Standard on Priorities and Planning and Targeting Interventions' and is 'consistent with priority planning guidance used by HSE's own inspectors'.

4.5 Standards for Farms including Open Farms

4.5.1 Approved Codes of Practice

Practical advice on compliance may be given by a regulator in the form of an approved code of practice (ACoP). For example, an ACoP may explain the meaning of a 'sufficient and suitable' risk assessment in the COSHH regulations (17). An ACoP may be produced for microbiological hazards as is the case for control of legionella (18). ACoPs have a special legal status under HSWA. If employers are prosecuted for a breach of health and safety law and it is proved that they have not followed relevant provisions of an applicable ACoP, a court may find them at fault unless they can show compliance in some other way. There is no ACoP specifically for *E. coli* O157. We noted that since 2007, some Codes of Practice have been approved to do with gas installation, construction, asbestos and work equipment (see www.hse.gov.uk).

4.5.2 Accreditation Schemes

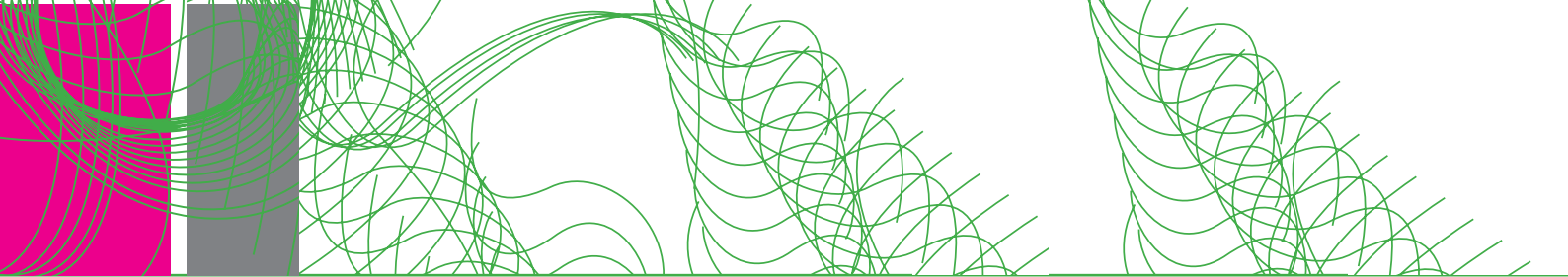
Self-regulation and voluntary accreditation are recognised as playing a part for setting standards. Accreditation schemes, whereby a business or individual can seek a 'badge' from an independent expert organisation with competence to carry out inspections and audits, offer assurance to the public that the business is meeting any relevant standards. The Access to Farms 'Farm Inspected' scheme is an accreditation scheme for farms where educational activities are undertaken.

4.5.3 HSE Guidance on Open Farms

Agriculture remains one of the most hazardous industrial sectors, with a fatal injury incidence rate in 2008/09 (19) of 5.7 per 100,000 workers (compared with 2.4 per 100,000 workers in construction and a national average of 0.6 per 100,000 workers).

Approximately 530,000 people work in agriculture (source: Defra Census 2008) which includes a range of sectors including arable, dairy, livestock and mixed farming, the growing of fruit and vegetables, arboriculture, forestry, production horticulture, agricultural and animal husbandry services.

HSE's strategy for addressing the poor health and safety performance of the industry has changed over time. For many years, the interventions chosen were based on inspection. Latterly, greater resource has been directed to promoting and raising awareness among much greater number of farmers through a variety of communications methods, including direct marketing, Safety and Health Awareness Days (SHADs) and working with key industry influencers and stakeholders. This approach has resulted from a regulatory decision that an inspection based approach was neither effective nor cost effective in tackling an industry characterised by micro-businesses, self employment and family enterprises. This analysis has continued to underpin HSE's strategic approach to the industry.



The current strategy (Agriculture Revisited) agreed by the HSE Board in May 2008 is set out in Board paper 08/24 which can be accessed from the HSE website.

The Investigation noted the Prevention of Accidents to Children in Agriculture Regulations 1998 (PACAR) and the associated ACoP (20) introduced in April 1999. The regulations apply to farmers or persons responsible for agricultural activities and prohibit children from driving or riding on certain classes of vehicle or agricultural plant and machinery. They do not address the health risks to children from agricultural activities and were not brought to our attention by any witnesses. There is also advice and guidance for farmers (21) that includes how to reduce the risk of accidents to children and young people whether residents or visitors and refers to risks from animals including (briefly) *E. coli* O157 infection.

To assist Open Farms with risk assessments the HSE published free information sheets setting out advice to farmers on practical steps to ensure the health and safety of visitors, including one aimed specifically at Open Farms and the risk of *E. coli* O157 infection (Agricultural Information Sheet AIS23 [discussed in Chapter 8]). LA Inspectors are expected by HELA to make reference to this when inspecting Open Farms. The leaflet contains a supplement designed to help teachers and others who organise visits to farms (AIS23 Supplement) (see **Appendix 5**).

Another information sheet – *Common Zoonoses in Agriculture* (AIS2) – gives general guidance for farmers on the range of diseases carried by animals that can also affect humans and the precautionary measures that should be put in place on working farms and also if the farm is open to the public (see **Appendix 6**).

The advice contained in published guidance such as AIS23 is non-statutory, and is usually accompanied by this legal disclaimer:

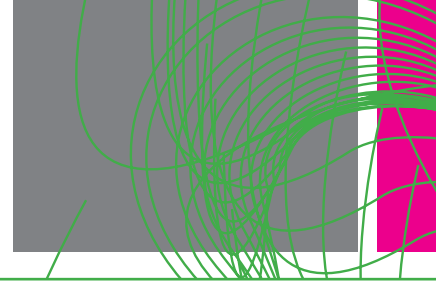
'This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.'

Employers are thus free to take other action, but the HSE takes the view that if they do follow guidance they will normally be doing enough to comply with the law.

In 2003 the HSE produced a four-minute video (22) containing advice about the risk at farms from *E. coli* O157. This can still be viewed on the HSE website.

The HSE issued guidance (23) to inspectors in 2003 on applying the principles of the EMM to risks to health and the standards expected in AIS23 (Rev) on Open Farms (see **Appendix 7**). In 2005 HELA also launched a secure intranet website called HElex where HSE and LAs' enforcement officers can communicate with one another by uploading, downloading and exchanging relevant information and data. This site is not publicly accessible.

After the Godstone outbreak, and following a request by the HPA to the HSE and LAs that all Open Farms should be visited, HELA issued another circular (24) to LAs on 21 October 2009 entitled '*E. coli* O157 outbreak – August/September 2009'. This contained revised advice from the HSE about inspections of Open Farms, reaffirming LAC 61/1 'general guidance on application to health risks' with an annex explaining how to apply the EMM to various scenarios they might find. The circular contained a statement: '*HSE's Biological Agents Unit (BAU) is satisfied that the guidance in AIS23 (Rev) is proportionate and fit-for-purpose providing sensible, practical advice, consistent with that provided in other countries, eg, USA. It is aimed at farmers and through the supplement at teachers or others in charge of visits as a work activity, not at members of the public generally.*'



4.5.4 International Standards for Open Farms

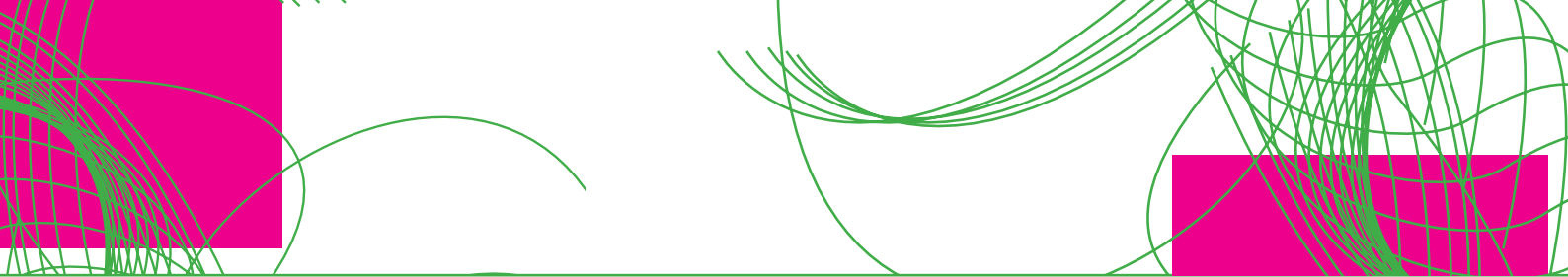
Chapter 1 identifies that agricultural and environmental exposures are a well recognised cause of *E. coli* O157 outbreaks across the world. During the Investigation we searched on the internet and also sought information from expert authorities for more detail on international standards and legislation relevant to Open Farms.

In the USA, a number of outbreaks of *E. coli* O157 have been associated with animal contact, but there is no Federal US law that specifically addresses the issue of preventing disease associated with animals in public settings. The Animal Welfare Act (9CFR Ch. I, Section 2.131) administered by the US Department of Agriculture (USDA) requires petting zoos to hold a licence and is aimed principally at assuring humane treatment of animals, not the protection of human health. However the licensing requirements demand supervision at all times by a trained and competent person if the animals are being handled. Suitable barriers must be in place to protect both the animals and the public from harm. In 2009, Centers for Disease Control and Prevention (CDC) issued a 'Compendium of Means to Prevent Disease Associated with Animals in Public Settings' (25). This was because of the inadequate understanding of disease transmission among visitors, especially children to Open Farm-type premises and also because of instances in which numerous persons became ill. The report, which includes 'petting farms' (ie, Open Farms) provides recommendations for public health officials, veterinarians, animal venue staff members, exhibitors, visitors, physicians and others concerned with minimising risks associated with animals in public settings.

Pennsylvania enacted legislation that specifically regulates petting zoos (26) and North Carolina enacted legislation in July 2005 that requires petting zoos to obtain permits and undergo inspections (27); the bill is called 'Aedin's Law' in honour of two-year-old Aedin Gray whose exposure led to life-threatening haemolytic uraemic syndrome (HUS) and its purpose is to control public contact with animals, inform the public of risks related to animal contact, provide transition areas, regulate animal care and license petting zoos. Massachusetts and Washington State have available brief recommendations (28,29). The South Australian Government's Department of Human Services has also issued guidelines for control of infections at 'petting zoos' and in Canada the Ontario Farm Animal Council has issued a single page guideline (30).

In Europe, while we are aware of the EU's strategy for improving health and safety at work generally, there is no European Directive that sets out standards or controls over the *E. coli* O157 risk for Open Farms. However, we understand that in Sweden there is legislation that requires Open Farms to be registered and the owners are required to develop a hygiene plan with veterinary input. We understand that in Denmark, the Danish Ministry of Food, Agriculture and Fisheries (Animal Health Division) is responsible for certification of zoological gardens and farms open to visitors and that there is requirement that: children under five years of age are only in exceptional circumstances allowed into animal areas; the person who is responsible for the farm is also responsible for people who have been in contact with animals or their faecal products to ensure they wash their hands afterwards; that visitors are not allowed access to unpasteurised milk or products and all animals must be registered in the equivalent of a County Parish Holding (CPH). Generic advice is similar to AIS23 but it and other information additionally suggest:

1. Only wearing clothes and footwear (eg, Wellington boots) which are washable, when on farms
2. Wash all clothes and footwear immediately after any visit to a farm or leave it on the farm
3. Wash all equipment etc, used on the farm
4. Don't kiss the animals, but please pet them and then wash your hands

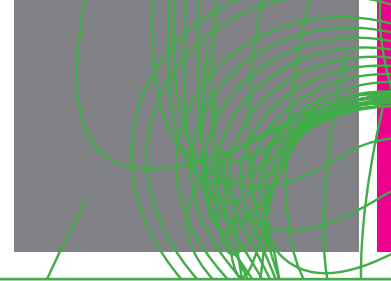
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5. No 'dummies' are allowed on farms
 6. No toys are allowed to be brought onto farms
 7. No ordinary shoes allowed
 8. An 'anteroom' to change clothes is recommended as a 'lock' for people entering and leaving to encourage/remind people to change clothes and wash hands
 9. Wash all clothes at 60 degrees
 10. Information on how to wash hands.

Visitors are also recommended to check the health status of any farm before visiting it and this information is openly available on the internet in Denmark.

We have received, via VLA, information from the Dutch Food and Consumer Product Safety Authority. The Dutch recognised human infections with *E. coli* O157 as the result of Open Farm visits in 2000. To date, the measures adopted in the Netherlands have been to concentrate on improving the hygiene on farms ('a safe farm environment') and 'teaching' the visitors. The Dutch organisation representing Open Farms has also worked on a quality/certification system to provide information and to motivate the Open Farm owners to invest in providing a hygienic farm environment. The certification is currently voluntary, but it may become compulsory and if so, public farms not having the basic certificate (there are different levels) will be closed to the public. Farms with a certificate will be inspected on a regular basis. Furthermore, we have been told that the Office for Risk Assessment in the Netherlands is currently proposing a stronger regulatory framework regarding Shiga-toxin (VTEC)-producing and other relevant zoonotic pathogens such that enforcement will be possible. This proposal is in the context of the ascending recognition of the importance of zoonotic infection to the human population, especially for visitors to Open Farms (personal communication, Dr RAA van Oosterom).

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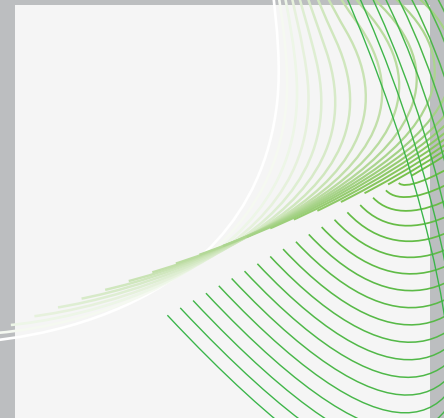
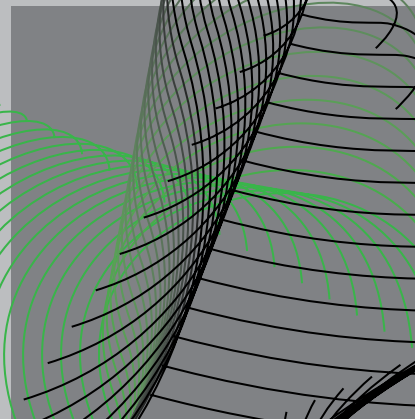
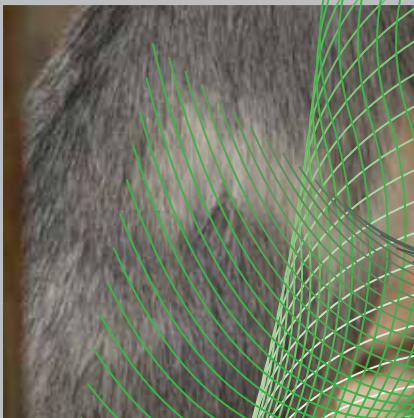
Independent Investigation Documents available at www.griffininvestigation.org.uk

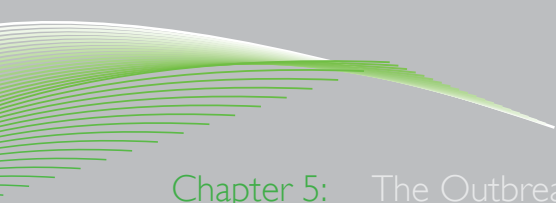
- i The Statutory framework and the roles and responsibilities of relevant public bodies concerned with protecting public health in relation to visits to 'Open Farms' and when investigating an outbreak of *E. coli* O157 – a paper by Weightmans Solicitors.



PART B THE OUTBREAK

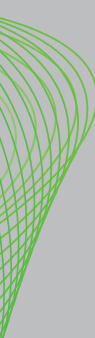
Chapter 5: The Outbreak



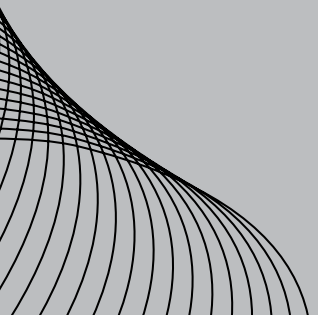


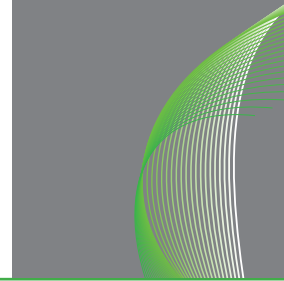
Chapter 5: The Outbreak

- 5.1 Godstone Farm
- 5.2 Timeline of the Outbreak
- 5.3 Investigation of the Outbreak
- 5.4 The Source of the Outbreak
- 5.5 The Clinical Impact of the Outbreak
- 5.6 References



Key Points

- An outbreak of *E. coli* O157 occurred at Godstone Farm in August and September 2009
 - This is the largest outbreak of *E. coli* O157 linked to an Open Farm to have occurred in the UK. There were 93 cases (91 laboratory confirmed as *E. coli* O157 and two further cases based on other clinical and laboratory information), of whom 76 (82%) were under 10 years of age
 - Of the 78 people with symptoms, 27 (35%) were admitted to hospital and 17 (22%) were diagnosed with haemolytic uraemic syndrome (HUS) (all children). Eight children required dialysis, and of these children, some have been left with permanent kidney damage
 - Microbiological investigations confirmed that there were clear microbiological links between nearly all the cases, since all the cases from whom isolates were available were infected with the same strain of *E. coli* O157
 - The similarity of human, animal and environmental strains of *E. coli* O157 indicates an outbreak with a common source
 - Epidemiological investigations pointed to the main animal petting barn at Godstone Farm as the source of the outbreak. This is corroborated by the high proportion of animals from the large barn that tested positive. There was also evidence of wider environmental contamination at the Farm, suggesting that even without direct animal contact there was a risk of infection from contact with railings or soiled footwear
 - The outbreak ceased after the animal petting barns at Godstone Farm were voluntarily closed on Friday 4 September 2009.
- 



Introduction

During August and September 2009 there was an outbreak of *E. coli* O157 associated with Godstone Farm in Surrey. It is the largest outbreak of *E. coli* O157 associated with an Open Farm to have occurred in the UK.

This chapter describes the outbreak at Godstone Farm, including an account of the treatment and care of people infected by *E. coli* O157. It begins with a description of the Farm and a factual account of the outbreak timeline. This is followed by a summary of the epidemiological, environmental and microbiological investigations that took place and conclusions about the most probable cause of the outbreak.

The Farm premises are within the geographical area covered by the Surrey and Sussex Health Protection Unit (SySxHPU). SySxHPU is one of a network of 26 Health Protection Units (HPUs) that forms part of the Health Protection Agency's Local and Regional Services (HPA's LaRS) (see **Appendix 3**). The staff includes consultants in communicable disease control (CsCDC) and Health Protection Practitioners who work directly with primary care trusts (PCTs), acute hospital trusts and local authorities (LAs) in the area to deliver local health protection services. The unit has teams based in Leatherhead, Chichester and Lewes, and is supported by the South East Regional Unit of the HPA. The Surrey team based in Leatherhead led the investigation of this outbreak.

The enforcement authority for Godstone Farm is Tandridge District Council (DC). The Council is responsible for regulating health and safety, and food safety at the Farm. These functions are carried out by Environmental Health Officers (EHOs) based in the Council's Environmental Health Department (EHD). Tandridge is one of 11 DCs in Surrey providing services in partnership with Surrey County Council.

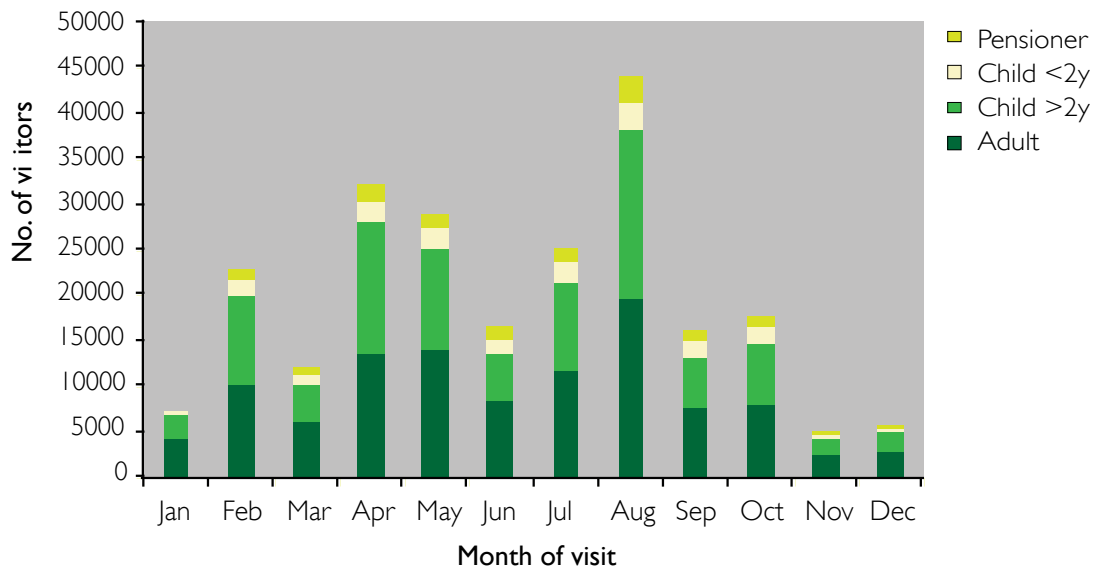
5.1 Godstone Farm

Godstone Farm is located in the village of Godstone in Surrey, just south of the M25. It is an Open Farm used exclusively as a visitor attraction and has been in operation for more than 25 years. The Farm is open to members of the public and also hosts pre-arranged visits from groups such as nurseries and primary schools. It is a popular venue for birthday parties.

The Farm now receives more than 200,000 visitors per year (Figure 5.1), with between 1,500 and 2,000 per day during the summer school holidays (Figure 5.2), according to figures provided by Godstone Farm. Nearly half the visitors are children under 12 years of age. Visitors come from all over the South East, particularly from Surrey, South London and Kent. The Farm is open all year.

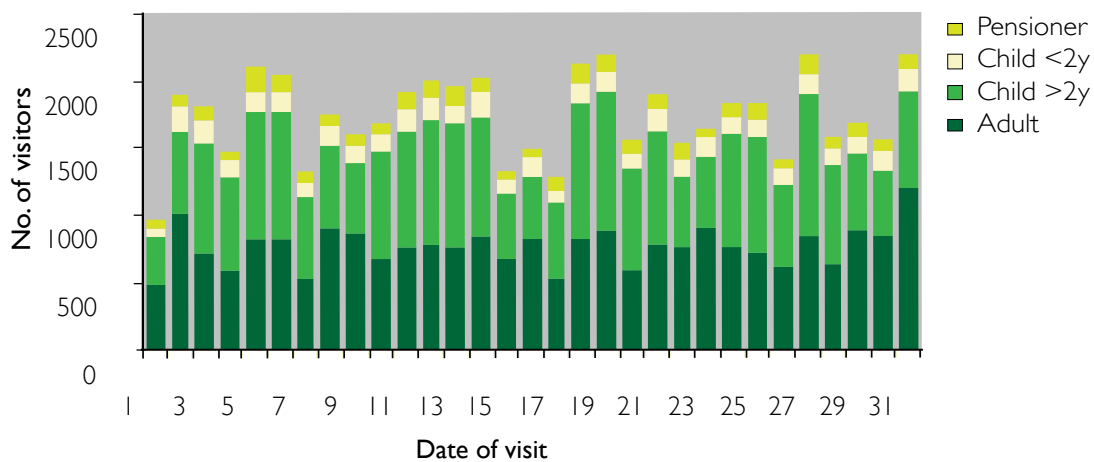
The Farm owner operates a similar business at Horton Park Children's Farm, near Epsom, Surrey.

Figure 5.1: Monthly visitor numbers at Godstone Farm, 2008



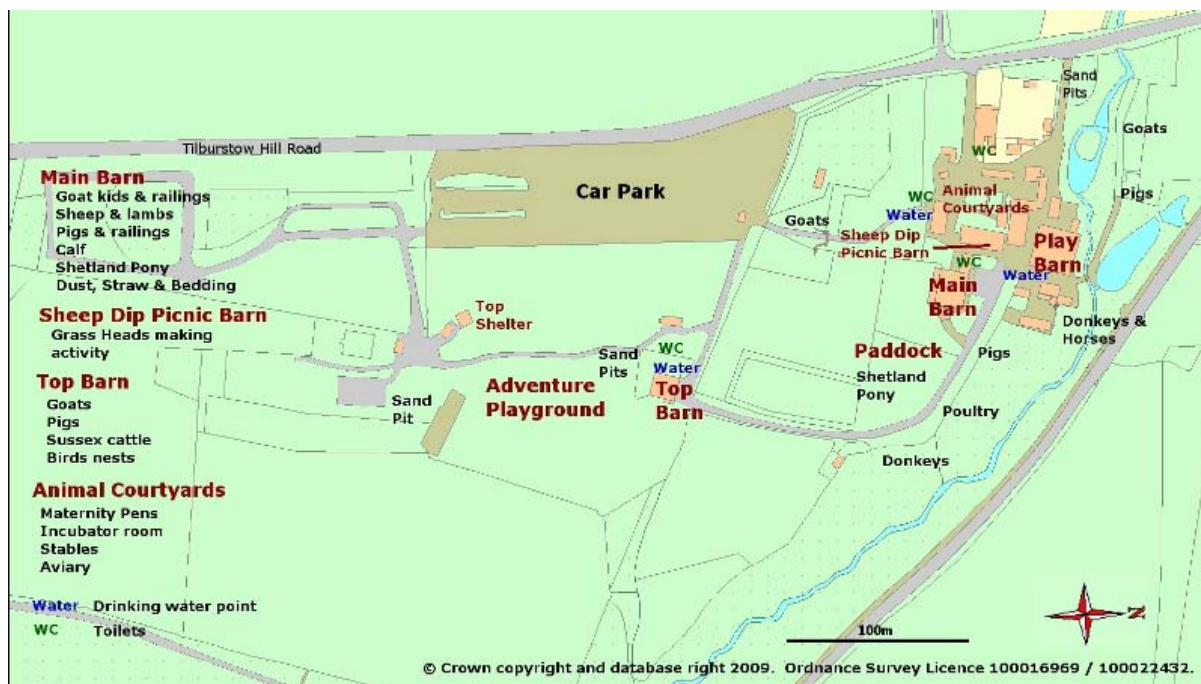
Source: Tandridge DC report (i)

Figure 5.2: Daily visitor numbers at Godstone Farm, August 2009



Source: Tandridge DC report (i)

Figure 5.3: Layout and attractions at Godstone Farm



Source: Godstone Farm map (ii) and OCT Final Report (iii)

The layout of the Farm is shown in Figure 5.3. Most visitors enter the Farm via the main entrance from the car park. They may then explore the Farm by following any of the paths shown on the map.

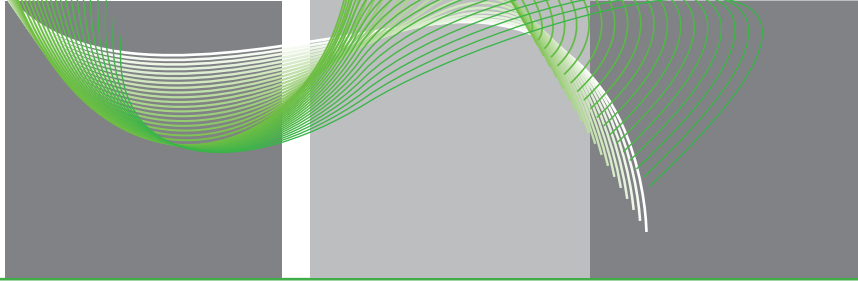
Animal areas are indicated in text on the map. The Farm includes a display area for pet rabbits and small mammals located in the animal courtyards, adjacent to a shop and first aid post. Children are allowed to enter the rabbit cages to handle and feed them. There are two animal petting barns. The main animal barn housed sheep, goats, pigs, a calf and a Shetland foal at the time of the outbreak. The top animal barn is located near the adventure playground and housed goats, calves and piglets at the time of the outbreak. All the animals in these two barns can be touched and children are encouraged to climb in and play with lambs in the large animal barn.

There is a tearoom on site (located west of the animal courtyards), and two ice cream outlets that operate during the summer. Although there are designated picnic areas, visitors are allowed to picnic wherever they choose. There are several play areas distributed around the site including an indoor play barn, an outdoor adventure playground and several sandpits.

In addition to handwashing facilities in all the toilets, there are three main handwashing stations available for visitors, two of which are located at the entrance/exit to the main barn, and a short distance from the top barn respectively. All are provided with soap and paper towels. We were told that there are 47 notices alerting visitors to the importance of washing hands with soap and water and informing them that sanitising gels on their own do not provide adequate protection.

The Farm employs about 12 full-time staff most of the year, and also has about 12 extra part-time staff during peak times. Between 25 and 30 students are employed at weekends and during school holidays.

In August 2000, the Farm experienced an outbreak of *E. coli* O157 which resulted in eight microbiologically confirmed cases. A veterinary investigation identified that goats were probably the source of the infection and the Farm subsequently took measures to restrict contact with the goats.



5.2 Timeline of the 2009 Outbreak

A timeline of the main events associated with the 2009 outbreak is set out below.

Thursday 20 August

South West London HPU informs SySxHPU of a child with presumptive *E. coli* O157 who had visited Godstone Farm on 8 August. On the same day, Croydon EHD informs Tandridge EHD of two cases: this case and a sibling.

Wednesday 26 August

South East London HPU informs SySxHPU of a case of *E. coli* O157 who had visited Godstone Farm on 15 August and had also recently returned from holiday in Spain. SySxHPU informs Tandridge EHD of this case on the same day.

Thursday 27 August

The microbiology laboratory at St Richard's Hospital, Chichester, informs the Chichester office of SySxHPU Chichester of a presumptive case of *E. coli* O157 who had become unwell on 24 August.

Friday 28 August

SySxHPU Chichester office passes on details of this case to the Leatherhead office which relays them to Tandridge EHD. Later that day, the EHD find out that this case visited Godstone Farm on 21 August and had no other apparent risk factors. Tandridge EHD telephones Godstone Farm to advise on extra signage and make arrangements to visit as soon as possible after the Bank Holiday. One of the SySxHPU staff also rang Tandridge DC to emphasise the importance of dealing with this case before the Bank Holiday Weekend (the call was documented in the HPZone record).

Bank Holiday Weekend 29 to 31 August

Tuesday 1 September

Following the Bank Holiday weekend, Tandridge EHD informs SySxHPU of a fourth case of *E. coli* O157, the sister of the case reported on 20 August, who became ill on 18 August and suggests there may be an outbreak associated with Godstone Farm.

Wednesday 2 September

SySxHPU and Tandridge EHD make arrangements to visit Godstone Farm the following day.

Thursday 3 September

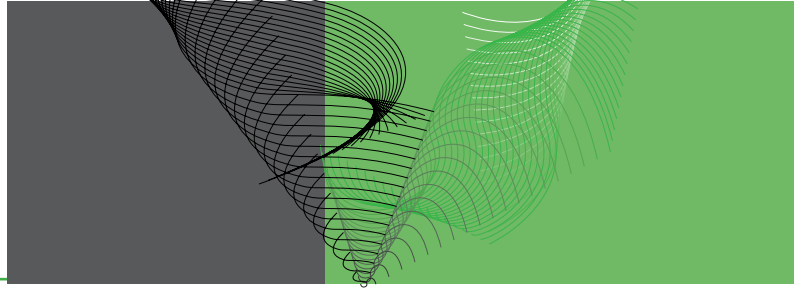
A joint team from SySxHPU and Tandridge EHD visit Godstone Farm and discuss various options with the Farm owners to reduce the risk of infection. The visit focuses particularly on adequacies in handwashing facilities and on the risk associated with feeding animals.

By the evening of Thursday 3 September, the total of confirmed and presumptive cases known to have visited Godstone Farm rises to eight.

Friday 4 September

Following the site visit an email is sent by SySxHPU to Godstone Farm. This suggests extra signage and extra staff to emphasise the importance of handwashing, measures to prevent waste spilling on to paths, and closure of sandpits. It also suggests that the Farm 'may want to consider voluntary closure for a time'.

The Farm owners decide to restrict direct contact with animals by closing the two animal petting barns and goat bridge to the public, and by prohibiting the feeding of animals by visitors. They also close some of the sandpits.



Saturday 5 September

Godstone Farm sends an email to SySxHPU to confirm the action it has taken.

Monday 7 September

A staff member from the Veterinary Laboratory Agencies (VLA) Winchester office visits Godstone Farm at the request of the HPU to take samples.

A multi-agency outbreak control team (OCT) teleconference is convened by SySxHPU after further new cases are reported over the weekend. The OCT is attended by representatives of South East London HPU, South West London HPU, HPA South East Region, HPA Centre for Infections (CfI), Reigate and Banstead Borough Council, Surrey PCT and Godstone Farm. Tandridge EHD did not attend. A representative from the VLA was unable to attend this teleconference but attended all future meetings of the OCT. A representative from Animal Health (AH) attended this first meeting and a number of the later meetings. The Health and Safety Executive (HSE) did not join the OCT until 22 September.

The OCT agrees that there does not appear to be any ongoing risk and that 'no further measures (are) needed and the Farm did not need to be closed'. This is because the animal petting barns have already been closed and none of the cases reported so far visited the Farm after 31 August.

A further OCT meeting is scheduled for Friday 18 September.

Tuesday 8 September

The outbreak is declared an HPA level 2 incident.

The Nephrology Unit at the Evelina Children's Hospital calls SySxHPU to express serious concern about the cases of HUS associated with Godstone Farm which they have admitted. They are told by the HPU that the matter 'is in hand'.

Thursday 10 September

VLA informs SySxHPU of the preliminary farm sample results.

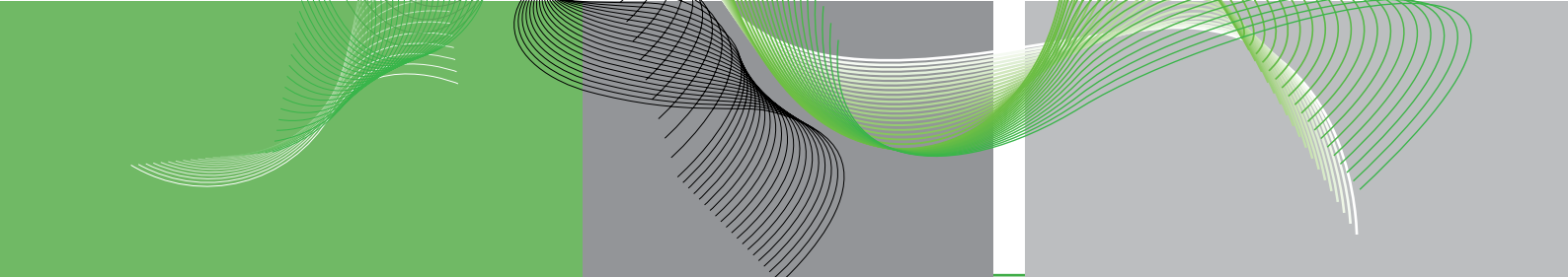
Information about the outbreak is sent to neighbouring HPUs; all hospitals, walk-in centres and GPs in Surrey; and to the Local Education Authority.

The Nephrology Unit at the Evelina Children's Hospital requests to speak to a senior member of staff at the SySxHPU because three new patients are admitted with HUS, and they are concerned that the Farm was still open. They conveyed the seriousness of the medical condition of the children. They are reassured once again and informed that the person leading on negotiations with the Farm will call back. Nobody from SySxHPU returns the call.

Friday 11 September

VLA confirms that the majority of samples taken from ruminant animals (25 of 30 [83%] tested) are positive for *E. coli* O157.

Two further patients are admitted to the Evelina and one of the paediatric nephrologists in the Nephrology Unit has a conversation with the SySxHPU, expressing frustration at the lack of information regarding why the Farm is still open and concern about the exposure of more children over the coming weekend. The HPU assures that the person in charge of negotiations will call before the end of the day but there are no calls. The Nephrology Unit calls the HPU again at 5pm, but there is no response and it appeared the office is closed until Monday.



South East and South West London HPU report a further seven presumptive cases of *E. coli* O157, two of whom had visited Godstone Farm, on 1 and 4 September respectively. This raises the possibility that the Farm is still a public health risk and causes concern that the true size of the outbreak has been underestimated.

That evening, SySxHPU, HPA South East Region together with representatives from the HPA's Communications Division and Cfl hold a teleconference and decide to request the Farm to close. SySxHPU telephones Tandridge EHD to request they close the Farm.

Saturday 12 September

Tandridge EHD visits Godstone Farm before it is due to open at 10.00am and the Farm agrees to immediate voluntary closure for an indefinite period.

Second meeting of the OCT. There are now 36 cases of confirmed or presumptive *E. coli* O157, including 12 who are known to be in hospital with complications. An epidemiological study is planned involving staff from SySxHPU and South East Regional Unit with advice from the HPA Cfl. Information about the outbreak is sent to hospitals in London and the South East.

Sunday 13 September

Third meeting of the OCT. The possibility of setting up a helpline is discussed. It is agreed that the NHS Direct service should manage. There is media interest and complaints from parents that the Farm should have closed earlier are reported.

Monday 14 September

Fourth meeting of the OCT. The outbreak is declared an HPA level 3 incident. There is intense media interest.

Thursday 17 September

HPA issues an apology for delays in the handling of the outbreak.

Saturday 19 September

AH provides advice drafted by the VLA to Godstone Farm on the movement of animals off the Farm.

Monday 21 September

Joint inspection visit to Godstone Farm by the HSE (in an advisory role) and Tandridge EHD at the request of Tandridge EHD.

Tuesday 22 September

HSE invited to join the OCT.

Monday 28 September

AH provides advice to Godstone Farm on the cleansing and disinfection of the Farm. This is to be supervised by a veterinary officer from AH.

The case-control study starts. HPA staff conduct telephone interviews with the parents/guardians of children who have visited Godstone Farm.

Monday 12 October

Last case (asymptomatic) reported.

Thursday 15 October

Outbreak declared over.

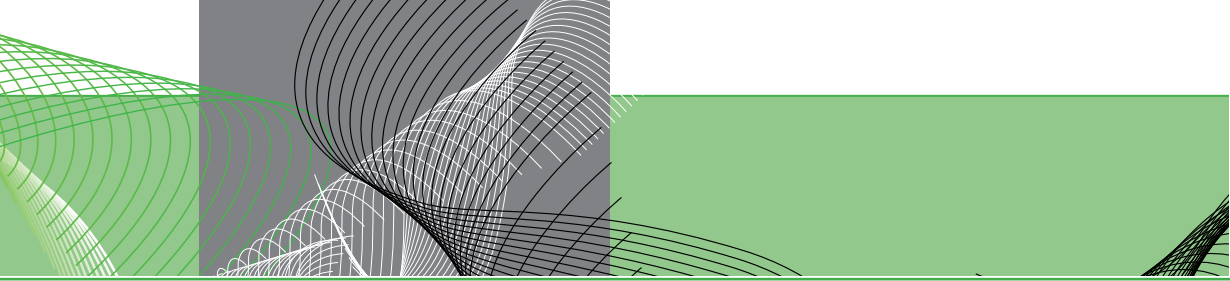
Table 5.1: Timeline of key events in the Godstone Farm outbreak with number of cases

Date	Event	Number of cases ^a
Thu 20 Aug 2009	First case reported to SySxHPU	1
Fri 28 Aug 2009	Telephone call to Godstone Farm by Tandridge EHD	3
Sat 29 Aug 2009		
Sun 30 Aug 2009	August Bank Holiday weekend	
Mon 31 Aug 2009		
Tue 1 Sep 2009	Tandridge EHD alert SySxHPU about possible outbreak at Godstone Farm	4
Wed 2 Sep 2009	Visit to Godstone Farm arranged	
Thu 3 Sep 2009	HPA level 1 incident declared First visit to Godstone Farm by joint SySxHPU and Tandridge EHD team	7
Fri 4 Sep 2009	Team member emails Godstone Farm with advice on control measures Farm voluntarily closes animal barns	9
Mon 7 Sep 2009	First OCT meeting	13
Tue 8 Sep 2009	HPA level 2 incident declared	16
Wed 9 Sep 2009		23
Thu 10 Sep 2009		26
Fri 11 Sep 2009	Teleconference to discuss closure of Godstone Farm	
Sat 12 Sep 2009	Visit to Godstone Farm Farm voluntarily closes to the public Second OCT meeting	32
Sun 13 Sep 2009		
Mon 14 Sep 2009	HPA level 3 incident declared	41
Mon 21 Sep 2009	Joint visit to Godstone Farm by EHD and HSE (in an advisory role)	
Mon 28 Sep 2009	Case-control study starts AH advises Godstone Farm on cleaning and disinfection procedures	
Mon 12 Oct 2009	Last case (asymptomatic) reported	93 ^b
Thu 15 Oct 2009	Outbreak declared over	
Mon 26 Oct 2009	Godstone Farm re-opens play areas	
Mon 12 Apr 2010	OCT Final Report published	

^a number of cases reported to SySxHPU at the time

^b 65 primary cases, 13 secondary cases and 15 asymptomatic carriers

Source: Minutes of OCT meetings, OCT Final Report (iii) and Individual Timeline (Figure 5.5)



5.3 Investigation of the Outbreak

5.3.1 Epidemiological Investigations

As with most outbreaks, there were three main strands to the investigation by the OCT. The first was an epidemiological investigation described in full in the OCT Final Report (iii). This found that:

- There were 93 cases of *E. coli* O157 infection associated with the outbreak, (91 laboratory confirmed *E. coli* O157 and two further cases based on other clinical and laboratory information)
- This included 65 primary cases (people infected at the Farm), 13 secondary cases (people infected from contact with a primary case) and 15 asymptomatic carriers (people who tested positive to the organism but had no symptoms)
- Most cases were children under 10 years of age
- All cases were from Surrey, Sussex, Kent, or the South London boroughs
- Primary cases had visited the Farm between 8 August and 4 September
- Primary cases became ill between 13 August and 18 September.

During the outbreak, attack rates of *E. coli* O157 varied significantly from day to day for reasons which remain unclear. Peak attack rates occurred on Tuesday 25 August (4.9 cases per 1000 visitors), Saturday 29 August (4.7 cases per 1000) and Tuesday 1 September (5.8 cases per 1000). These figures are based on a denominator of all visitors to the Farm, regardless of age and extent of animal contact.

Figure 5.4 is the epidemic curve for the outbreak. This graph shows the relationship between the date of farm visit and the date of onset of illness for all the symptomatic cases associated with the outbreak. The first intervention was the telephone call to Godstone Farm by Tandridge EHD on Friday 28 August. The animal petting barns were closed on Friday 4 September and the Farm was closed on Saturday 12 September.

The upper graph, based on the date of onset of illness, shows that the last primary case (shown in yellow) became ill on Friday 18 September, and that secondary cases (shown in brown) continued to occur in late September and early October. However, the lower graph, based on the date of the Farm visit, shows that there were no further primary cases (shown in blue) after the petting barns were closed. This indicates that measures taken on 4 September were successful in preventing spread of *E. coli* O157 infection and that no further cases occurred in the period before the Farm was fully closed.

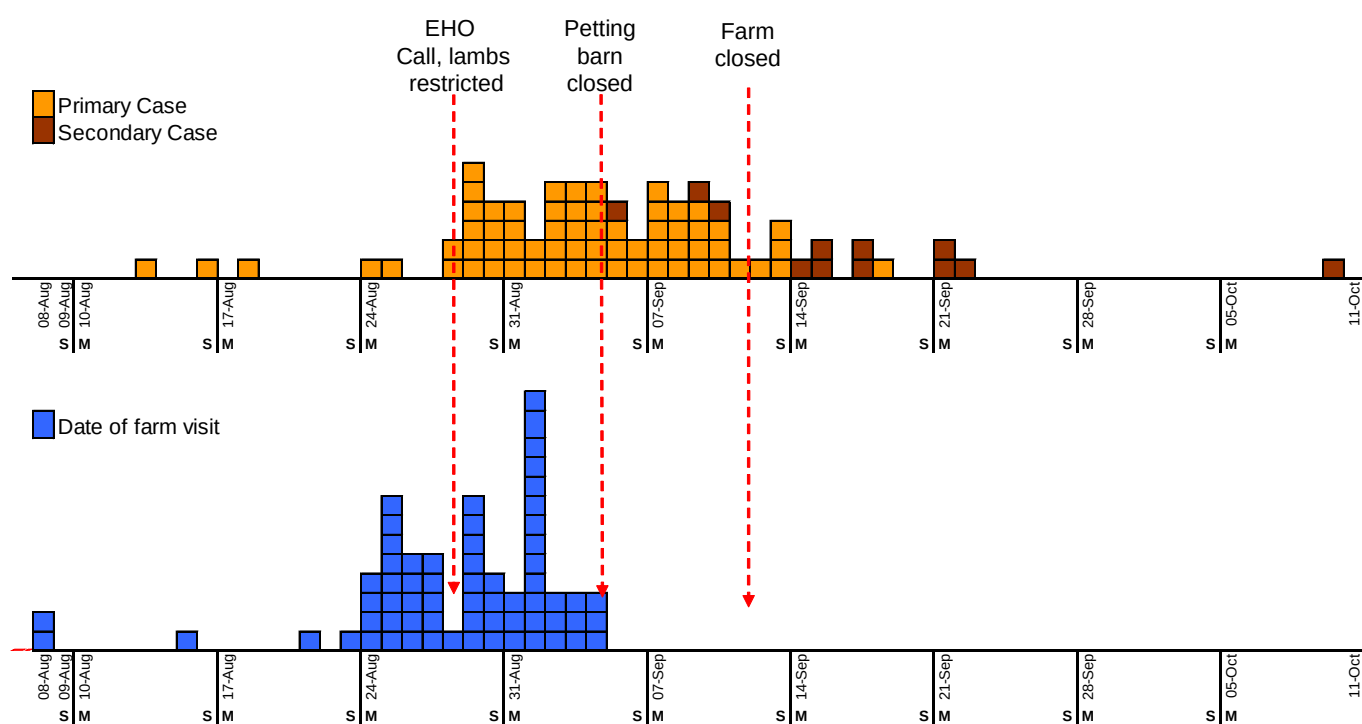
Figure 5.5 is a detailed timeline of the outbreak. It shows, for each individual case, the period in days from the date of the Farm visit to the date of onset of illness (incubation period – shown in blue) and from the date of onset of illness to the date reported to SySxHPU (reporting delay – shown in yellow). The figure also indicates which cases were admitted to hospital (Y) and which developed HUS (H) as well as categorising cases as primary (P), secondary (S) or asymptomatic (A).

Thirty-seven of the 65 primary cases visited the Farm after Friday 28 August, including 15 cases who visited on the Bank Holiday weekend (eight on Saturday 29 August, four on Sunday 30 August, three on Monday 31 August) and a further 22 cases who visited before the animal petting barns were closed on Friday 4 September.

The epidemiological investigation also included a case-control study of children under 11 years of age (iii). The purpose of this study was to identify the source of the infection by comparing the activities of children who visited the Farm and were infected with *E. coli* O157 (cases) with the activities of children who visited but did not become infected (controls). This found that cases:

- Were less likely to be frequent farm visitors
- Were more likely to have visited for a prolonged period
- Were more likely to have visited the main animal barn, and that
- Petting sheep within the large barn increased the risk further.

Figure 5.4: Epidemic curve of *E. coli* O157 outbreak, Godstone Farm, August to September 2009 by date of onset of illness (top) and by date of farm visit (bottom)



Notes: The epidemic curve by date of onset includes primary and secondary cases (N=77) (unavailable for 1 secondary case). The epidemic curve by date of farm visit includes only primary cases (N=65). Asymptomatic cases (N=15) are not shown. Source: OCT Final Report

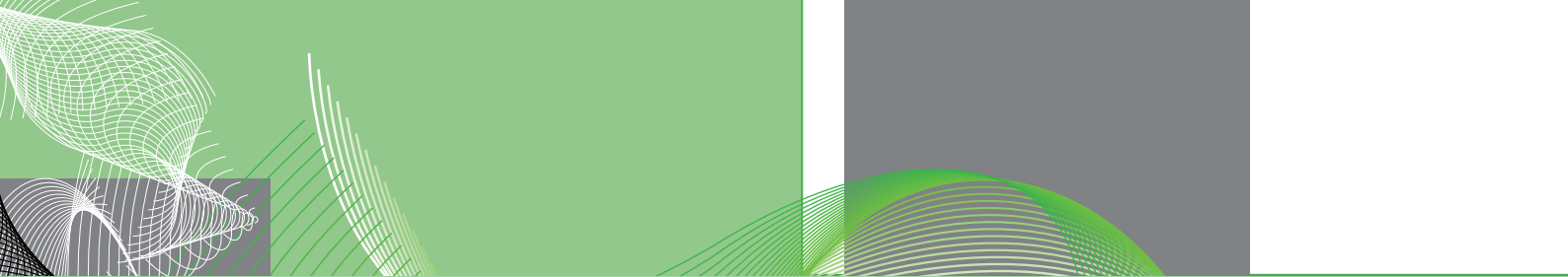
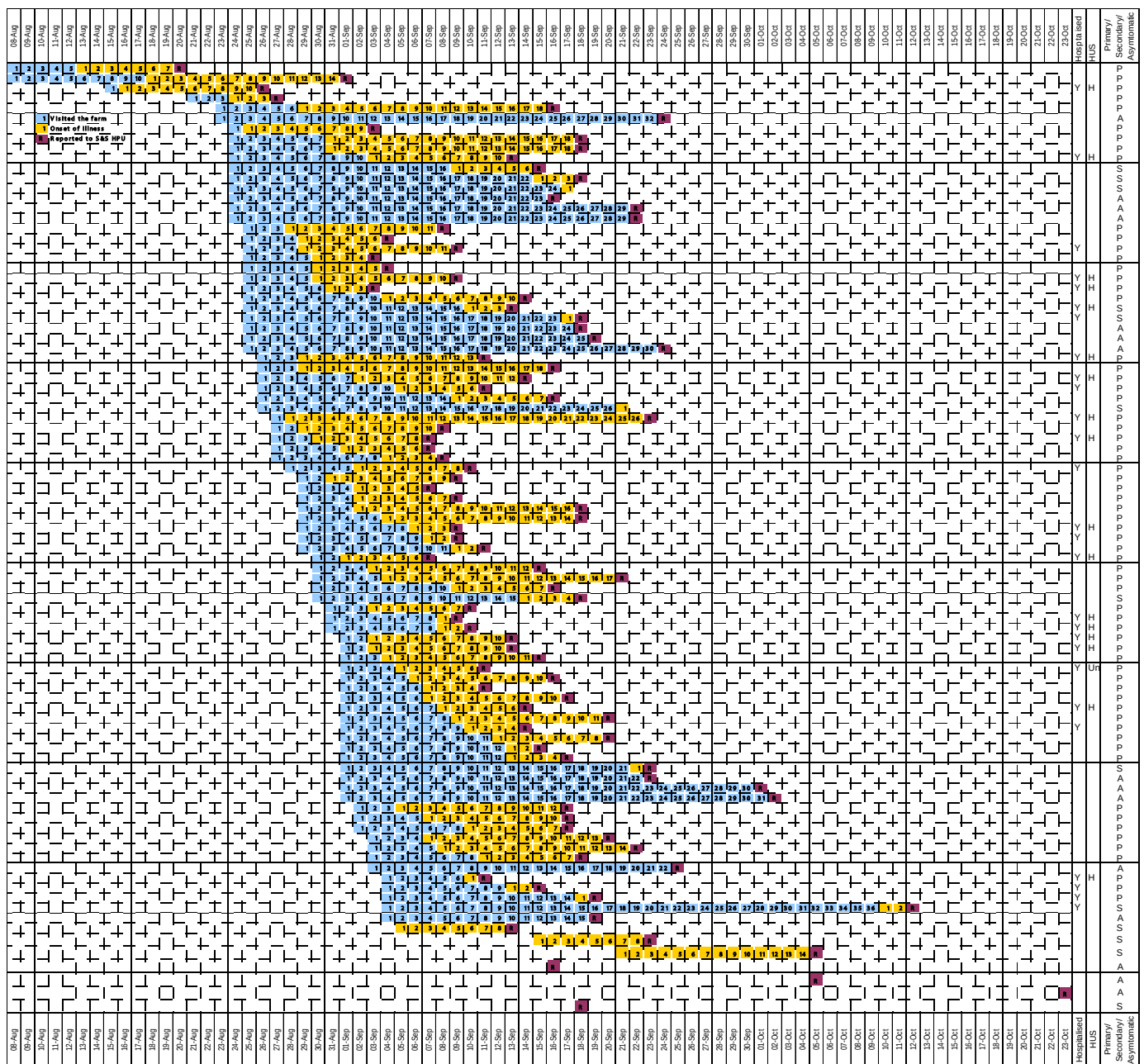


Figure 5.5. Individual timelines of 93 *E. coli* O157 cases, Godstone Farm outbreak, August to September 2009, showing incubation period (blue) and reporting delay (yellow)



* date of onset unknown for one secondary case

Source: OCT (personal communication)

5.3.2 Environmental Investigations

The second strand involved visits to Godstone Farm to observe the farm layout and facilities, to evaluate health and safety practices at the Farm, and to evaluate any potential risk these might incur.

The first inspection visit by a joint team from SySxHPU and Tandridge DC took place on Thursday 3 September (iv).

There were some concerns about insufficient signage on handwashing, the absence of handwashing facilities adjacent to the exit, the use of hand gels by visitors in preference to soap and water, spilling of waste from animal pens on to paths, and possible contamination of the sandpits. It was agreed to:

- Request the VLA to visit the Farm the following week and take samples from the animal enclosures
- Arrange an outbreak control meeting next week
- Seek advice on whether other more urgent action was required.

At the request of Tandridge EHD, a joint inspection visit of Godstone Farm by the HSE (in an advisory role) and Tandridge EHD took place on the morning of Monday 21 September (v). This found that:

- The health and safety risk assessment provided by the Farm 'did not meet suitable and sufficient criteria'
- There was no documentation of staff training about *E. coli* O157
- Signage mostly relied on words rather than visual illustrations
- Handwashing facilities were not very convenient for the tea room and top barn.

This was followed, on the afternoon of Monday 21 September, by a joint visit of the HSE and the neighbouring Epsom and Ewell EHD to the sister farm, Horton Park.

5.3.3 Microbiological Investigations

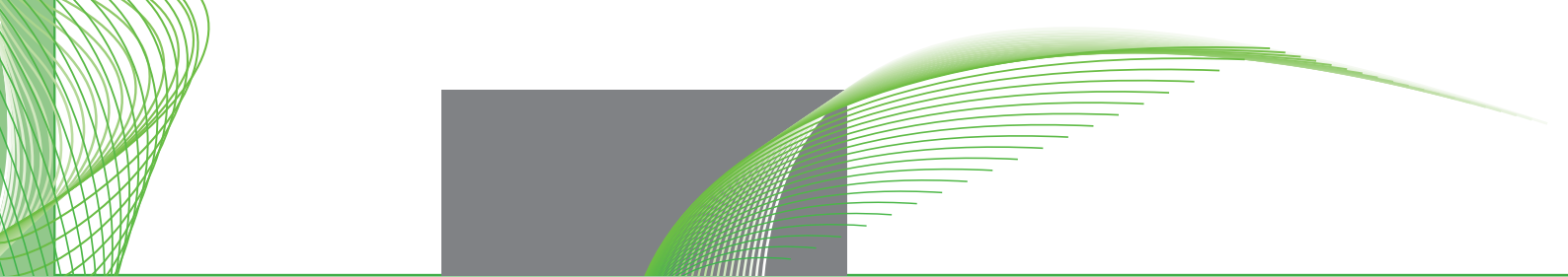
The third strand involved human, veterinary and environmental microbiology testing to identify the strain of *E. coli* O157, described in full in the HPA Outbreak Report (iii).

People who were suspected of being infected were asked to provide faecal specimens. The VLA carried out animal sampling. Tandridge DC and the VLA collected samples from the farm environment including wash basins, metal railings, straw bedding and dust. Sutton and East Surrey Water Company inspected the water supply and took samples from drinking water taps.

Human samples were tested at a variety of hospital microbiology laboratories, veterinary samples were tested by VLA Bury St Edmunds, and environmental and water samples were tested by Ashford Food, Water and Environmental (FWE) Laboratory. All presumptive *E. coli* O157 isolates were sent to the Laboratory for Gastrointestinal Pathogens at the HPA CfI for detailed typing. Isolates were available for testing from 91 of the 93 cases.

These investigations found that:

- All human isolates had genes for verocytotoxin (VT) 2 and were phage type (PT) 21/28
- Of 72 samples from animals tested for *E. coli* O157, 33 samples tested positive (25 of 30 from the ruminant animals, four of seven samples from pigs, three of three from the Shetland pony and one from the 32 rabbit samples)
- The main animal barn yielded the most positive samples (27)
- All but one of the animal isolates were *E. coli* O157 PT 21/28 VT2

- 
- Five of 45 non-direct animal-associated environmental samples from surfaces (eg, wash basins, climbing frames around the Farm's site) obtained by Tandridge DC and tested by the HPA FWE Laboratory at Ashford were positive for *E. coli* O157 PT 21/28 VT2. The five samples that tested positive were from bark chipping from a bridge and tower in the adventure playground, from the straw bedding, from dust from a metal railing, from one of the pig pens in the main barn, from a railing from one of the goat pens and two bird's nest samples from the main barn. All environmental samples taken from the sandpits were negative
 - All water samples were negative.

More detailed analysis of the human and non-human *E. coli* O157 isolates by variable number tandem repeat analysis (VNTR) showed that they could be regarded as belonging to the same outbreak originating from a common source. A comparison of the fingerprint of a subset of human and non-human isolates by pulsed field gel electrophoresis (PFGE) confirmed that they belonged to the same outbreak group.

5.4 The Source of the Outbreak

These investigations confirm that there were clear microbiological links between nearly all the cases, since all the cases from whom isolates were available were infected with the same strain of *E. coli* O157. The similarity of human, animal and environmental strains indicates an outbreak with a common source.

The epidemiological investigation points to the main animal barn as the source of the outbreak. This is corroborated by the high proportion of animals from the main barn that tested positive. There was also evidence of some wider environmental contamination at the Farm, suggesting that even without direct animal contact there was a risk of infection from contact with railings or soiled footwear.

5.5 The Clinical Impact of the Outbreak

This is the largest outbreak of *E. coli* O157 linked to an Open Farm in the UK. Ninety-three people were infected, of whom 76 (82%) were under 10 years of age. There were 47 males (51%) and 46 females (49%).

The 65 primary cases had visited Godstone Farm between 8 August and 4 September 2009. The incubation period (the time between visiting the Farm and onset of illness) ranged from one to 14 days with a median of five days, and was similar for all age groups.

Of the 78 primary and secondary cases (excluding 15 asymptomatic carriers), 27 (35%) were hospitalised and 17 (22%) were diagnosed with HUS. Most of the patients admitted to hospital, and all those with HUS, were aged between one and nine years. Three of the patients admitted to hospital and one with HUS were secondary cases.

Table 5.2: Cases admitted to hospital and diagnosed with HUS, *E. coli* O157 outbreak, Godstone Farm, 2009

Age group (years)	Total No. (%)	Admitted to hospital No. (%)	HUS No. (%)
< 1	2 (2)	0 (0)	0 (0)
1 to 4	47 (51)	13 (49)	10 (59)
5 to 9	27 (29)	11 (41)	7 (41)
10 to 14	3 (3)	1 (4)	0 (0)
> 15	14 (15)	2 (7)	0 (0)
Total	93 (100)	27 (100)	17 (100)

Source: OCT Final Report (iii)

Six primary cases and one secondary case were transferred to one of three specialist units. Of the 16 children with HUS known to the Paediatric Nephrology Unit at the Evelina Children's Hospital, nine were admitted to the Evelina Hospital, two to Great Ormond Street Hospital and five were treated at their local District General Hospital (in clinical contact with the unit at the Evelina Hospital). All had kidney problems.

At the Evelina Hospital, six children had peritoneal dialysis and one had both peritoneal and haemodialysis. The kidney function of two children improved so that they did not require peritoneal dialysis. One child at Great Ormond Street Hospital also had peritoneal dialysis.

Altogether, eight children required dialysis for between five and 33 days. Of these children, some have been left with permanent kidney damage. None of the children treated at their local District General Hospital required dialysis.

In an average year, the Paediatric Nephrology Unit at the Evelina Hospital treats five to 10 HUS cases. The catchment area for the Evelina Hospital is the whole of South East England, but the hospital had not previously experienced a problem on this scale. The unit's resources were stretched to the maximum so that, on 14 September, short stay arrangements on the Paediatric Nephrology ward were cancelled and standby arrangements made to dialyse four more patients if required. This arrangement was kept in place for one week.

It is possible that some children with HUS will experience long-term damage including hypertension and chronic kidney failure. All the children who were admitted will be reviewed regularly. This will involve further tests of kidney function in one year's time and regular follow-up for at least 10 years. Children with reduced kidney function may need a kidney transplant at some stage in the future.



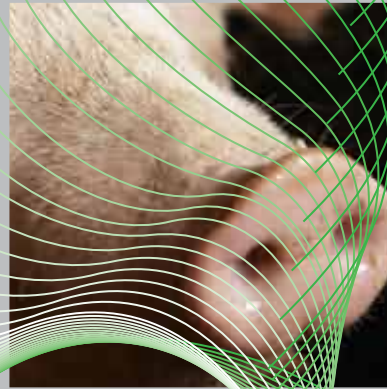
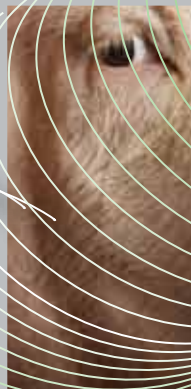
5.6 References

Independent Investigation Documents available at www.griffininvestigation.org.uk

- i. Tandridge District Council. Presentation to the Investigation Committee on the role of Tandridge District Council. Godstone Farm history, context and operation (Document TDCI).
- ii. Godstone Farm. Godstone Farm map (Exhibit I).
- iii. Outbreak Control Committee. Outbreak of verocytotoxin-producing *Escherichia coli* O157 infection in visitors to Godstone Farm, Surrey: August-September 2009.
- iv. Health Protection Agency. Report of Godstone Farm site visit by joint team from SySxHPU and Tandridge EHD, 3 September 2009
- v. Health and Safety Executive. Feedback from visits undertaken by the Health and Safety Executive to Godstone Farm, Godstone and Horton Park Children's Farm, Epsom on 21 September 2009.

Chapter 6:

The Views of Parents



Chapter 6: The Views of Parents

6.1 Synopsis of Interviews

Introduction

We felt it was important to obtain the views of the parents of children who had been affected by the outbreak. A letter from Professor Griffin was sent to all the families affected by the outbreak plus a further eight members of the public who had contacted the Health Protection Agency (HPA) about issues relating to the outbreak or its management, to seek their views.

The letter was sent by the Surrey and Sussex Health Protection Unit (SySxHPU) to preserve the confidentiality of the families and was accompanied by a cover letter from the HPU Director and a set of questions about the outbreak drafted by the Investigation. The letter invited the families to a meeting with Professor Griffin at one of three venues (Rochester-Chatham, Crawley and Croydon), selected for the families' convenience. If the families did not wish to attend a face-to-face meeting, they were given the opportunity to respond to the questions by post, anonymously if they wished, or by email.

A postal address was set up for the Investigation together with an email address (responses@griffininvestigation.org.uk).

6.1.1 Summary of Meetings with Affected Families

Eighteen families affected by the outbreak met Professor Griffin, an additional member of the Investigation Committee and the Committee Secretariat at Rochester-Chatham (six families), Croydon (eight) and Crawley (four). Another family, whose child had *E. coli* O157 following a visit to Godstone Farm earlier in the year, and one parent whose child had not been infected with *E. coli* O157, but who had contacted the HPA, also met the Team (see Table 6.1).

Notes taken during the face-to-face meetings were emailed to the families to check for factual accuracy. These were collated and are included as **Appendix 8** of this Report. Verbal consent from the families was obtained during the face-to-face meetings. The main points that arose are summarised in Table 6.2.

A further nine families provided responses by post (six of these families had children infected with *E. coli* O157, one respondent was the grandfather of one of the families who attended a meeting and two had visited the Farm during the period of the outbreak). For completeness, we have included these responses in **Appendix 8**, but details are not included in the summary tables 6.1 and 6.2 as far less information was available from the written responses compared with the information from the face-to-face interviews.



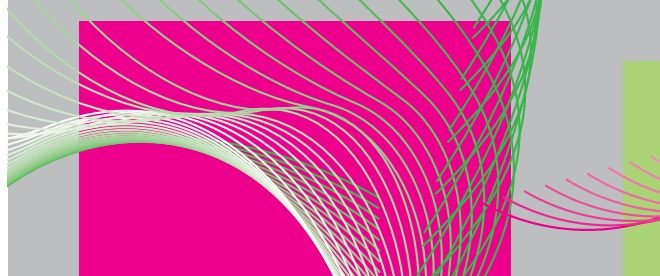
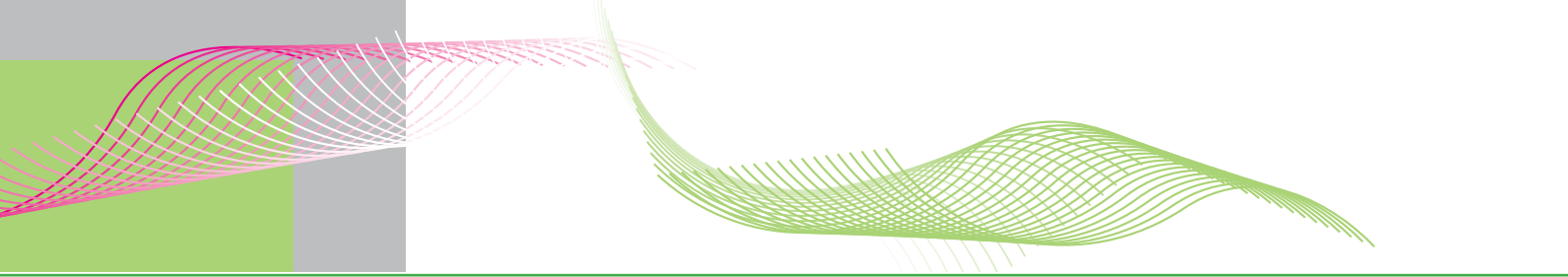


Table 6.1: Summary of meetings

Families contacted:	All families affected by the August outbreak 8 who had contacted the HPA 1 case of <i>E. coli</i> O157 earlier in 2009
Total number of families who met the Investigation Team:	20 18 from the August outbreak 1 earlier case 1 who had contacted the HPA (not affected by <i>E. coli</i> O157)
Total number of families who provided written responses:	9

Table 6.2: Main points arising from meetings with 19 affected families

Dates visited:	
- Week of Mon 24.08.2009 to Sun 30.08.09 (includes Bank Holiday Sat and Sun)	9 (47%)
- Week of Mon 31.08.09 to Sun 06.09.09 (includes Bank Holiday Mon)	7 (37%)
- Number who had visited the Farm before	16 (84%)
Differences noted about this visit:	
- Farm exceptionally busy	5 (26%)
- Child had animal contact for first time	3 (16%)
- Observed children picking up feed from floor	5 (26%)
Handwashing arrangements:	11 (58%)
- Noted cold water	
- Noted difficulty using taps	6 (32%)
Severity of illness:	
- Child(ren) admitted to hospital	13 (68%)
- Child(ren) admitted to specialist renal care with acute renal failure	8 (42%)
Prior knowledge of <i>E. coli</i>	
- General awareness of <i>E. coli</i> O157 or <i>E. coli</i>	16 (84%)
- Aware of <i>E. coli</i> associated with uncooked food	8 (42%)
- Believed <i>E. coli</i> was a risk for pregnant women	3 (16%)
Knowledge that <i>E. coli</i> is present in animal faeces	ZERO



6.1.2 Principal Comments

It is noted that the observations and comments are those of the families alone. These are the views of the parents interviewed at the face-to-face meetings but may not be typical of the views of the families as a whole.

Familiarity with Godstone Farm

The majority of the families (16) were regular visitors to Godstone and said that their children enjoyed visits there. Only three families had not visited before.

When asked if there had been anything different about their visit, some (five) noted that the Farm was exceptionally busy. There had been a queue to get in and/or they had to wait to use the washing facilities. They noticed straw and paper towels strewn over the floor.

Two parents noted their child had fed the animals for the first time and one child had gone into the rabbit pen for the first time.

Five parents observed children picking up feed from the floor to feed the animals.

Handwashing

All the parents said they were aware of the need to wash their children's hands. A number said they were very careful and had used hand gels. It is unclear whether gels had been used instead of handwashing and none seemed to be aware that handwashing with soap is crucial and that gels alone are not effective.

Several commented that the taps were difficult to use, particularly for the younger children, and at most of the sinks there was only cold water. Eleven families commented that there was little supervision by farm staff and considered that there should have been more staff supervision at handwashing and animal contact areas.

Signage

Most families had noticed signs about handwashing at the Farm but some felt there should have been more. Many of those who had visited after the first few cases were confirmed commented that they had not noticed specific signs about *E. coli* O157.

Awareness of *E. coli* O157

The majority (16) of parents had heard about *E. coli*. Eight thought that it was associated with eating poorly cooked food or thought it was a 'tummy bug'. Only three were aware of the association with animal contact but thought this was specifically a problem during pregnancy. None was aware of the association of *E. coli* O157 infection with animal faeces or animal contact in children, or indeed the very serious nature of this infection.

Clinical Management

A common theme emerging was a lack of urgency at primary care level in dealing with children (many under five years of age) who presented with bloody diarrhoea and stomach cramps.

Several of the parents made repeated visits to their GP surgery or out-of-hours service before stool samples were taken. Several of the parents decided to present to their local A&E Departments and the children were then admitted as their clinical condition deteriorated rapidly. All the parents whose children were referred to the specialist Paediatric Nephrology services at the Evelina or Great Ormond Street Hospitals were extremely complimentary and appreciative of the excellent service they received there.

Table 6.3 sets out the clinical details of the children and their management as described by the parents during the face-to-face meetings.

Communication and Advice

Communication and advice received by the parents did not appear to be consistent. Some families had been contacted by the HPU and some by the local authority Environmental Health Department (LA EHD).

Some parents mentioned they had been given a leaflet about *E. coli*. One parent mentioned that the environmental health officer (EHO) who interviewed her had commented that they were more used to investigating restaurants. One of the parents had been told by their GP that their child (who still had positive stool samples for *E. coli* O157) could attend school. Another family commented about the lack of awareness of staff in their local A&E Department about the outbreak, even though there were already numbers of cases in the local area at the time their child was admitted.

The parent of a child who had *E. coli* O157 associated with Godstone in March 2009 was concerned that there was little awareness by the HPA of this case before the outbreak in August.

One family (not directly infected with *E. coli* O157) expressed concern that the primary school attended by two children who were known to be infected, had no idea of the Public Health Regulations and the implications for the school, particularly in terms of preventing secondary spread, and had additionally received no help or instruction from the LA.

6.1.3 Future Action

Many of the families said their experiences had been so traumatic they would not visit an Open Farm with their children again. However, many recognised the value of an animal contact experience for children in general and thought that much more information should be made available so that parents could make an informed decision on animal contact.

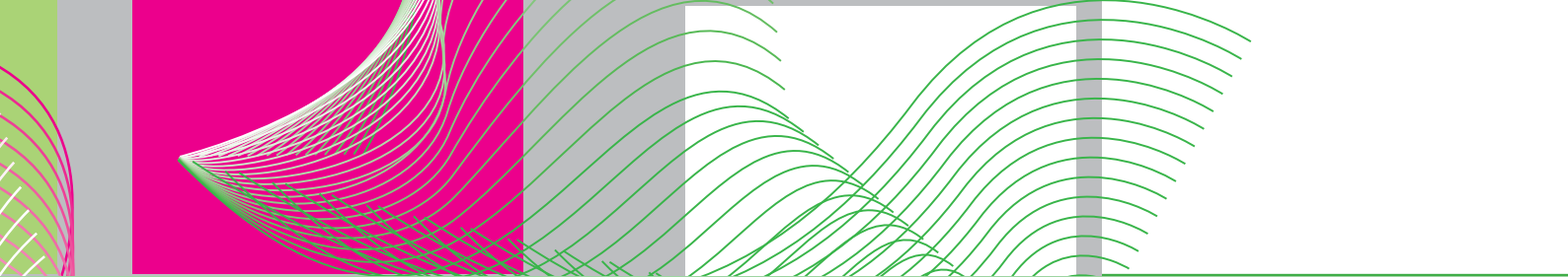
A large number of the families felt there should be increased staff supervision in animal contact and handwashing areas. Better training of staff was also mentioned, as well as more controls during periods of high visitor numbers.

Some of the families felt there should be better signage specifically about *E. coli* O157 although they did acknowledge that the Farm had a number of general handwashing signs.

The families whose children were infected with *E. coli* O157 are now much more aware about the transmission of *E. coli* O157 from animal faeces and feel that the general public visiting Open Farms do not have this awareness.

Many families had clearly given thought to how the Farm could have prevented or reduced faecal contamination. For example, one parent said that the children should not be able to walk into the animal pens. There should be improved cleaning regimes with hay and animal feed pellets regularly removed from the public areas and railings regularly cleaned. There should be more information to visitors about the potential for faecal contamination of boots, shoes and buggies and the possible consequences.

One parent suggested that farm staff should walk through disinfectant after working in an animal pen and before walking through a public area. Another parent felt Open Farms should improve their risk assessments.



Several families wondered whether the mix of animal petting and recreational activities was suitable. Godstone Farm has several large children's play areas (including an outdoor activity area, toboggan run, sandpits and an indoor plastic soft play area with ball pond).

Several families realised the potential for these areas becoming contaminated with faecal material on children's shoes or for the children to get faecal material on their hands when removing their shoes to play in the soft play area. In addition, several families remarked that their children actually preferred the play areas to the animal contact areas.

Many of the families could not understand why the Farm had not closed earlier. Furthermore they expected that it was the HPA which had responsible powers for closure and expressed surprise when they were later told that the HPA had no regulatory powers.

Table 6.3: Clinical details of individual children from interviewed families

Case No: *	Days from farm visit to onset of symptoms	Days from farm visit to stool sample	Days from farm visit to being seen by GP	Days from farm visit to A&E attendance or admission to hospital	Duration of hospital admission (days)	Presenting symptoms	Treatment
1)	3	6 (hospital)	6	6: Admitted	12	Bloody diarrhoea Abdominal pain Bloody urine	Intravenous fluid Anti-emetic Blood transfusion Naso-gastric feed No dialysis
2)	6	No stool sample	Not seen by GP	No hospital attendance	Not admitted	Bloody diarrhoea Abdominal pain	None required
3)	9	12	Not seen by GP	11: Parents took child to A&E 11: Admitted from A&E	2	Bloody diarrhoea Dehydration Nausea Vomiting	Rehydration with oral fluid
4)	3	4	3	4: Parents took child to A&E 4: Admitted from A&E	7	Bloody diarrhoea Abdominal pain Vomiting Prolapsed bowel	Intravenous rehydration
5)	6	Unknown	Not seen by GP	7: Parent took child to A&E 7: Admitted from A&E	6	Bloody diarrhoea Abdominal cramps	
6)	5	7	Not seen by GP	7: Parents took child to A&E. Not admitted	Not admitted	Bloody diarrhoea Vomiting Violent stomach cramps	Amoxycillin Rehydration with oral fluid
7)	3	8	5: Call to NHS Direct 5: Emergency GP Service 8: GP visit	No hospital attendance	Not admitted	Bloody diarrhoea Vomiting Stomach cramps	Rehydration with oral fluid
8)	9	No stool sample	9	9: Advised to go to local hospital by GP 9: Admitted 11: Transferred to specialised renal unit	14	Dehydration Diarrhoea Limp and floppy Renal Failure Anaemia (HUS)	Intravenous rehydration Blood transfusion (2) Peritoneal Dialysis (8 days) Morphine

* Case numbers refer to this Table only and do not relate to case numbers referred to elsewhere in the Report

Case No: *	Days from farm visit to onset of symptoms	Days from farm visit to stool sample	Days from farm visit to being seen by GP	Days from farm visit to A&E attendance or admission to hospital	Duration of hospital admission (days)	Presenting symptoms	Treatment
9)	9	No stool sample	9	9: Advised to go to local hospital by GP 10: Transferred to specialised renal unit	41	Dehydration Diarrhoea Renal Failure Anaemia (HUS)	Intravenous rehydration Blood transfusion (2) Peritoneal Dialysis (33 days) Haemodialysis Naso-gastric feed
10)	14	14	14	No hospital attendance	Not admitted	Diarrhoea	None required
11)	No symptoms	14	14	No hospital attendance	Not admitted	Asymptomatic	None required
12)	4	7	7: Consulted GP 13: Called GP as child very unwell	13: Advised to go to local hospital by GP 13: Admitted	3	Bloody diarrhoea Abdominal pain Dehydrated Vomiting	Intravenous rehydration
13)	21	21	21: Consulted GP 21 (evening): Called Out of Hours Service	23: Admitted to local hospital from GP Out of Hours Service	2	Bloody diarrhoea Cramps	Oral rehydration
14)	10	No stool sample	11: Phoned GP and then saw Out of Hours Service 13: Consulted GP	No hospital attendance	Not admitted	Diarrhoea Cramps Nausea Bloody diarrhoea Vomiting	Oral rehydration Antispasmodic syrup
15)	No symptoms	24	Not seen by GP	No hospital attendance	Not admitted	Asymptomatic	None required

* Case numbers refer to this Table only and do not relate to case numbers referred to elsewhere in the Report

Case No: *	Days from farm visit to onset of symptoms	Days from farm visit to stool sample	Days from farm visit to being seen by GP	Days from farm visit to A&E attendance or admission to hospital	Duration of hospital admission (days)	Presenting symptoms	Treatment
16)	4	7: on 2 nd visit to GP	4: Consulted GP and also "a few days later"	10: Attended local A&E as child unwell 10: Transferred immediately from A&E to specialised renal unit	11	Diarrhoea Vomiting Blood in urine Abdominal pain Anaemia (HUS) Renal failure	Oral rehydration Blood transfusion Peritoneal dialysis (3 days) Morphine
17)	Not stated	No stool sample	Not seen by GP	No hospital attendance	Not admitted	Diarrhoea for 1 day	None required
18)	7	10	9: Phoned NHS Direct 9: Advised to go to local A&E 10: Consulted GP	9: Seen in local A&E. Not admitted 11: Seen in local A&E. Not admitted 12: Seen in local A&E. Admitted 13: Transferred to specialised renal unit	42	Bloody diarrhoea Abdominal cramps Dehydrated Floppy Anaemia (HUS) Renal failure	Intravenous rehydration Peritoneal dialysis (4 weeks)
19)	2	6	6	6: Admitted to local hospital 10: Transferred to specialised renal unit	13	Bloody diarrhoea Abdominal cramps Vomiting Renal failure	Peritoneal dialysis (10 days)
20)	4	6	6: Phoned Out of Hours Service. Advised to go to Walk-In Clinic at local hospital	6: Attended local hospital; not admitted 7: Seen at Walk-In Clinic. Not admitted 15: Admitted to local hospital 15: Transferred to specialised renal unit	21	Bloody diarrhoea Vomiting Swollen feet and hands Kidney failure Anaemia (HUS)	Oral rehydration Peritoneal dialysis (7 days) Blood transfusion (x 3)

* Case numbers refer to this Table only and do not relate to case numbers referred to elsewhere in the Report

Case No: *	Days from farm visit to onset of symptoms	Days from farm visit to stool sample	Days from farm visit to being seen by GP	Days from farm visit to A&E attendance or admission to hospital	Duration of hospital admission (days)	Presenting symptoms	Treatment
21)	9	10	10: Phoned NHS Direct Advised to see GP 10: Consulted GP Advised to go to local hospital 11: Called Out of Hours GP Service	10: Seen at local hospital. Not admitted 13: Admitted to local hospital 14: Transferred to specialised renal unit	12	Bloody diarrhoea Vomiting Renal failure Anaemia (HUS) Low platelets (HUS)	Peritoneal dialysis (10 days) Blood transfusion Naso-gastric feed
22)	3	5	9: Saw GP and referred to local A&E	9: Admitted to local hospital 10: Transferred to specialised renal unit	11	Bloody diarrhoea Acute renal failure (not passing urine)	Peritoneal dialysis (12-14 days) Blood transfusion (x 2)
23)	5	16	16	No hospital attendance	Not admitted	Bloody diarrhoea Abdominal cramps	None required
24)	14	20	Not seen by GP	18: Out of Hours Clinic at local hospital Not admitted	Not admitted	Bloody diarrhoea Abdominal cramps	None required
25)	6	7	7	8: Attended local A&E. Not admitted 10: Attended local A&E. Not admitted 11: Attended local A&E. Not admitted 12: Attended local A&E. Admitted 13: Transferred to specialised renal unit	3	Bloody diarrhoea Vomiting Dehydration Renal failure Anaemia (HUS)	Antibiotic (amoxicillin) Intravenous rehydration (Dialysis not needed)
26)	6	8	6: Phoned Out of Hours GP for advice (not seen) 8: Phoned GP; not seen, advised to send stool sample 11: Consulted GP	15: Attended local A&E. Not admitted	Not admitted	Bloody diarrhoea Abdominal cramps	None

* Case numbers refer to this Table only and do not relate to case numbers referred to elsewhere in the Report

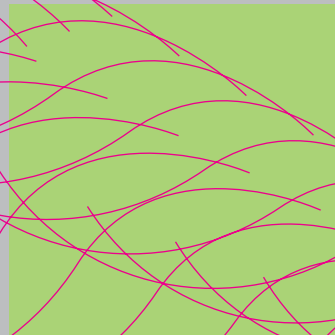
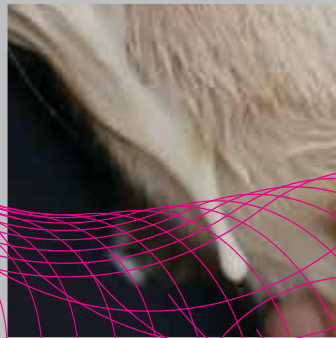
Source: Information provided by parents at the face-to-face meetings

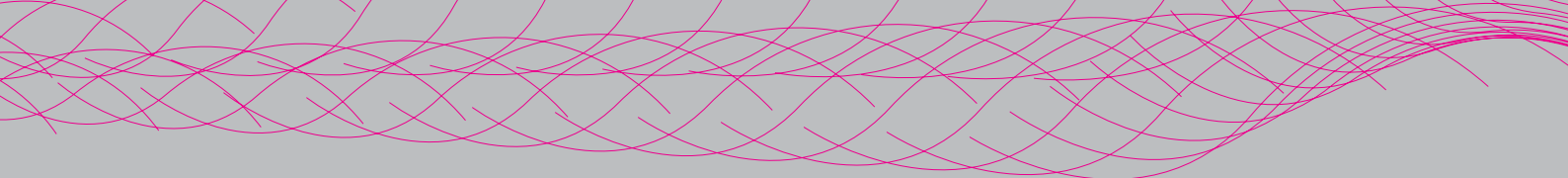
Note that the ages of the children have been removed for confidentiality reasons. However the age range of the 26 children referred to in the table is between one and 14

PART C MANAGEMENT OF THE OUTBREAK

Chapter 7:

The Management and Control of the Outbreak





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7.1 Local Arrangements for Outbreak Control

7.2 Recognising the Outbreak

7.3 Convening the OCT

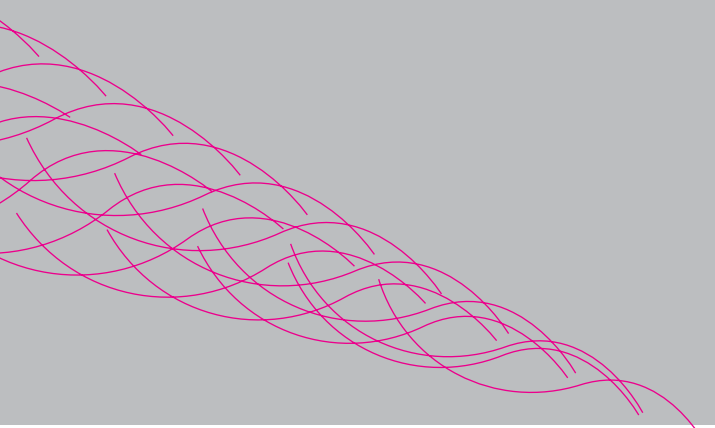
7.4 Responding to the Outbreak

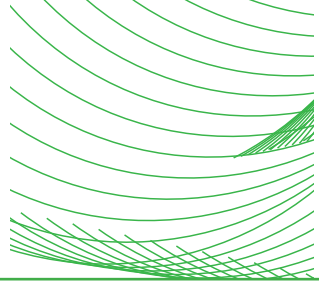
7.5 The Size and Nature of the Outbreak

7.6 After the Outbreak

7.7 References

Key Points

- There was delay in recognising the outbreak due to the fact that no one person in the Health Protection Unit (HPU) appears to have had a clear picture of how many cases of *E. coli* O157 with links to Godstone Farm had been reported
 - The Outbreak Control Team (OCT) was convened exceptionally late in the course of the outbreak
 - Had the OCT been convened earlier, there would have been a more timely assessment of the public health risks and almost certainly more effective control of the outbreak
 - There was unacceptable delay in initiating strict control measures at Godstone Farm. Had a decision been made on the August Bank Holiday weekend (or even after it, on Tuesday 1 September) to stop all contact with ruminant animals, a substantial number of cases of *E. coli* O157 could have been prevented
 - There was unacceptable delay in carrying out the systematic epidemiological investigation of the outbreak, particularly in commencing the case-control study
 - General practitioners (GPs) and hospital clinicians serving the catchment area of Godstone Farm, including paediatric renal unit staff, should have been alerted much earlier to the occurrence of the outbreak
 - Even with prompt action this would have been a big outbreak. Nevertheless, there was a lack of public health leadership and a missed opportunity to exercise decisive public health action and thereby restrict the size of the outbreak
 - There was unnecessary delay in reaching a decision about reopening Godstone Farm, and in publishing the OCT final report.
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7.1 Local Arrangements for Outbreak Control

The Surrey and Sussex Health Protection Unit (SySxHPU) has an Outbreak Control Plan (i), dated January 2005. It provides details on:

- Managing communicable disease control
- The roles and responsibilities of key agencies
- The OCT
- The investigation of food poisoning and other gastrointestinal diseases.

Among the roles of the HPU are:

- Surveillance of communicable disease including early recognition of outbreaks
- Co-ordination of a joint policy on outbreak control
- Convening an OCT and chairing meetings.

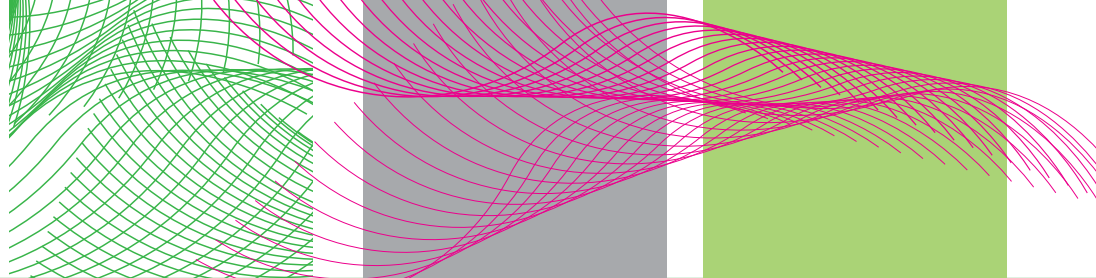
It includes a list of communicable diseases which are categorised according to who leads in the investigation. The consultant in communicable disease control (CCDC) based at the HPU is specified as being generally responsible for leading the investigation of *E. coli* O157 infection, in accordance with the following principles:

- The chief environmental health officer (CEHO) ensures that the HPU is notified and consulted promptly by fax or phone
- The HPU investigates but may request assistance from the CEHO
- The HPU and CEHO share information
- The HPU will liaise with the CEHO on establishing an OCT
- The HPU will convene an OCT when considered necessary
- The HPU will chair the OCT.

The NHS and local authorities (LAs) were asked by circular HSG(93)56 to ensure that they had up-to-date joint plans covering the structures and procedures for managing communicable disease control in their areas, both on a day-to-day basis and if an outbreak occurred (1). We note that circular HSG(93)56 appears not to have been revised since 1993 and understand that the Faculty of Public Health and Health Protection Agency (HPA) have recently written to the Department of Health to seek clarification.

We conclude that it would assist future joint working if it were brought up to date. **We recommend** that circular HSG(93)56 should be revised to bring it up to date and jointly circulated to all LAs.

We have been advised by the Chartered Institute of Environmental Health that structures within LA Environmental Health Departments (EHDs) are changing rapidly and the post of CEHO often no longer exists. **We recommend** that to ensure swift and appropriately resourced response to an outbreak, every LA should ensure that a senior post has been identified with responsibility for managing the LA's participation in outbreak control.



7.2 Recognising the Outbreak

On 20 August 2009, the first case of *E. coli* O157 linked to Godstone Farm was reported to SySxHPU and Tandridge EHD. By Friday 28 August, three cases of *E. coli* O157 linked to Godstone Farm had been reported to the HPU and four cases (including two siblings) had been reported to Tandridge EHD (ii).

This knowledge should have led to recognition of a potential outbreak linked to the Farm.

This failure to recognise the outbreak was due to the fact that no one person in the HPU appears to have had a clear picture of how many cases of *E. coli* O157 with links to Godstone Farm had been reported. The failure was related to a number of factors (iii):

- There were breakdowns in communication within SySxHPU, leading to responsible staff members being unaware of recent telephone reports of cases of *E. coli* O157
- A computerised case management and decision support system (HPZone) in use at the HPU since August 2006, which was intended to facilitate the identification of linked cases did not perform its intended function because of technical difficulties in the IT infrastructure. We were informed that these were connectivity problems due to insufficient broadband capacity at the Leatherhead office and that this had been reported through formal HPA governance routes. This meant that information entered on HPZone was sometimes lost and no longer visible on the system
- There was resulting uncertainty and confusion at the HPU about the size of the outbreak in its very early stages. This may have delayed the decision to investigate further.

We conclude that this uncertainty could and should have been avoided, both by proper connectivity of HPZone and by robust handover arrangements. Had these deficiencies not occurred, the outbreak associated with Godstone Farm could have been identified earlier.

We recommend that HPU staff are required to log every case of *E. coli* O157 on HPZone as a matter of urgency and routine, and that the technical functionality of HPZone is reviewed.

We recommend that the risk associated with each case of *E. coli* O157 should be assessed and the following aspects specifically considered:

- The possibility that the case may be part of a cluster or outbreak
- The possibility that there may be a preventable ongoing source of infection that may affect others
- The risk of secondary spread to household contacts
- The risk of secondary spread to other contacts, particularly children in pre-school childcare settings.

We recommend that all HPUs and EHDs should have robust handover arrangements in place, during working hours and out of hours, to ensure that details of recently reported *E. coli* O157 cases are communicated to the relevant staff.

7.3 Convening the OCT

Friday 28 August was a crucial day in the management of the outbreak. Both the HPU and the EHD were aware of at least three cases of *E. coli* O157 linked to Godstone Farm. It was the Friday before the August Bank Holiday weekend, a period when Godstone Farm might be expected to be at its busiest. Yet this knowledge does not seem to have generated any undue concern and the primacy of public safety was neglected.

The HPU discussed the situation with Tandridge EHD and agreed a course of action. Tandridge EHD contacted Godstone Farm by telephone to advise them of the cases and of the need to alert parents about handwashing and hygiene measures, and to arrange a visit to the Farm (ii). The HPU did not declare an outbreak, did not make any arrangements to review the circumstances over the Bank Holiday weekend, and did not convene an OCT. No visit was made to the Farm over the weekend.

There were nearly 5,500 visitors to the Farm that weekend, including 2,000 children.

We believe that a visit to the Farm by staff from the HPU and EHD might have led to a different assessment of the risk based on the likely number of visitors that weekend and the various possible sources of exposure to *E. coli* O157 at the Farm. A visit might also have prompted an earlier decision to call an OCT and a consideration of whether enforcement action should be taken by the EHD.

The SySxHPU Outbreak Control Plan defines an outbreak as 'an occurrence of disease clearly in excess of normal expectancy'. It indicates that the responsibility for convening an OCT lies with the HPU, but does not stipulate a timeframe within which an OCT should be called other than 'as soon as possible' (i).

The first OCT (Chapter 5) did not meet until Monday 7 September, 10 days later. This was in spite of the fact that four cases linked to the Farm had already been recognised by Tuesday 1 September and that substantial further activity had occurred on 3 and 4 September. This included an inspection of the Farm on 3 September; recognition of an additional four cases and email correspondence with the Farm owners suggesting possible courses of action, one of which was voluntary closure (ii,iv,v).

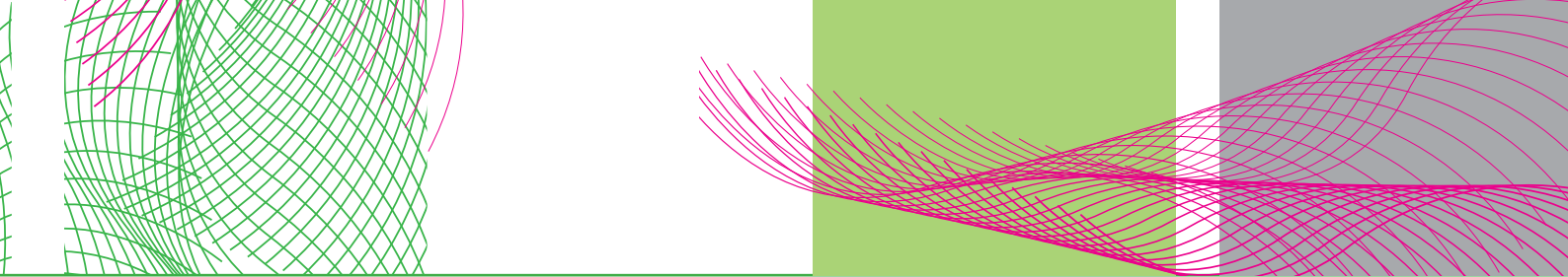
The first OCT meeting decided that there appeared to be no ongoing risk (vi). This decision seems to have been based in part on the fact that none of the newly recognised cases had visited the Farm after Monday 31 August. The date of the next OCT meeting appears to have been set for Friday 18 September, the end of the next working week.

We conclude that, in relation to normal practice, the OCT was convened exceptionally late in the course of the outbreak. This delay is unacceptable, even taking into account the deficiencies in the flow of information that delayed initial recognition of the outbreak.

We conclude that, had the OCT been convened earlier, there would have been a more timely assessment of the public health risks and almost certainly more effective control of the outbreak.

We conclude that the failure to convene the OCT on Tuesday 1 September, when both the HPU and EHD were aware of a cluster of four linked cases, represents a failure of public health leadership, and that the main responsibility for this failure lies with the HPU.

We conclude that the decision by the OCT that there was no ongoing risk was premature. Since the incubation period for *E. coli* O157 can range from two to 12 days and cases may not be diagnosed for some days after onset of symptoms, there can be an interval of two to three weeks between exposure and diagnosis. The decision not to reconvene until Friday 18 September shows a failure to appreciate the seriousness of the situation.



We recommend that an OCT should be convened by the CCDC as soon as two or more presumptive cases of *E. coli* O157 infection from different households but with a potential common link are identified.

We recommend that the first OCT meeting should specifically assess the ongoing risk to the public based on:

- The possibility that there may be a preventable ongoing source of infection that may affect others
- The size and vulnerability of the population at risk
- The risk of secondary spread to household contacts
- The risk of secondary spread to other contacts, particularly children in pre-school childcare settings and in primary schools
- The availability of effective control measures.

7.4 Responding to the Outbreak

7.4.1 Epidemiological Investigation

By the time the first OCT was called on Monday 7 September, 13 cases of *E. coli* O157 linked to Godstone Farm had been reported (Chapter 5). The following day, the outbreak was declared a HPA level 2 incident, ie, an incident of wider local impact requiring deployment of both local and regional resources. This was already the second largest outbreak linked to an Open Farm to have occurred in the UK. There appear to have been no plans made at this stage to carry out a systematic epidemiological investigation by gathering and collating detailed information about cases (vi). The case-control study interviews to test hypotheses about the cause of the outbreak did not start until Monday 28 September (ii).

We conclude that there was unacceptable delay in carrying out the systematic epidemiological investigation of the outbreak, particularly in commencing the case-control study.

We recommend that the OCT should ensure that hypotheses with a clear focus on identifying the source and mechanism of spread of infection are tested, wherever possible, by means of an analytical epidemiological investigation, and that this is carried out as a matter of urgency.

7.4.2 Farm Restrictions and Closure

During the early stages of the investigation of an outbreak, it is often impossible to pinpoint which specific activities are sources of infection. However, given the existing literature implicating animal contact in previous outbreaks of *E. coli* O157 infection (Chapter 1), there should be a high index of suspicion that this is the likely source in an Open Farm outbreak.

In the first instance, therefore, an OCT should consider introducing control measures that restrict animal contact, particularly with ruminants, as well as those that promote and encourage good hygiene. Control measures should be introduced as a matter of urgency and should not await the findings of the outbreak investigation. They may be modified at a later date, if required, based on the results of investigations. Action to protect public safety should take precedence over economic considerations.

Since the first OCT did not meet until Monday 7 September, initial decisions about control measures were based on the assessment made at the joint Farm visit by SySxHPU and Tandridge EHD on Thursday 3 September (iv,v). This visit appears to have focused particularly on the adequacies of handwashing facilities. However, following the site visit and an email sent by the CCDC, the Farm owners suspended the sale of animal feed and voluntarily closed the animal barns, goat bridge, and some of the sandpits at close of business on Friday 4 September (vii). The Farm was not asked to carry out any cleaning.

The options available under existing health and safety legislation for premises that are suspected as the source of an *E. coli* O157 outbreak are limited to restrictions (improvement notices and prohibition notices) on specific activities rather than closure of the entire location (Chapter 4). If there is suitable and sufficient evidence of a risk of serious personal injury from one or more activities, those activities can be prohibited until remedial action is taken. Some activities may be so fundamental to the business that the effect is, de facto, to close it. We understand that voluntary closure is the usual outcome in outbreaks at Open Farms, but should there be a need for enforced closure this is the responsibility of the LA EHD, usually at the request of the OCT. Since April 2010, a new health protection power has become available under the Health Protection (Part 2A Orders) Regulations 2010. This permits closure of premises that may be contaminated and present significant harm to human health, although this requires an application to be made by the LA to a Magistrates' Court for an order (Chapter 9).

Godstone Farm did not close completely until Saturday 12 September. However, it is clear that no further primary cases occurred after the animal petting barns were voluntarily closed by the Farm on Friday 4 September (Chapter 5) and that this measure was therefore successful in bringing the outbreak of *E. coli* O157 infection at the Farm under control.

We conclude that there was unacceptable delay by the HPU and EHD (in the absence of an OCT) in initiating strict control measures at Godstone Farm and, if action had been taken sooner to stop all contact with ruminants, a substantial number of *E. coli* O157 cases could have been prevented.

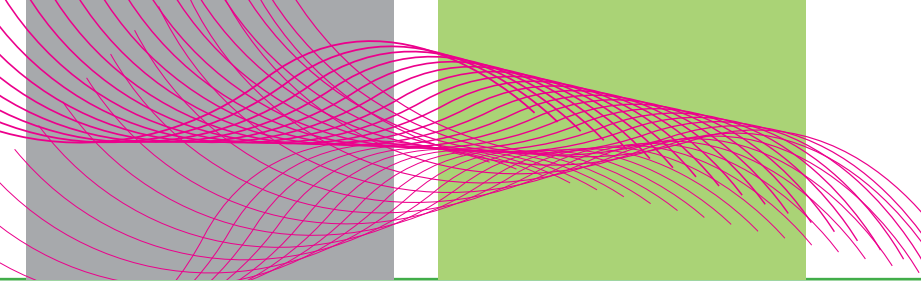
We recommend that the first OCT meeting should consider what control measures are available, should decide which activities should be prohibited or improved, and should identify who is responsible for ensuring each of its decisions are implemented. Animal contact, especially with ruminants, should be prioritised as the activity to be closed at the earliest suspicion of a farm-related *E. coli* O157 outbreak.

7.4.3 Handwashing

Thorough handwashing with soap and hot water followed by careful drying of hands protects against *E. coli* O157 infection (Chapter 1). Reliance on sanitising hand gels or cursory handwashing do not. However, even provision of good handwashing facilities without additional measures to minimise the risks associated with animal contact and contamination of the farm environment may prove inadequate.

On Friday 28 August, an EHO from Tandridge DC phoned Godstone Farm to advise them that cases of *E. coli* O157 had been linked to the Farm and ask them to alert parents to the need for handwashing. We received evidence that the Farm displayed such notices at the entrance (vii), but none of the parents we interviewed remembered seeing these. Nevertheless, all the parents said they were aware of the need for handwashing and had washed their children's hands after touching the animals (Chapter 6).

We conclude that the Godstone Farm outbreak clearly demonstrates that handwashing alone is insufficient to prevent outbreaks of *E. coli* O157 infection at Open Farms. A range of additional



measures are necessary to reduce the risks associated with animal contact and to minimise faecal contamination of the environment (Chapter 8). The case-control study did not show that handwashing was protective, but the report of the study also said that 'the effect of reporting and recall bias could not be excluded' (ii).

We recommend that parents of children visiting Open Farms are clearly informed, before entering animal contact areas, that:

- Touching or feeding farm animals can be a source of life-threatening infection, particularly in young children
- It is the parent or carer's choice whether their child is allowed to touch or feed the animals
- The only way to eliminate this risk entirely is for children to avoid contact with animals and their faeces
- It is primarily the parent or carer's responsibility to supervise the washing of their children's hands immediately after leaving the animal contact area, before eating or drinking on the farm and after removing footwear
- Sanitising hand gels are not a substitute for thorough handwashing.

Recommendations directed at farm owners and regulators are discussed in detail in Chapters 8.

7.4.4 Communications

Rapid communication with professional colleagues and with the public during an outbreak serves a variety of purposes. These include making sure that cases are diagnosed quickly and receive appropriate care, identifying cases that may have been diagnosed elsewhere but have not yet been linked with the outbreak, and reminding colleagues of the importance of prompt reporting of new cases.

Communication with health care professionals was not discussed at the first OCT on 7 September and the HPU did not send out letters to GPs and hospital clinicians until 10 September (iii,vi). Paediatric renal units serving South East England were not informed of the outbreak. It is clear, from reports to the Investigation Committee (viii) by the tertiary care centre (the Evelina Children's Hospital) caring for children with haemolytic uraemic syndrome (HUS), that despite several phone calls between 8 September and 11 September 2009, the HPU did not appreciate the urgency of the incident and responses were rudimentary and inadequate. Promised calls were not returned and the clinicians reported that the HPU did not appreciate the severity and the serious nature of the outbreak. It was not until there was an intervention from another senior clinician that the HPU showed some awareness that the situation was becoming critical.

After the Farm closed on 12 September, there was extensive media coverage of the outbreak. Public reaction to the media coverage triggered reports of earlier cases related to Godstone Farm that had not been identified or reported to SySxHPU and Tandridge EHD.

We conclude that GPs and hospital clinicians serving the catchment area of Godstone Farm, including paediatric renal unit staff, should have been alerted much earlier to the occurrence of the outbreak.

We recommend that the first OCT meeting should discuss and agree an appropriate communication strategy for professional colleagues, the public and the media.

7.4.5 Rapid Diagnosis and Clinical Investigations

A common theme that emerged from interviews with parents was the lack of urgency with which GPs regarded symptoms of bloody diarrhoea and stomach cramps (Chapter 6). Acute bloody diarrhoea is a rare event in previously healthy children and should be considered a medical emergency. GPs should refer patients to hospital as soon as possible when the risk of *E. coli* O157 infection is high or its consequences are likely to be severe (Chapter 1). Some of the delays in diagnosis might have been avoided if local GPs and Accident and Emergency departments had been alerted earlier about the outbreak.

We conclude that there needs to be greater awareness among GPs of the importance of symptoms of bloody diarrhoea and stomach cramps in previously healthy children.

We recommend that the HPA considers ways to increase awareness among GPs of the importance and seriousness of acute bloody diarrhoea in previously healthy children.

We recommend that GPs refer previously healthy children with acute, painful, bloody diarrhoea, but no fever, urgently to hospital both to ensure appropriate clinical management and to reduce the risk of spread within the household.

Generally, much of the delay in the diagnosis of *E. coli* O157 infection is caused either by patients hesitating to seek medical attention or doctors failing to recognise early symptoms. However, there is also scope for improving the speed of microbiological diagnosis. We understand that a rapid polymerase chain reaction (PCR) test that can be used directly on stool specimens and which will diagnose *E. coli* O157 within hours rather than days is already under development.

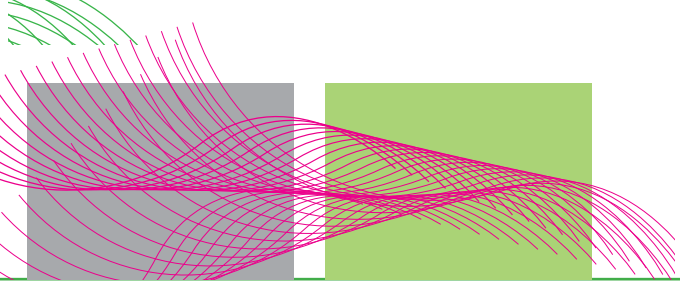
Acute kidney failure is the most serious, and indeed life-threatening, consequence of *E. coli* O157 infection. When *E. coli* O157 infection is diagnosed, there is currently no way of accurately predicting which children will develop kidney failure. Nor is there any specific treatment that will stop kidney failure developing. However, there is some early research on using a monoclonal antibody to treat *E. coli* O157. This acts by removing the toxin produced by *E. coli* O157 from the circulation in order to prevent the kidney damage that it causes. Further large-scale, international research is required.

We recommend that research into rapid methods of microbiological diagnosis, and rapid detection of acute kidney failure, is encouraged. Clinical research into predicting which children with *E. coli* O157 infection will develop HUS and into the use of monoclonal antibody directed against verocytotoxins should be given high priority.

7.5 The Size and Nature of the Outbreak

7.5.1 Scale

The large number of cases arising in the outbreak at Godstone Farm offers unusual insights into the widely variable clinical presentation and natural history of *E. coli* O157 infection. There is always a time lag between exposure to infection and becoming ill and also inherent delays in diagnosing and reporting infection. As a result, a substantial minority of the children who would later become ill had already visited Godstone Farm before the earliest evidence of a problem emerged (Chapter 5, Figure 5.4). This highlights the fact that outbreak control can never be more than a second line of defence, and that protecting public health at Open Farms will always rely on good prevention and rapid identification of an outbreak.



The size of the outbreak at Godstone Farm was probably determined by a number of factors (ii), including:

- The scale of the enterprise and the large visitor numbers
- The practices in place at the Farm, with substantial direct animal contact and visitor access to faecally contaminated environments
- The slow responses of the public health authorities to the outbreak itself.

We are aware that large outbreaks associated with Open Farms have been described in the USA, and we note with concern that the frequency of farm-related *E. coli* O157 outbreaks in the UK increased in 2009 (Chapter 1).

We conclude that the outbreak at Godstone Farm was not exceptional, other than in terms of its size. We believe that unless the factors described above are addressed, other large outbreaks at Open Farms could occur in future.

We recommend that the regulatory framework relating to Open Farms is reviewed and reinforced. This is discussed in greater detail in Chapters 8 and 9.

7.5.2 Speed of Response

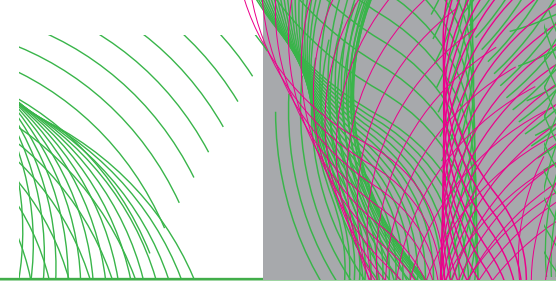
The timely investigation of incidents and outbreaks and the strategic co-ordination of the multi-agency response are key functions of the local and regional services provided by HPA (ix). In this outbreak, however, there appears to have been a lack of leadership and a paralysis of decision-making, in spite of the fact that OCTs are generally used to dealing with uncertainty.

A potential outbreak at Godstone Farm should have been recognised on Friday 28 August. This should have led to a more proactive response including a decision to visit the Farm and to convene an OCT on the eve of the August Bank Holiday weekend. Thirty-seven of the 65 primary cases visited the Farm after Friday 28 August, including 15 cases who visited over the Bank Holiday weekend and a further 22 cases who visited before Saturday 5 September (Chapter 5). The outbreak ceased only when the Farm voluntarily closed the animal petting barns on Friday 4 September. There was no additional benefit in terms of outbreak control from the decision to close the Farm completely on Saturday 12 September.

We conclude that even with prompt action this would have been a big outbreak. Nevertheless, there was a lack of public health leadership and a missed opportunity to exercise decisive public health action and thereby restrict the size of the outbreak. Had a decision been made on the August Bank Holiday weekend (or even after it, on Tuesday 1 September) to stop all contact with ruminant animals, a substantial number of cases of *E. coli* O157 could have been prevented.

7.5.3 Rate of Infection

During the outbreak, attack rates of *E. coli* O157 varied significantly from day to day for reasons which remain unclear. Peak attack rates occurred on 25 August (4.9 cases per 1,000 visitors), 29 August (4.7 cases per 1,000) and 1 September (5.8 cases per 1,000) (Chapter 5). These figures are based on a denominator of all visitors to the Farm, regardless of age and extent of animal contact. Substantially



Chapter 7: The Management and Control of the Outbreak

higher daily attack rates may be expected among younger children who visited the animal contact areas. Attack rates in other outbreaks have varied but in one UK outbreak earlier in 2009 in the Yorkshire and the Humber Region, there was an attack rate of 8.6 per 1,000 farm visitors (see Chapter 1).

We conclude that when conditions are right for spreading *E. coli* O157 the risk per visitor may be substantial and quantifiable.

We recommend that a detailed analysis of the epidemiological and microbiological data from Godstone Farm outbreak is completed and published in the scientific literature.

7.5.4 Impact on Health Services

Among the 78 primary and secondary cases with symptoms, 27 (35%) were hospitalised and 17 (22%) were diagnosed with HUS (Chapter 5). Although not all of the HUS cases required renal dialysis, the outbreak nevertheless came close to saturating the specialist paediatric renal services in London and South East England.

We conclude that rapid identification and control of outbreaks of *E. coli* O157 infection are crucial in limiting the impact of the infection upon affected individuals and their families, and on primary, secondary and tertiary health services.

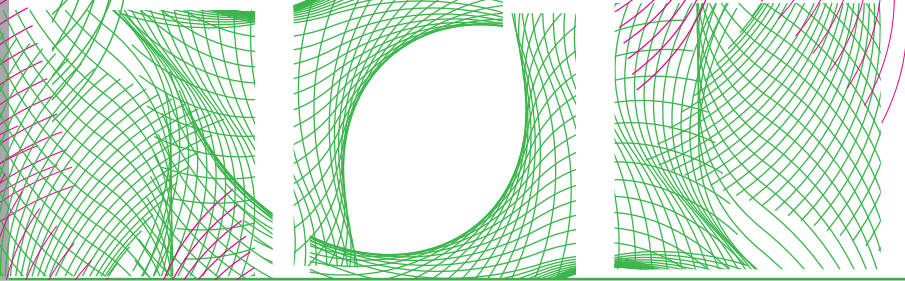
7.6 After the Outbreak

One of the responsibilities of an OCT is to declare the outbreak over at an agreed juncture, usually when all public health actions have been implemented and there are no more new cases of infection. The OCT should then make a statement to this effect and communicate it to the public and all appropriate agencies.

The outbreak was declared over on 15 October 2009. The last case of *E. coli* O157 infection in this outbreak was a secondary case (an asymptomatic carrier) with an illness onset on 10 October, which was reported to the HPU on 12 October 2009. Godstone Farm remained closed until 26 October, but restrictions on animal contact continued thereafter. The last OCT meeting took place on Friday 5 March 2010.

We are aware that there was considerable uncertainty about when Godstone Farm should reopen. We are surprised that criteria for reopening the Farm were apparently not agreed at the time that the Farm was closed, on Saturday 12 September. The HPA issued interim criteria for advising LAs on the proposed reopening of Open Farms affected by *E. coli* O157 in early October 2009 (x). The Independent Investigation also provided interim advice in March 2010, at the request of the HPA, concerning animal contact at Open Farms (**Appendix 9**). The final report of the OCT was published on 12 April 2010 (ii).

Outbreak reports are a valuable learning opportunity and will often identify new hazards or make useful recommendations about further preventive action (see Chapter 1, section 1.5.6). However, there is no national database of outbreak reports and no mechanism currently for ensuring these recommendations are properly collated and widely disseminated.



We conclude that there was unnecessary delay in reaching a decision about reopening Godstone Farm, and in publishing the OCT final report.

We recommend that the HPA devises a system for ensuring that OCT reports concerning outbreaks of *E. coli* O157 at Open Farms are properly collated and widely disseminated.

7.7 References

- I. NHS Management Executive. Public health: responsibilities of the NHS and the roles of others. November 1993. HSG(93)56

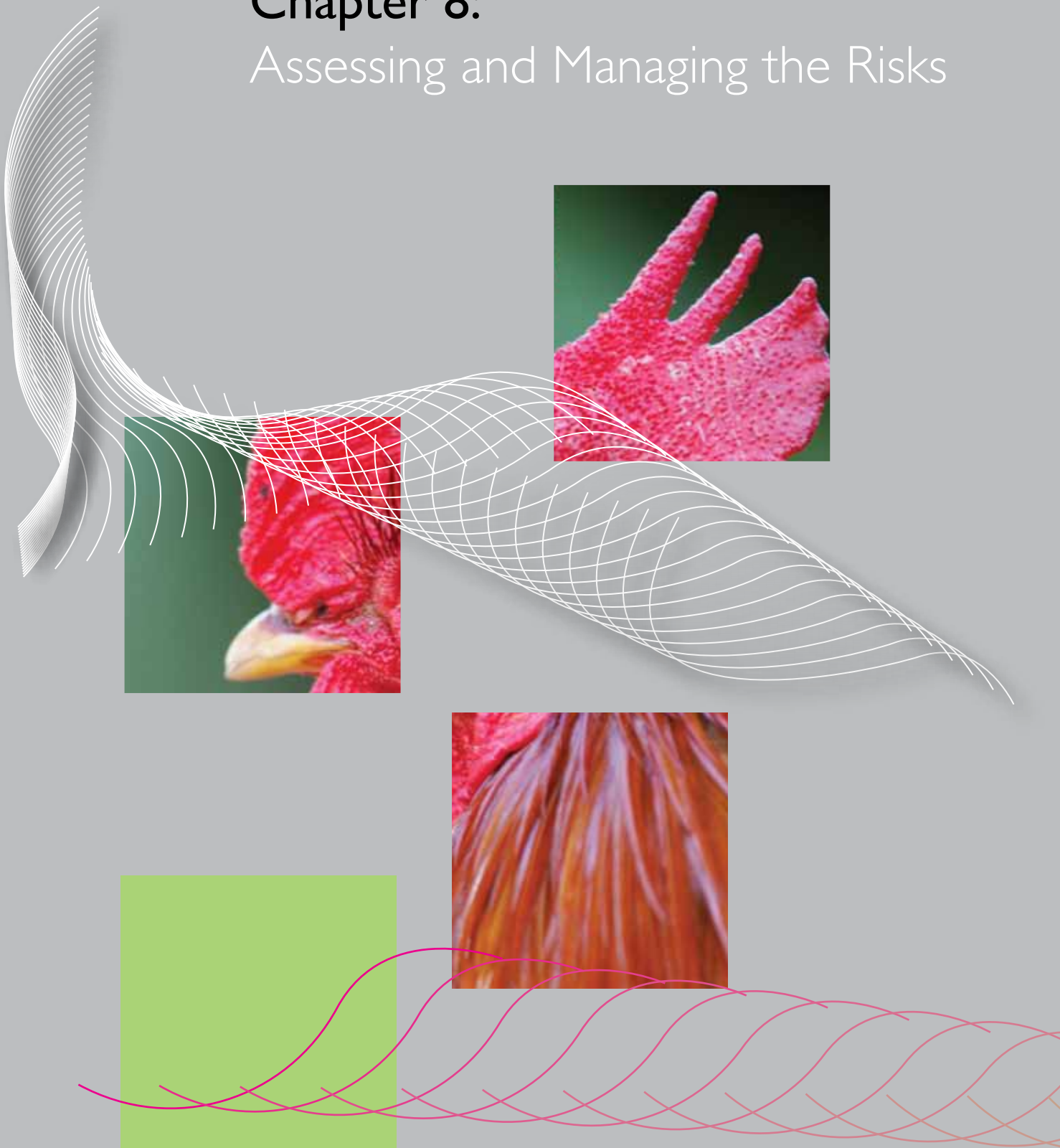
Independent Investigation documents available at www.griffininvestigation.org.uk

- i Health Protection Agency. Outbreak Control Plan – Surrey. Joint Health Protection Agency, health sector, and local authority outbreak control plan excluding hospitals. January 2005.
- ii Outbreak Control Committee. Outbreak of verocytotoxin-producing *Escherichia coli* O157 infection in visitors to Godstone Farm, Surrey: August-September 2009.
- iii Health Protection Agency Internal review of the *E. coli* O157 outbreak associated with Godstone Farm. Health Protection Agency, November 2009
- iv Health Protection Agency. Report of Godstone Farm site visit by joint team from SySxHPU and Tandridge EHD, 3 September 2009.
- v Email from SySxHPU to Godstone Farm, 4 September 2009.
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- viii Notes from the meeting of the Independent Investigation Committee Jan 13 2010
- ix Health Protection Agency. Forward thinking, future working. Framework specification for local and regional service provision 2008-2010. October 2008.
- x Health Protection Agency. Interim HPA criteria for advising local authorities on the proposed reopening of petting farms affected by *E. coli* O157 or other verocytotoxin-producing *E. coli*. Health Protection Agency, 6 October 2009.

PART D THE CHALLENGE OF REDUCING THE RISKS

Chapter 8:

Assessing and Managing the Risks



Chapter 8: Assessing and Managing the Risks

8.1 Risk Assessments

8.2 Risk Management

8.3 Existing Open Farm Guidance

8.4 Control of Infection Risks at Open Farms

8.5 Control of the Risks of Infection from Agricultural Animals

8.6 References

Key Points

Assessment

- The assessment of risk carried out by Godstone Farm was inadequate
- The national risk assessment process used by the local authority (LA) did not support the identification of biological hazards on the Farm
- The regulatory inspections carried out by the LA were ineffective in preventing an outbreak
- The general Health and Safety Executive (HSE) assessment of 'low risk' relating to *E. coli* O157 did not take adequate account of the very low infectious dose of this organism and the severe consequences and impact of this infection in children.

Control Measures

- Farm control measures should primarily focus on preventing visitor contact with animal faeces; handwashing remains the principal control measure available to the public
 - Infection risks must be made clear to visiting families, with particular reference to children
 - Farm layout and design is critical to reducing the risk of infection
 - The practice of 'deep bedding' should not be permitted in children-animal contact areas.
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Introduction

This chapter discusses the assessment of risk that was carried out by Godstone Farm prior to the outbreak, the risk assessment process used by the LA as part of the regulatory inspection system and the general assessment of *E. coli* O157 risk on Open Farms carried out by the HSE. The chapter then discusses the existing control measures and proposes changes to the measures currently advised that would offer control from the risk of *E. coli* O157 and other zoonoses present on Open Farms. Furthermore, the Report proposes appropriate risk reduction in other farm settings where the public has animal contact.

8.1 Risk Assessments

8.1.1 The Assessment of Risk by Godstone Farm

The purpose of the risk assessment carried out by the operators of Godstone Farm is to ensure that the risks of infection are adequately controlled in accordance with the Control of Substances Hazardous to Health Regulations (COSHH) and the Management of Health and Safety at Work Regulations (see Chapter 4). It has not been our task to review the risk assessments carried out by Godstone Farm but the Tandridge District Council Environmental Health Department (Tandridge EHD) risk assessment (i) shows their 'confidence in management' rating for Godstone Farm as 'very confident' and that the Farm was considered 'better than average'.

Assessing the ability of management to handle safety is a key part of the regulators' role. Lord Cullen described effective safety regimes as being 'crucially dependent on management and management systems' (ii). We note that the Tandridge EHD 'confidence in management' score is given additional weighting to emphasise the importance of such assessments.

The evidence provided to us included the following comments from Godstone Farm (iii) that are pertinent to their risk assessments:

'The outbreak in August 2009 appears to have been unprecedented in size. It was certainly unforeseeable by us'

'As far as we are concerned, we did everything we could reasonably do to comply with that Guidance'

'Had we been told at that time or since then that our washing facilities were inadequate, that more signs were needed, that footwear was to be disinfected and so on, we would have reacted accordingly and put them in place.'

After the outbreak, on 21 September 2009, a Principal HSE Inspector with agricultural expertise attended Godstone Farm as part of a joint visit with the Tandridge EHD (see Chapter 5). The attendance of the HSE Inspector was by invitation of Tandridge EHD, as Tandridge EHD hold regulatory responsibility for the premises. The report made by the HSE Inspector (iv) identifies the following issues in respect of the Farm's risk assessments.

- The COSHH risk assessment did not meet the criteria of being 'suitable and sufficient'
- The assessment was not site-specific
- The assessment was insufficiently detailed on the controls in place to minimise the risk of exposure of staff and visitors to *E. coli* O157
- The assessment was out of date and referred to only one contact area for animals, which was clearly not the case at Godstone Farm

- Where actions were identified in the assessment no person was named as responsible and there was no evidence of a date by when action should be taken
- No documentation was available to indicate any training had been provided to staff in respect of the risks associated with *E. coli* O157 or what they had been instructed to do with regard to control measures
- Under Regulation 7 of the Management of Health and Safety Regulations, a specific competent person must be nominated in respect of health and safety. This person was identified as the Assistant Farm Manager for Godstone Farm*. It was confirmed that he had received no training on his health and safety responsibilities.

*The Investigation was subsequently advised by Godstone Farm that the Farm Owner held responsibility for health and safety. The level of health and safety training undertaken by the Farm Owner was however, unclear.

Godstone Farm is a well-established Open Farm, with more than 30 years' experience of opening the Farm to the public and to hosting visits by children.

It has been apparent to us that the operators of Godstone Farm were somewhat familiar with the nature of *E. coli* O157 and were aware that the organism could cause illness, particularly in children.

Nevertheless, the Investigation noted that there appeared to be doubt over who held responsibility for health and safety on the Farm. Such a situation raises concerns over how health and safety policy was implemented in the day-to-day running of the Farm.

Following a visit of the Investigation Team to Godstone Farm, we concluded that the fundamental strategy in place at Godstone Farm to control the risks of infection was the use of visitor handwashing.

Despite having considerable farming experience and knowledge of the risk from *E. coli* O157, we believe that the Farm operator nevertheless failed to act on the risks that were inherent within the Farm layout, and failed to appreciate that certain farm practices in use at the Farm could exacerbate the risk from *E. coli* O157.

We observed that the Farm employed a 'deep litter' system, (which allowed an accumulation of animal faeces in animal pens) while also permitting children access to such animal pens. Similarly, pen fronts did not prevent contamination of visitor walkways and the Farm layout permitted seepage/runoff to cross visitor walkways. Additionally, we observed that it was possible to access play areas and catering facilities with limited opportunities for handwashing.

In our view the failure to provide adequate training to staff on how to conduct risk assessments and how to implement control measures must be seen as a critical weakness at the Farm.

We conclude that:

1. The Godstone Farm operators, while somewhat familiar with the nature of the hazard, and the risk it represented, and were well meant, relied overmuch on the actions of the public, primarily through handwashing, and regarded the Tandridge EHD's reports as an endorsement of their procedures
2. Godstone Farm showed little evidence that they appreciated the importance of their own actions in controlling the risks, and were not proactive in seeking out best practice on limiting the exposure of visitors to infection by *E. coli* O157. This is particularly surprising given the Farm's experience of an *E. coli* O157 outbreak on the Farm in 2000
3. The failure to provide suitable training to staff members renders Godstone Farm poorly placed to identify hazards on the Farm and to enact suitable control measures, as required under health and safety law.

It should be noted however, that the statements we have received from Godstone Farm, plus verbal comments from other farm operators and from the Tandridge EHD, all indicate to us that they believe that Godstone Farm was probably operating at least in the 'top half' of Open Farms in the UK, and there are other Open Farms that are likely to have substantially weaker procedures.

8.1.2 The Assessment of Risk by Tandridge EHD

Tandridge EHD use a process of risk assessment to rate premises according to the level of risk they present, and plan an inspection programme based on this assessment. This process was part of an agreed framework which was used nationally and described in LAC HELA 67/1 (rev 3) (v), (replaced by new guidance in October 2009). The process requires LA inspectors to systematically assess each employer. The inspector must then make an individual judgement as to how an employer should be 'scored', using the guidance provided within the framework.

While this methodology seems appropriate we have some concerns regarding how it was used by Tandridge EHD for Godstone Farm. Within this assessment methodology the public risk rating score is a weighted numerical score. The criterion 'public risk' is defined as the likelihood that the public will be harmed by activities at a workplace, and it has a strong influence on the overall score, and thus to the frequency of required visits.

The detailed material provided by Tandridge EHD (i) shows that Godstone Farm was given a public risk rating of Low Risk (scoring 2 out of a possible 6.) The associated national descriptors describe a premise with this level of public risk rating as having '*Adequate safe systems of work. Adequate supervision. Good standards of physical controls. Good standard of housekeeping. Some people exposed to hazards. Regular but not continuous use of hazardous articles/substances. Employees aware of significant risks and important control measures.*'

It is our view that assessing Godstone Farm at this level of public risk was inappropriate. We accept this type of assessment is subjective, but as the risk of *E. coli* O157 should be assumed to be present in all ruminants and all visitors will be exposed to this hazard, a higher classification would have been more appropriate. In addition we have already questioned whether supervision was adequate to the hazard from zoonoses, whether suitable physical controls were in place to prevent harm and whether employees were suitably trained on the hazard of *E. coli* O157.

Although it is clear to us that an assessment of risk was made by Tandridge EHD, and this risk assessment was made using an appropriate methodology, Tandridge EHD nevertheless appears to us to have underestimated the level of risk at Godstone Farm in five key areas:

1. The hazards present, eg, the risk from zoonoses; contamination of the general environment; potential for cross-contamination of play equipment
2. The extent to which hazards are controlled, eg, the site layout that allowed the public to walk through runoff from barns; the use of 'deep litter' bedding for the livestock; unsupervised access of children to animal pens; the distances from animal areas to the washing facilities
3. The number of people exposed to the hazards and the frequency of the hazard, eg, the volume of customers. At the time of the outbreak, Godstone Farm was attracting more than 2,000 visitors a day
4. The presence of particularly vulnerable groups, eg, the assessment does not take account of how many children were exposed to the risks from *E. coli* O157, or how many were of vulnerable age groups
5. The potential severity of the illness. In this outbreak alone 27 children were hospitalised.



Godstone Farm was the only Open Farm that Tandridge EHD regulated. At the same time Tandridge EHD had responsibility for a wide range of other premises, with an inspection programme on 1,350 premises over a five-year cycle (for health and safety) and 700 food premises on a three-year cycle. The national priority rating systems for both food hygiene and health and safety at work require higher risk premises to be inspected more frequently which means some premises receive visits as frequently as every six months, others every two or three years. The very lowest risk premises have one inspection every five years. Additionally, Tandridge EHD advised that at the time of the outbreak, only two out of four posts in the EHD were filled. Given these circumstances, it is unclear to us how much time was available to Tandridge EHD to spend on Open Farm risk assessment. We believe that Tandridge District Council should consider carefully whether the EHD is adequately resourced. It is apparent that the risk to the public appears to have been seriously underestimated by Tandridge EHD. It is our view, however, that there were several organisational factors that may have contributed to the inappropriately low level public risk rating for Godstone Farm.

The risk assessment documentation provided to us by Tandridge EHD has no requirement for the inspector carrying out the assessment to identify the particular hazards present. While this may speed up the process of assessment, not recording the hazards limits the capacity for management oversight of the risk assessment or any review of its proportionality. Recording hazards would assist the inspector in the task of assessing whether control measures in place are appropriate, a function made more challenging if the person carrying out the risk assessment and the inspection are not the same individual.

Inspectors are also required to make their assessment by consideration of nine key issues and including: 'Adequate processes to generate plans, risk assessments and performance standards to implement the policy'.

The guidance provided to inspectors gives the following caveat: *'In applying the scoring system to small firms enforcement officers should bear in mind that in many cases procedures may not be documented. In such cases the enforcement officer will be looking to identify how far spirit and practice of these examples is evident'*. This caveat clearly places a substantial onus on the inspector to use his or her experience and judgement in reaching a decision.

We believe that the regulatory authority should consider the caveat carefully. It is our view that it would be appropriate to take account of the activities of the business when deciding how to apply the scoring system and that size alone should not be the only determinant.

We conclude that where the level of public risk is considered high, it is reasonable for the regulator to have a higher expectation that procedures will be documented and that those procedures will be evidence of a robust system.

We recommend that the process of risk assessment should be reviewed within the context of the inspection system.

8.1.3 Inspections of Godstone Farm

The process of risk assessment carried out by Tandridge EHD was used by the Department to plan a programme of inspection visits. During the period 2003—2009, three separate inspections of Godstone Farm were carried out by Tandridge EHD (the most recent in 2008).

Tandridge EHD has shown us that they were familiar with the premises; they have provided us with comprehensive documentation to support this and have been commendably open with this Investigation. They recorded that they were very confident in the Godstone Farm management and scored the premises as being above average.

Chapter 8: Assessing and Managing the Risks

Despite this we are concerned by the apparent disparities between the inspections conducted by the LA inspectors, and the visit by the HSE inspector, albeit carried out post-outbreak (iv).

Tandridge EHD inspection reports showed that the Godstone Farm risk assessments (required under COSHH) were inspected on a three-yearly basis and judged by Tandridge EHD to be acceptable. The HSE Inspector however identified that these risk assessments failed to meet the criteria of being 'suitable and sufficient' to comply with the Regulations. This difference in professional judgment is in our view an unsatisfactory state of affairs and is of no benefit to the Industry or to the public. This disparity further suggests to us that it is likely that the LA inspectors had potentially underestimated the risk from biological hazards when carrying out their inspections at the Farm.

Although it is clear that the LA planned and carried out a regular programme of inspections at Godstone Farm, we have questioned the value that these visits provided to the Farm and to the public. Despite a regulatory inspection taking place during the summer of 2008, this was clearly insufficient to identify those conditions which subsequently enabled a major outbreak to occur.

We conclude that it is unacceptable that these weaknesses were not identified in earlier inspections. The disparity between the findings of these inspectors highlights fundamental flaws in the regulatory process that will be discussed further in Chapter 9.

We have heard evidence that inspection visits to Open Farms (including those made by Animal Health [AH]) were timed for periods of low activity in order to reduce the regulatory burden to the farm operator. We believe that this policy, while well intended, reduces the opportunity for inspectors to capture such risks as may exist. Epidemiological evidence shows the risk of *E. coli* O157 infection is greatest in UK during July and August. Thus the public risk is greatest when Open Farms are at their busiest.

We conclude that the potential for monitoring and controlling the public risk would be maximised if inspection visits were scheduled for times when the public risk can be predicted to be at its highest level.

We have not been presented with evidence demonstrating that information gathered from LA inspections is communicated to other LAs or to the HSE. Such information would be useful in detecting trends, sharing good practice and guiding development of regulatory strategy for the Open Farm industry.

8.1.4 The HSE Assessment of Risk at Open Farms

The HSE has given evidence to the Investigation on a range of issues, including how the HSE views and defines the concepts of hazard and risk, uses them in practice as a basis for decision-making and prioritising activity and how they are applied in the context of the risk of *E. coli* O157 at Open Farms. We have paid particularly close attention to the joint Statement provided to the Investigation by the HSE in conjunction with the Local Authorities Co-ordinators of Regulatory Services (LACORS). This submission asserts that *'Although individual cases of infection, particularly those involving young children or the elderly, can be very serious for those affected, the incidence of infection at open farms has been and continues to be low... In the context of between 5 and 10 million visitors to open farms each year the risk of infection is Low'* (vi).

The HSE has also advised that their rationale for judging that level of risk to be 'generally acceptable and tolerable' is based primarily on three factors:

1. The cultural and educational benefits from visitor attractions and the opportunities for contact with animals are valued by society



2. Exposure to *E. coli* O157 at Open Farms can be kept to a low level by adopting the measures set out in AIS23

3. The control measures themselves are seen as reasonable and acceptable by the visiting public.

The assessment of 'Low Risk' can be considered in the context of the risk from other hazards at farms in general. Over the 10-year period 1998-2008 for example, the HSE recorded 56 deaths to members of the public (including 22 children), as a result of agricultural work activities. The most common cause of death, among adults and children, was being struck by a moving vehicle. However, assessing the level of risk is a function of two parameters. First, the likelihood of the occurrence (eg, the incidence of infection) and second the severity of the consequences (eg, the level of harm that infection may cause). Sometimes, where sufficient data are available, this type of assessment can be made quantitatively, eg, the risk is such that one fatality may occur in every million visitors. Lord Cullen emphasised however, that quantitative risk assessment should not be used in isolation or as an automatic mechanism for risk assessment and 'that the numerical element must be viewed with great caution and treated as only one parameter in an essentially judgmental exercise'. (ii)

This warning was referred to by the HSE in *Reducing risks, protecting people* (vii) where it is stated that care needs to be taken in selecting the accident/incident sample, the time period and the statistical method used. It also states that 'the use of numerical estimates of risk by themselves can be misleading and lead to decisions which do not meet adequate levels of safety'.

In the case of Open Farms and *E. coli* O157 infection, the HSE appear to have predominantly considered the low number of cases, in relation to the total number of visitors, in assessing the general risk of infection as low. Despite clear warnings in a number of HSE publications that *E. coli* O157 can kill, and that children are particularly vulnerable, the severe harm that can occur to a child if infected with *E. coli* O157 appears not to have been sufficient to alter the judgment of the overall level of risk. While recognising that the consequences of infection could be serious, HSE nevertheless assessed the overall risk, (a function of both likelihood and severity) as 'low'.

We conclude that this assessment was inappropriate for the following reasons:

1. It failed to take sufficient account of the very low infectious dose of the organism and the severity of illness, particularly in children, including the significant possibility of life-limiting disease
2. It did not take sufficient account of the proportion of children in the visitor numbers or the activities carried out during the visit
3. We believe that the information cited by the HSE on the numbers of *E. coli* O157 infections per annum was likely to be incomplete for the following reasons:
 - At the time of the outbreak *E. coli* O157 was not a notifiable disease under public health legislation
 - A farm operator is unlikely to become aware that a recent visitor has become ill or to report the occurrence through the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR)
 - Information gained by the Health Protection Agency (HPA) on farm-associated outbreaks of *E. coli* O157 infection is not routinely passed to the HSE or to the LA except on a localised, case-by-case basis
 - While numerically small, deaths related to *E. coli* O157 infection that may occur some time after an outbreak may not be identified as farm exposure cases.



It is of concern to us that with the overall risk assessment by the HSE, the national regulator, given as 'low', the HSE concluded that the risks were generally acceptable and tolerable provided the available guidance was followed. It should be noted that as there is no HSE inspection programme for Open Farms such as Godstone Farm, it would have been difficult for the HSE to assess whether or not the guidance was being followed.

We conclude that whereas the HSE believed that the existing regulatory strategy was appropriate, we have no evidence that the HSE sought confirmation of whether the strategy was effective in controlling the numbers of *E. coli* O157 infections on Open Farms. Furthermore, there was no system of reporting in place from the LA to the HSE which would have assisted the HSE in this regard.

8.1.5 Public Assessment of Risk

At the most fundamental level, any member of the public visiting an Open Farm carries out a consideration of the risks of farm visits when they make the decision to visit. For non-experts, this assessment is often very subjective and may be strongly influenced by personal experience. From interviews with parents of children who were infected with *E. coli* O157 we have heard that many were frequent or repeat visitors to this type of farm experience, and had greatly enjoyed past visits.

In recent years however, public concern over health and safety liability has led to many organisations curtailing activities which might be construed as too risky. There has been a decline in the number of school trips undertaken as authorities and/or teachers have been concerned that they may be held liable for any unintended consequences that arise.

The HSE has sought to explain its perspective in more detail.

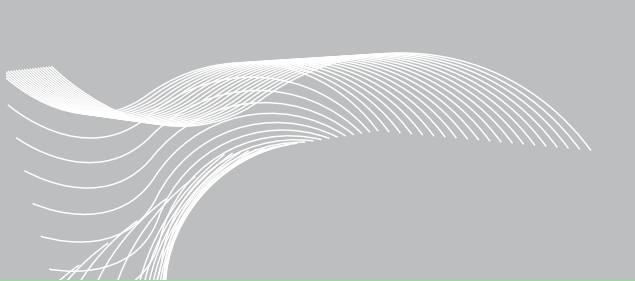
The HSE has stated the view that: *'continuing to expose children to managed risk through play, adventurous activities and the like, is one way to promote a personal responsibility for understanding risk ... 'Play' is inherently dangerous on some occasions, and for play to be meaningful, for it to be a beneficial experience, it is sometimes necessary to challenge and stimulate a child in a "risky" environment'.*(vii)

We support this view and know that many countryside and leisure attractions will never be entirely risk-free. However, in requiring members of the public to take personal responsibility for the risks, we believe that the choice to visit the countryside or enjoy a visit to an Open Farm should be an informed choice. Parents need to understand the nature of the environment they are visiting, what the hazards are and how much risk they and their families may be exposed to.

From interviews with parents whose children were affected after visiting Godstone Farm (Chapter 6 and Appendix 8) and also from evidence presented to us by University of Aberdeen (Chapter 4) gained from interviews with countryside visitors in different parts of the UK, we believe that there is a low level of understanding of the risk of *E. coli* O157 infection and its consequences, from contact with farm animals or the farm environment. It is our view that families are unlikely to be making informed decisions about the risk of visiting an Open Farm, for a number of reasons:

1. The majority of parents who gave evidence stated they were largely unaware of the risks of *E. coli* O157 through animal contact or farm visits. They were attending for a fun day out and their perception was that the risk that they and members of their family would be exposed to was minimal.

We conclude that public education on the risks of infection from *E. coli* O157 and the measures parents can take to protect their families is vitally important for their informed choice.

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2. There is no classification or rating scheme to allow the public to know whether a farm attraction has met a certain safety standard. The 'Rose' sign and the VAQAS certificate at the front of a premises approved by the Visitor Attraction Quality Assurance Scheme (VAQAS) (Chapter 4) may give a false sense of security if applied to Open Farms since its remit is broad and not specific to farming.

We conclude that an accreditation scheme, led by the Open Farm industry, would assist the public in understanding which farm premises were operated to a known standard and allow members of the public to make their decision to visit based on the knowledge that certain standards have been achieved and will be maintained.

3. There are also many elements of good health and safety practice that visitors are not well placed to judge. The management's commitment to safety, the use of good risk assessment processes and the knowledge and training that staff members have are all very important elements in ensuring safe practice but will not be apparent to visitors and they rely on regulators to carry out these functions adequately.

We conclude that the arrangements that we have been shown for ensuring that health and safety standards at Open Farms are being met are insufficiently rigorous to enable families to be confident that safe practices are in place.

8.2 Risk Management

8.2.1 Is the Risk Acceptable?

We recognise that farms are hazardous places and that the HSE has many competing demands, so irrespective of the level of assessed risk the question needs to be asked: 'Is the level of risk at Open Farms acceptable?'

The HSE, with LACORS, believes that it is and stated to us that: *'In the context of competing priorities for regulatory attention, the risk from E. coli O157 infection at Open Farms can be adequately controlled to levels and in ways which are acceptable to society by applying the existing regulatory regime, and by duty holders taking the measures set out in AIS23 (Appendix 5)'*.

It is the view of this investigation however, that the position is more complex. The HSE has assessed the overall risk of infection as 'low' on the basis of its calculation that five to 10 million visits to Open Farms take place each year and there is no record of fatalities.

Analyses of individual outbreaks however, show that at particular times, the public may be far more likely to contract an *E. coli* O157 infection than is implied by the HSE. The outbreak report for Godstone Farm (viii) has calculated the daily attack rate for visitors during the period 8 August to 4 September 2009. (The attack rate is the proportion of visitors who contract *E. coli* O157 infection). The highest attack rates at Godstone Farm occurred on 25 August (0.49%), 29 August (0.47%) and 1 September (0.58%) and 53% of cases were less than five years old. The maximum attack rate of 1.56% was seen, on specific days, in children less than two years old. It should be noted that these attack rates have been recorded in other *E. coli* O157 Open Farm outbreaks in the UK.

If these attack rates are viewed from the perspective of an average family visiting for a day out, it would be reasonable to assume that, had they known that there was a one in 100 risk of their child contracting a potentially fatal illness, they would not have regarded that risk as 'low' or, indeed, as acceptable. The secondary attack rates for *E. coli* O157 infection also present an extremely high risk to family contacts. Additionally, it has been reported that subsequent to *E. coli* O157 infection 26% of patients continue to suffer symptoms 12 months later (1).

We are also mindful that the HSE does not regard Godstone Farm as atypical within the industry and that other Open Farms have been reported to us as having far lower standards.

While we recognise the considerable pressures on the HSE and the absolute need to prioritise regulatory action, **we conclude** that the level of risk was not acceptable and that good practices in the Open Farm industry should have been more actively pursued by the regulators.

The question of tolerability and whether risks are 'acceptable to society' is inevitably highly subjective. In considering whether the level of risk is acceptable to the public, consideration should be given to whether the risk is understood by the public. It is our view that the public cannot be assumed to have understood or accepted the level of risk when they remain relatively unaware of the nature of *E. coli* O157 and the potential risk it can present to people visiting the agricultural environment.

The Godstone Farm outbreak contributed very significantly to the total number of *E. coli* O157 infections in 2009. The investigation has tried to consider whether the existing regulatory system could be considered to be adequately controlling the risk in the absence of the Godstone outbreak. We have noted the HSE's view however, that 'with the exception of the number of confirmed cases of illness, the outbreak at Godstone Farm in August 2009 was not atypical'. From our own investigations we would concur with this view, and that has given us cause for concern.

We conclude, having considered the evidence carefully, that the existing regulatory regime is insufficiently robust to ensure that a similar outbreak will not occur at an Open Farm in the near future. Open Farm outbreaks have been recorded for many years (Chapter 1) and while they have not been of the scale of the Godstone Farm outbreak, others of larger scale have occurred elsewhere in the world. In addition, it is clear to us that the control measures that limit the size of the outbreaks are largely dependent upon a prompt and effective public health response by the relevant authorities working in close co-operation.

More substantial regulatory efforts should be made to reduce the risk of harm to children at Open Farms. Open Farms are predominantly marketed as children's attractions and yet the likelihood that a child will become severely ill if infected with *E. coli* O157 is high. The regulatory authorities should remain alert to the risk of harm to children in this context and be rigorous in ensuring appropriate control measures are in place.

8.2.2 Can the Risks of *E. coli* O157 Infection at Open Farms be Avoided?

The current advice from the HSE is that *'The guidance given is predicated on the assumption that microbiological hazards, including that of E. coli O157, are always liable to be present on farms, ie, it is not possible to eliminate the potential for exposure'*. We have described in Chapter 1 how *E. coli* O157 will be commonly carried by farm animals, that animal infection with *E. coli* O157 causes no clinical signs, and that all ruminants need to be considered as carriers of the organism. In this context, the opportunities for risk avoidance may appear limited.

However, we have received a body of evidence on the operation of Open Farms and have also considered the international standards for Open Farms (Chapter 4). It is notable that some of these standards exclude very young children from animal contacts and it has been suggested in the UK national press that children aged less than five should be kept away from farms where they are at risk of contracting *E. coli* O157. While this is superficially attractive, the investigation felt that such enforcement was impracticable.



It is our view that rather than any draconian regulation that precludes children's access and enjoyment of Open Farms there are proportionate and reasonably practicable precautions that can be taken to reduce the risks. These practicable measures are described below after an examination of the existing guidance.

8.3 Existing Open Farm Guidance

The AIS23 guidance document (**Appendix 5**) was produced by the HSE after a review of existing data led to the conclusion that the risk of *E. coli* O157 was 'greater to children visiting farms than to the general public' (vi). The introduction of this document was an extremely positive step. At that time there was an absence of any sources of guidance for Open Farm operators and AIS23 provided helpful advice aimed at keeping children safe during farm visits.

The joint statement (vi) we were given by the HSE and LACORS asserts that the existing guidance on Open Farm standards contained in AIS23, as revised 2009, is robust and fit for purpose. However, the guidance has no statutory basis (see Chapter 4) and is unenforceable, which will be discussed in greater depth in Chapter 9. In addition to this concern there are difficulties apparent in relation to what is acceptable to the regulators. We were told by Tandridge DC (ix), and by the Chartered Institute of Environmental Health (CIEH) (x) that they had reservations about the usefulness of the guidance as a standard underpinning enforcement action by environmental health officers (EHOs) to achieve health and safety improvements. For example, EHOs were not confident about citing it in support of improvement or prohibition notices. This became apparent during the response to the Godstone Farm outbreak by the outbreak control team (OCT) in its deliberations (viii).

The guidance was reviewed by the Advisory Committee on Dangerous Pathogens (ACDP) in October 2009, immediately following the outbreak, in order that members could give an interim view of the advice provided. ACDP found the guidance to be generally satisfactory but that implementation was critical. A summary from the meeting can be accessed on www.hse.gov.uk/aboutus/meetings/committees/acdp/index.htm

This Government advisory committee is composed of individuals who provide independent expert advice to the Department of Health (DH), Department for the Environment, Food and Rural Affairs (Defra) and HSE on all aspects of hazards and risks to workers and others from exposure to pathogens. Government forms policy relating to specific pathogen risks and their impact based on this advice.

We asked LACORS (xi) for feedback from LAs about the guidance and received an indication that some thought it was satisfactory. However, we find it significant that the Godstone OCT (viii) expressed concerns about AIS23 and they considered that play equipment, farm layout, litter systems for animals, play barns and testing of animals on a regular basis are not adequately addressed.

We have also received evidence that the guidance in AIS23 is unsatisfactory or unclear. This includes evidence from Tandridge EHD (ix) that questions whether the possible legal consequences of failing to follow the advice are obvious to an owner. The LA (ix) identifies 20 separate points on areas where they find AIS23 to be lacking, including: signage; farm management practices; play equipment; deep litter systems for animal bedding; separation of activities; recognition of the use of cleaning gels; education standards and recommended footwear and changing facilities. In some cases, these are areas which are covered by AIS23, but not to a level of detail that enabled the LA to feel comfortable that they could 'enforce' against a prescribed Standard. This fundamental difficulty is revisited in Chapter 9.

Statements from the OCT Reports from other outbreaks of *E. coli* O157 associated with Open Farms in 2009 (see Chapter 1) include assertions of compliance with AIS23 and but also reports of hazardous activities such as *'the public walking on relatively high concentrations of animal faeces'*; *'HSE guidance is not prescriptive and does for example allow animals to roam freely as part of an overall risk assessment'*.

Godstone Farm's written submission (iii) to our investigation includes the statement *'as guidance we found this document to be of assistance to the way that we went about managing the Farm. It does not, however, provide the panacea to the problems facing petting farms relating to the transmission of E. coli. The vague nature of the HSE Guidance Document combined with the difficulty we faced applying some of the guidance makes it a document which, in part, lacks relevance to our business'*.

AIS23 remains the principal source of guidance for Open Farm operators and their regulators. In our view however, the potential usefulness of the document is limited by the lack of detail necessary to enable farm operators and LAs to reduce risk to a minimum. This has resulted in some farm operators relying overly on handwashing as a principal measure.

Furthermore, the importance of reducing the opportunities for visitors to become contaminated with faecal material should be specifically stressed to farm operators as the primary means of reducing risk. Appropriate handwashing is the important secondary mechanism for reducing risk, should contamination occur and is the principal control measure available to the public. We believe this simple message has not been given sufficient emphasis in AIS23.

We conclude that AIS23 as a guidance document causes considerable difficulties of interpretation and lacks sufficient detail to enable decisions to be made on what is thought to be reasonably practicable to do. The guidance touching on human health and safety at Open Farms needs to be reviewed, improved and clarified where necessary. This is primarily the business of the regulatory authorities and **we recommend** that the HSE and LACORS pursue this, developing appropriate control measures in close consultation with the HPA, Defra and leading, knowledgeable representatives of the industry. We welcome the assurance we have received from the HSE of its willingness to do this in the light of the evidence presented to us.

8.4 Control of the Infection Risks at Open Farms

8.4.1 Reducing the Infection Risks at Open Farms

During the Investigation we were told of a variety of risk control measures that had been adopted at other Open Farms, two of which we visited. The operators of these farms displayed a strong sense of the risk from *E. coli* O157 and expressed great concerns about the interruption and financial damage to the Industry that an outbreak of infection at any Open Farm could cause. They regarded the control measures they had adopted to protect visitors as reasonably practicable and proportionate.

It is important that Open Farm operators assess the risk of each planned activity and consider carefully which control measures (or combination of measures) will fit most appropriately. We have noted for example, that whereas the HSE has emphasised to the general public that handwashing is the best control measure, some farm operators appear to have adopted handwashing at the expense of other crucial controls (principally the avoidance of faecal contamination).

Handwashing as a means to prevent the spread of infections has long been established, but the ability of handwashing to prevent infection is severely compromised by the failure of many people to wash their



hands at an appropriate time or to use appropriate washing techniques.

Duggan (2005) (2) observed that 'handwashing practices are poorly observed by most children.' And Pete (1987) (3) reported that while *'handwashing has been shown to be the most effective way of reducing the burden of communicable disease ... the practice of washing the hands after using the toilet has been found to be very low in most school-age children'*. Despite handwashing guidelines having been in place for nearly 20 years Pittet (4) reported that *'health-care workers' adherence to recommended hand hygiene practices is unacceptably low ... Compliance is usually estimated as less than 50%'*.

A number of studies have been made of handwashing practice among children, and the level of compliance is found to be lower when children were not directly supervised. These findings suggest that promoting good hygiene practice needs to be actively pursued to be most effective. It should also be noted that the epidemiological investigation carried out as part of the HPA's investigation of the Godstone Farm *E. coli* O157 outbreak reported that they found that: *'There was also no demonstrable protective effect conferred by handwashing.'*

For these reasons, **we conclude** that Open Farm operators would be misdirected to assume handwashing is their primary control mechanism. However, we believe handwashing remains the principal control measure available to the public and must be actively encouraged by the farm operator.

We also note that Godstone Farm reported to us on the unusually high number of visitors who were observed using sanitising gels for hand cleaning. In Chapter 1 it was noted that possible reasons given for the increase in outbreaks and persons affected by *E. coli* O157 could include an increasing reliance on hand gels rather than handwashing with soap and water. We are unable to reach any conclusion on this point but have made specific comment in Infection Control Measures for Open Farms (8.4.3), that visitors should be informed that using sanitising gels is not a substitute for washing hands with soap and water as gels may fail to remove contamination in the manner that running water can. However it is likely that using sanitising gels following handwashing with soap and water may provide extra benefit.

We believe that Open Farm operators have a duty of care and should be primarily responsible for risk control on their premises. This duty of care should be carried out with the support and guidance of the regulatory authorities. Important though handwashing is, we would prefer to see the main emphasis being placed on those measures that farm operators can take to prevent or reduce risk.

In particular, **we have concluded** that the primary measure for preventing infection with *E. coli* O157 must be the avoidance of contact with, or contamination by, animal faeces. We regard this as vital to prevention of infection and that there should be no misunderstanding by operators or inspectors about the importance of this control measure.

We were invited by the HPA to provide interim advice in advance of the Easter (2010) reopening of Open Farms and we understand that the interim advice has proved useful to the OCT in considering allowing animal contact after the reopening of Godstone Farm (see **Appendix 9**).

We recommend that in addition to reviewing whether the advice that is currently provided in the AIS23 document remains valid, the HSE should review:

- I. Whether the current inspection policy provides the HSE with sufficient knowledge of the Open Farm industry to be able to identify emerging risks; and

2. Whether the HSE strategy of using the AIS23 guidance document to provide management of the risks of *E. coli* O157 infection can be shown to be effective, using information gained from the farming industry, the LA regulatory system, the HPA and DH.

8.4.2 Infection Control Measures for Open Farms

We have already described that some Open Farm operators and some LAs have sought more detailed advice than is currently available on which to base their risk assessments. We wish to reiterate our conclusion that too heavy a reliance is placed on secondary measures to be taken by visitors after exposure to the hazards. We have concluded that the primary prevention must be the avoidance of contact with or contamination by animal faeces. We regard this as vital to prevention of *E. coli* O157 infection and that there should be no misunderstanding by operators or inspectors about the importance of this control measure. We believe that this will have additional benefit in controlling the risks from other animal-borne infections.

Preventive or remedial actions should be based on the assumption that *E. coli* O157 is present on the farm. Operators must assume that any or even all of their ruminant animals may be maintaining and excreting *E. coli* O157 and be mindful of the extremely small number of organisms required to infect humans.

Farm operators have a duty of care to any visitors to the farm. In order to limit any opportunities for infection to pass from animals to visitors, farm operators must be:

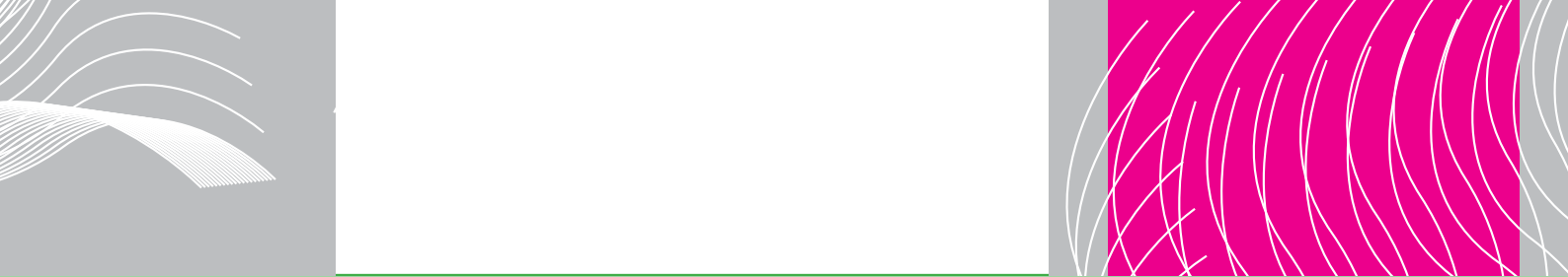
- Active in putting preventive measures in place
- Committed to ensuring good practices take place at the farm
- Vigilant of how staff and contractors carry out their responsibilities.

We recommend that operators of Open Farms should ensure that the layout and design of public areas on the farm are such that visitor contact with animal faeces is minimised or eliminated. When planning how farm operations are to be carried out operators must ensure activities are conducted so as to minimise the exposure of visitors to animal faecal contamination.

Operators should be aware that visitors may have little experience of farms and may not appreciate the significance of some hazards. Children who are most susceptible to infection may not be able to read signs and may often be in pushchairs, or have items such as gloves, sandals, dummies, bottles and toys that become easily contaminated. Children will also often suck fingers or may place their mouths over railings.

Therefore at the entry to the Open Farm good public health messages should be displayed, providing information on the risks of *E. coli* O157 infection. **We recommend** that Open Farm operators do more to raise public awareness of the risks when arriving at a farm attraction and use a variety of means to communicate this information. The responsibility of the accompanying adult should also be spelled out, emphasising the risk of children becoming infected through animal contact.

To minimise visitor contact with animal faeces **we recommend** the following issues should be addressed in all Open Farm risk assessments as a matter of urgency:



Farm layout and design

1. The layout and design of the farm is critical to control of the risks. The farm should be designated as 'clean non-animal areas'; 'look and see pens' and 'controlled-contact areas'
2. Attention must be given to clearly identifying 'controlled-contact areas'. In 'controlled-contact areas', colour coding should be used to inform the public of the risk status. Gates and/or doors should be used so that these areas are not accessible to unaccompanied children
3. Animal pens must be constructed of impermeable materials, pen fronts must be of solid construction to a suitable height, and surfaces readily cleanable.

Farm operations

4. Rotation of animals to stock fields is encouraged to ensure that the 'look and see' and 'controlled contact areas' do not become contaminated
5. Deep bedding is unacceptable in 'controlled-contact areas'
6. There must be no build up of faeces in 'controlled-contact areas' so animals must be on clean bedding or in fields.

Animal handling and feeding

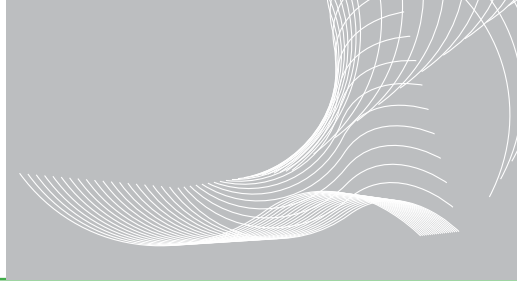
7. Handling of small animals should be supervised by farm staff and take place outside of the pens
8. Climbing into animal pens containing ruminants should not be allowed
9. Many Open Farms provide or sell feedstuffs that the public may acquire for animal feeding. Provision of the feedstuff by the farm must not be in paper bags that can easily tear and release their contents, or become contaminated and then be taken off the premises. Preference should be given to provision of feedstuffs in cartons or containers that cannot be easily placed in bags or pockets and whose surfaces are relatively waterproof. Such feedstuffs must comply with Feedstuff Regulations, but additionally should be of a nature that will not encourage rodents where spillages occur
10. Feeding of ruminants should take place through the fencing, should be supervised and visitors then directed to handwashing facilities which should be fully supervised.

Paths and access routes

11. The public should be kept separate from animal passageways, and animals should not be able to contaminate the walkways by defecation, urination or seepage/runoff
12. Walkways with firm surfaces for buggy and wheelchair access to 'look and see' animal areas should be provided.

Food and drink

13. Eating, drinking and smoking should be forbidden in 'controlled-contact areas'
14. Food and beverages must be prepared, sold or consumed only in 'clean non-animal areas'
15. Any picnic area must be a 'clean non-animal area'. The surrounding animals may be 'look and see', but must be behind double fencing and signage should prohibit entry to the animal areas. Species such as poultry and goats which are difficult to confine and are likely to wander from pens or fields must be permanently excluded from picnic areas
16. Washing facilities and bins must be adequately provided and signposted in picnic areas.



Washing facilities

17. While the primary control measures should focus on reducing or eliminating faecal contamination, the most effective method for removing dirt remains handwashing with soap and warm water
18. Facilities should be provided for visitors to clean contamination from footwear, buggy wheels, etc, before leaving premises
19. Floor markings are a useful direction to hand basins/washing facilities. The design of the areas should be to exit visitors through passageways where there is appropriate signage and a plentiful supply of sinks that are at a variety of heights. Hand drying towels must go into bins that are open or have pedal operation
20. Visitors should be informed that handwashing is the most effective means of removing harmful dirt or contamination. Using sanitising gels is not a substitute for washing hands free of any contamination. However, gels may be effective in killing any remaining bacteria and so can only be used as an addition to handwashing, but not as a substitute
21. Handwashing should be properly supervised by staff. Reliance cannot be placed on visitors to hand wash. While we understand the reluctance of some operators to confront customers who ignore advice, we believe that active supervision of visitors by staff is necessary to ensure health and safety and that it is a reasonably practicable thing to do.

Play areas

22. Many Open Farms will have other entertainment activities such as playpens, slides, swings, climbing areas, sandpits or ball pits. To prevent contamination of these areas that may be difficult to clean, they should be sited so that there is no direct access from controlled-contact areas and preferably in a distinctively separate 'clean non-animal' area of the Open Farm.

8.5 Control of the Risks of Infection from Agricultural Animals

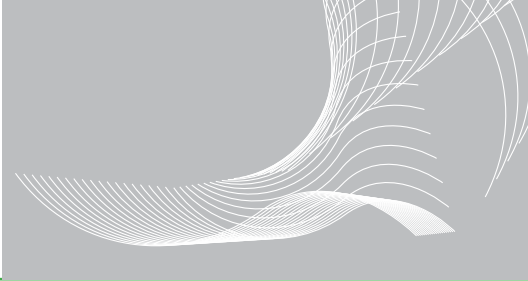
8.5.1 Infection Control Measures for Agricultural Contacts

From the outset of the investigation we were presented with the problem that the circumstances where the public have contact with animals are many and varied. While our primary focus is on the types of premises and the animal contacts that led to the outbreak of *E. coli* O157 at Godstone Farm we are also aware of many other situations and circumstances where the public may be exposed to the risk of zoonotic infection and in particular to *E. coli* O157.

In Chapter 4 we define Open Farms as:

'those premises that maintain farm animals, actively attract visitors for leisure purposes, have visitor facilities and encourage, permit and allow animal contact, and such premises need not be open on a daily basis nor solely operating as commercial leisure activities'.

Our conclusions and recommendations for regulation, inspection and operational procedures are focused on Open Farms like these but all managers, operators and regulators of agricultural premises must be aware that animals carrying *E. coli* O157 will not show clinical signs and cannot be readily identified.



We have described in Chapter 3 the circumstances where the general public is brought into direct contact with animals; these should not be forgotten, particularly in view of the complicated arrangements that are currently in place for their regulation (Chapter 4). There are also circumstances where farms do not invite the public to have animal contact but where contact with animal faeces may be incidental. We are therefore concerned that farms allowing direct animal contact or having facilities where the public have access to contaminated environments should have robust practices in place to prevent human infection. We consider that the potential risks of infection from animal contact may be mitigated and primary control measures should focus on preventing faecal contamination of people arising or their accidental swallowing of contaminated material. While we consider that the achievement of zero risk can never be a practical reality we do consider that there are reasonable and practicable controls that may be utilised to reduce risk to an acceptable minimum. Many of the points made in reference to Open Farms will be relevant to other settings.

In addition, we wish to highlight the Task Force on *E. coli* O157 Report 2001 (4) whose starting point is to assume that all ruminant animals are maintaining and excreting *E. coli* O157 and that risk assessments and any preventive or remedial actions have to be based on this assumption. The Task Force Report has a series of recommendations for access and use of rural land and these remain highly relevant.

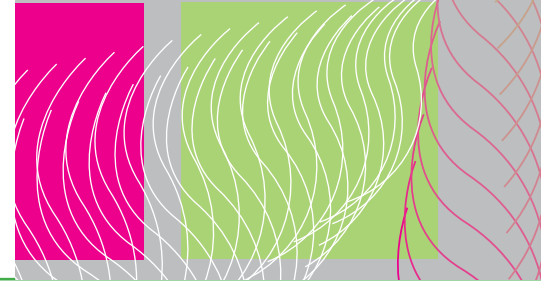
We have also considered the specific issue in relation to the period between animal grazing and public use of animal pastures. The Task Force Report guidance states: Keep farm animals off fields for the three weeks prior to use; Keep farm animals off fields during use; Remove visible droppings ideally at the beginning of the three-week period; Mow the grass, keep it short and remove clippings before the fields are used for recreation; Always wash hands before eating, drinking and smoking, ie, use soap, clean towels and preferably hot running water; Ensure water from streams and burns is treated before drinking and Ensure adequate supervision of children, particularly those less than five years of age.

We are aware of some concerns expressed in the media that it is feasible for *E. coli* O157 to persist for longer than three weeks on land. Maule (5) reported survival of up to 50 days in cattle faeces, up to 130 days in soil and when air-dried on stainless steel and plastic surfaces, the organism was reported as surviving more than 60 days. The issue of environmental stability remains a subject for continued research. However, we agree with the comments made by the Chair of the Task Force which were that the recommendations were intended to be practical and proportionate. We are additionally aware that some organisations have adopted the three-week period as their operational standard, and this period is currently advised by the HSE. Although we know there is some suggestion of infection having arisen after contact with agricultural land despite adherence to the three-week recommendation, it is our conclusion that rather than revision and possible confusion arising, that the period of animal exclusion should be widely adopted and the three-week period reinforced as a benchmark.

We recommend that the Veterinary Laboratories Agency (VLA) and HPA investigate the circumstances where *E. coli* O157 infection arises after contact with animal pasture to determine if a period of three weeks is sufficient to control the risk of *E. coli* O157 infection.

8.5.2 Control of *E. coli* O157 in Animals

It is evident to the investigation that exposure to livestock faeces is common among the causes of human *E. coli* O157 infection. Indeed the investigation heard that many of the sporadic infections (1,000+ in UK per annum) whose source cannot be identified may be due to livestock exposures.



Chapter 8: Assessing and Managing the Risks

During the course of our work, we have focused our attention on Open Farms as exemplified by Godstone Farm. Although the Task Force on *E. coli* O157 Report 2001 commented on the lack of interventions in animals we have learned from Defra of recent developments that may have a wider application in reducing the carriage of *E. coli* O157 by farm livestock. A five-point plan has been developed from Defra-commissioned research to reduce the carriage of *E. coli* O157 (6). This plan identifies the provision of dry and clean bedding, and maintaining animals in stable rearing groups as the two most important measures. We were also impressed by the use of vaccines to reduce both the numbers of positive animals and the levels of *E. coli* O157 being shed. The vaccine approach for control is one that has been pursued in cattle in North American feedlots. We consider that while vaccine control of *E. coli* O157 is not immediately applicable in UK, since no UK licensed vaccine is available, such control may be of considerable relevance to the agricultural industry and to the wider issue of *E. coli* O157 control. We are also concerned to establish if the identification of 'super-shedder' animals on Open Farms may be explored along with the five-point plan as a means of reducing the likelihood for the spread of *E. coli* O157.

We recommend that: Defra studies the feasibility for vaccine control of *E. coli* O157 in UK, and identifies the obstacles to implementation.

We recommend that Defra commissions studies to identify whether the microbiological testing of cattle, sheep and goats with an enumeration of *E. coli* O157 and the implementation of farm hygiene practices is a practical means for reducing the risk of *E. coli* O157 on Open Farms.

8.5.3 Public Awareness and Sharing the Risk

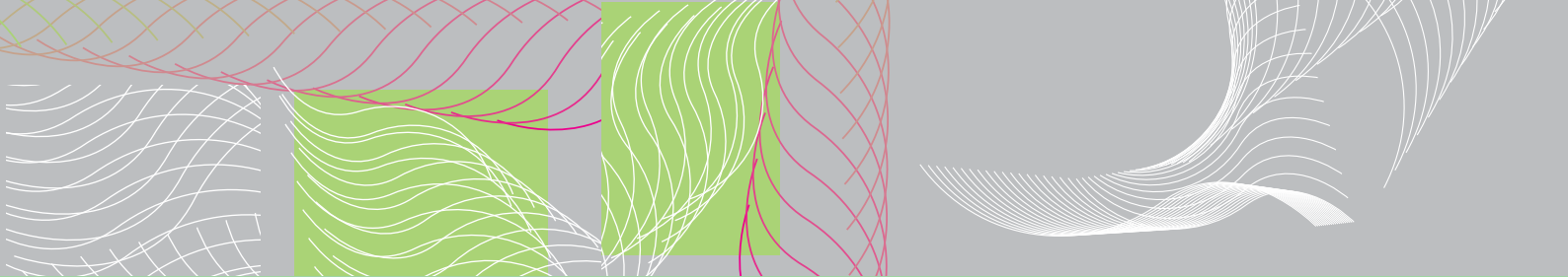
We heard evidence, primarily from the HSE, that it is important that the public take personal responsibility for the risks they experience. However, we presented in 8.1.5 that the majority of parents who gave evidence stated they were largely unaware of the risks of *E. coli* O157 through animal contact or farm visits. Their perception was that the risk that they and members of their family would be exposed to was minimal. **We conclude** that more needs to be done to raise public awareness of the risks of *E. coli* O157 from animal contact and that this would substantially reduce the level of risk across the wide variety of circumstances where the public may be exposed to infection. Such awareness would also contribute to families' abilities to make informed choices.

The Task Force Report (4) has a series of recommendations and a concluding Chapter on Public Awareness and Education. It is our view that these are good recommendations but it is of concern that 10 years after publication of the Report, the public's awareness of the hazards and associated risk remains poor. There is no simple means to raise public awareness but the evidence of the charity Haemolytic Uraemic Syndrome Help (HUSH) (xii) and of research by University of Aberdeen (xiii) showing that awareness is somewhat higher in Scotland indicates to us that it is a feasible objective. We concur with the Task Force Report that the message needs to be clear and concise and we additionally ask all stakeholders be they farmers, countryside residents, countryside visitors, regulators or the media to acknowledge their part in this message.

The media should clearly identify that the risk of infection arises primarily from *E. coli* O157 and not simply *E. coli*. There are many hundreds of strains of *E. coli* and many of these are harmless.

The public message needs to clearly state that:

- *E. coli* O157 is frequently carried in the gut of animals, especially cattle, sheep and goats and other



ruminants, and will be excreted in faeces

- *E. coli* O157 has been detected in samples of saliva from ruminants
- Infection by *E. coli* O157 may arise from contaminated food, water, from direct contact with animals or their environments
- Children and the elderly are especially vulnerable and deaths have occurred from infection by *E. coli* O157
- Infection from *E. coli* O157 may be reduced when visiting the countryside or agricultural environments by
 - avoiding any contact with animal faeces, and
 - by ensuring that good hygiene practices are in place and are scrupulously followed.

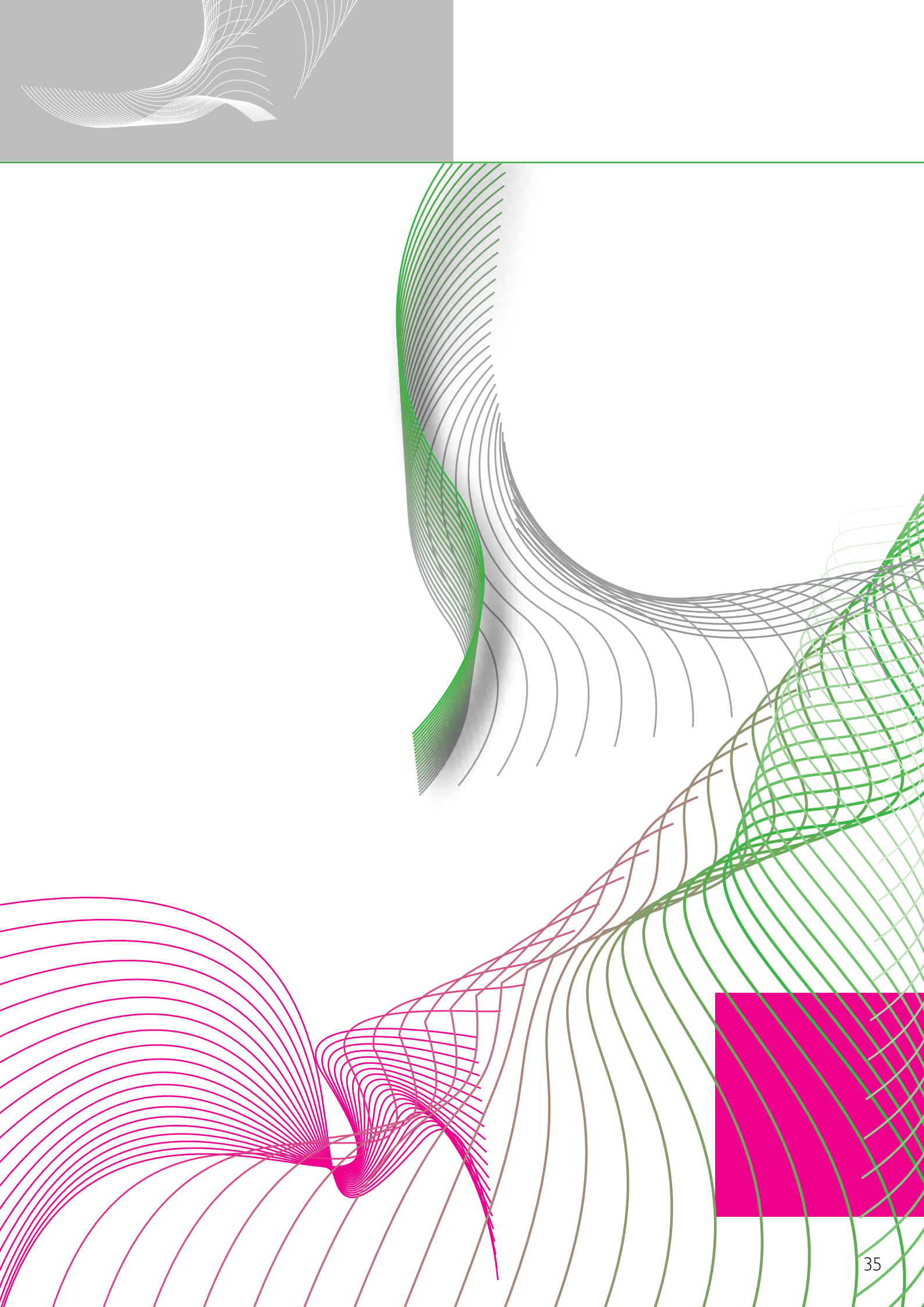
We consider that the media have a key role to play in ensuring the above message is simply communicated and we believe that the discussion and debate that arise from the publication of our report will provide an opportunity for such a message to be promoted.

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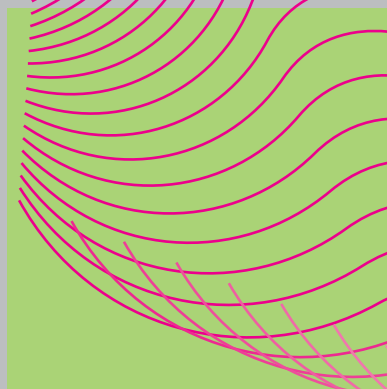
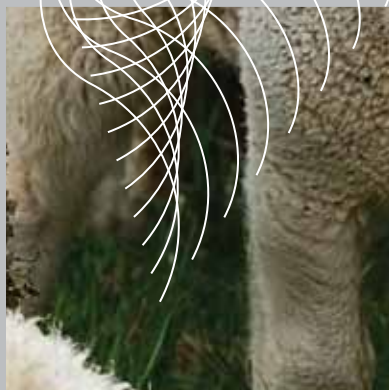
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Chapter 9:

Meeting the Challenges

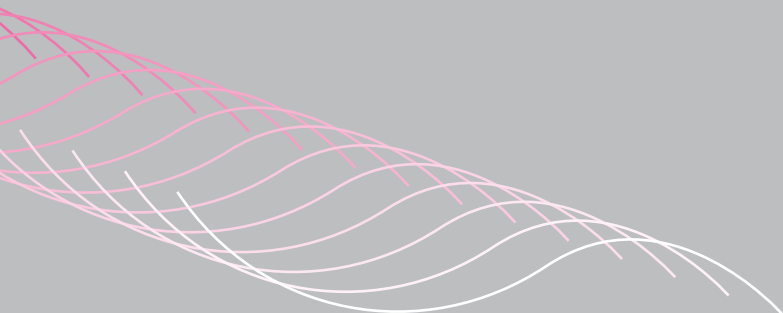


Chapter 9: Meeting the Challenges

- 9.1 Strengthening the Regulatory Regime
- 9.2 An Approved Code of Practice
- 9.3 Securing Compliance
- 9.4 Working Together
- 9.5 References

Key Points

- The existing regulatory structure is not securing compliance with standards and is unlikely to reduce the risk of future outbreaks at Open Farms unless reinforced
- Non-statutory, unenforceable guidance leaves room for doubt about standards of protection; simply reviewing guidance will not be sufficient to meet the challenge of improving public health protection
- An approved code of practice (ACoP) would be a proportionate means of providing clarity and certainty about standards, helping both operators and enforcing authorities
(Key recommendation)
- A voluntary accreditation scheme for Open Farms is strongly recommended as helpful to both operators and regulators; we do not recommend making special regulations or licensing of Open Farms at this time **(Key recommendation)**
- A definition of an Open Farm is needed and a national register would help target awareness-raising, education and inspection programmes for Open Farms
- The Health Protection Agency (HPA) has no enforcement powers and is not an enforcing authority; the powers of the local authority (LA) inspectors and proper officers to prohibit activities or close premises need clarification
- Confidence and competence of Environmental Health Officers (EHOs) to inspect and enforce standards at Open Farms need to be strengthened through training and support from centres of expertise
- There is a need for agencies to share information and work much more closely together in regulating Open Farms **(Key recommendation)**.



Introduction

Chapter 8 has analysed weaknesses in assessment of risk, risk management and control measures necessary to reduce risk of *E. coli* O157 infection of visitors to Open Farms. Several problems have been identified that get in the way of achieving compliance with standards, involving farm operators, industry and regulatory bodies. This Chapter discusses solutions.

9.1 Strengthening the Regulatory Regime

9.1.1 The Regulatory Framework

On the face of it, the framework of health and safety law for the protection of visitors to Open Farms looks robust, with 'general duties' (see Chapter 4) requiring operators to keep risks arising as low as reasonably practicable and further statutory requirements for competent risk assessment and management of health and safety. Moreover, the *E. coli* O157 risk has been recognised in guidance for farm operators describing control measures that the Health and Safety Executive (HSE's) Biological Agents Unit believes are reasonably practicable and proportionate to the risk.

There are considerable strengths in the UK's regulatory approach, not least in the establishment of expert leading national agencies such as the HSE, Food Standards Agency (FSA) and Animal Health (AH) with 'delivery' at local level by LAs, strengthened by the forging of partnerships between national and local regulatory bodies. Until the *E. coli* O157 outbreaks in 2009 (see Chapter 1, section 1.5.6), there might have been some points of justification that 'light touch' regulation of Open Farms was appropriate.

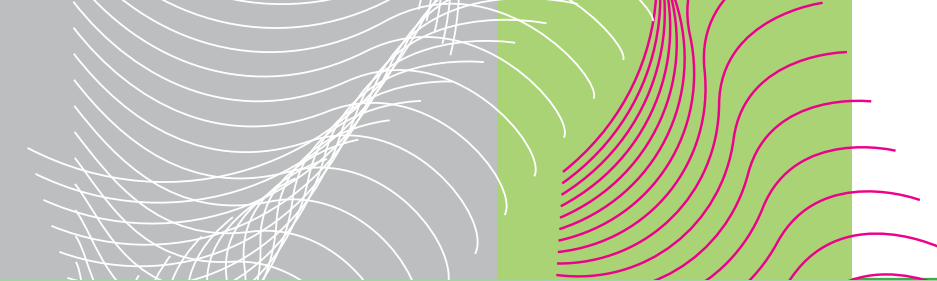
However, many of the businesses in this sector are small, having originated largely from working farms that needed to diversify in order to remain viable. The resources and expertise available to them for risk assessment are few and it is unsurprising that they have difficulty (as we discovered) in understanding the risk and what they needed to do to control it.

The 'goal-setting' approach of the Health and Safety at Work Act (HWSA), which allows employers to choose how to comply with the Act's general duties and other legal obligations, suits large businesses with in-house resources and expertise enabling them to manage a variety of risks competently without need of further regulatory intervention. This is not so true of smaller, less well resourced firms who will often say 'just tell us what we should do'. For small businesses, clarity and certainty about their statutory obligations are essential. The Department of Business Innovation and Skills has issued a Code of Practice on Guidance on Regulation which recognises these needs (it can be found on www.bis.gov.uk).

There are a number of lessons to be learned from the farm-associated outbreaks occurring in 2009. At Open Farms, the success of the regulatory regime protecting public health relies principally on the regime set up for occupational health and safety. Public health depends initially on prevention, which clearly failed in 2009. **We conclude** from our findings that if the risk of future outbreaks is to be reduced, the regulatory regime needs to be strengthened, demanding a more rigorous approach towards securing compliance with standards from both farm operators and regulators. How should this be achieved?

9.1.2 Role of the Regulators

There are impediments in securing greater compliance that will need to be overcome. Assessing



whether an organisation is in compliance with health and safety law is not an easy task for inspectors when the law allows each business to take a different approach to controlling risks. We have heard from farm operators and from the Tandridge Environmental Health Department (Tandridge EHD) that they would favour a more prescriptive regulatory approach. We have also heard criticism of the existing guidance material because, for example, it requires 'too much interpretation', that 'it does not say how many signs there should be, or what size the lettering should be'.

These comments may be symptomatic of a difference of regulatory attitude between LAs (who, together with farm operators, are a primary user of the HSE's guidance) and the HSE. The HSE advised us that their strategy for addressing health and safety in agriculture had changed over time. Rather than spending resources on inspection of the many small enterprises, more effort was now being directed toward promoting and raising awareness among farmers through a variety of communication methods (see Chapter 4). The HSE's own inspectors are at ease with the 'goal-setting' approach. They are well trained and recognised as highly competent. Being responsible for inspection of the majority of farms in Great Britain, they acquire a detailed understanding of health and safety in agriculture. On the other hand, with so few Open Farms for each LA to inspect, resulting from the current division of enforcement responsibility, it would not be surprising if lack of experience of good health and safety practices in farming and a relatively low level of expertise in agricultural and microbiological risks on farms left EHOs at a disadvantage.

This has struck us as a weakness in the regulatory approach that needs to be remedied by the leading bodies. There are several ways in which this can be done and the HSE is well placed to take the lead, having already forged a strong relationship with Local Authorities Co-ordinators of Regulatory Services (LACORS).

For example, following the Godstone Farm outbreak the HSE has, commendably, attempted to support LAs by issuing advice through the HSE and LA joint liaison committee (HELA) on how to apply the Enforcement Management Model (EMM) at Open Farms, seeking consistent and effective regulatory actions. But unlike the regulatory approach followed by the FSA under food safety legislation there is no auditing of LAs' performance in health and safety inspection and therefore no means of knowing whether consistency and effective regulation are being achieved.

We conclude that the question of how the health and safety regulators assure themselves and the general public that a consistent, effective regulatory approach to Open Farms is being maintained needs to be answered. **We recommend** this be addressed by the HSE and LACORS, taking the industry's views into account.

9.2 An Approved Code of Practice (ACoP)

The regulatory options available under the HSWA have been highly successful over the last 35 years in improving standards of health and safety in Great Britain in a variety of industries. A major challenge that now has to be met by both the industry and regulators to improve health and safety at Open Farms is establishment of a set of clear and enforceable standards for this sector. More needs to be done to improve understanding of what it is reasonably practicable for operators to do and what would be acceptable to regulators.

We have discussed at length in Chapter 8, problems drawn to our attention arising from guidance

currently available to Open Farm operators and have concluded that control measures need to be reviewed in close consultation with leading representatives of the industry.

However, we do not regard a review of guidance alone as a sufficient response to the lessons of the 2009 outbreaks. That is the starting point for a more fundamental strengthening of the regulatory regime.

The role of the industry in strengthening the regime is as important as the role of the regulator. After all, operators of Open Farms have a primary duty of care. They also have a strong commercial interest in ensuring public confidence in their sector's management of risks. There is work to be done to restore trust after the 2009 outbreaks.

We conclude that a more rigorous approach to securing compliance with good practice needs to be taken by both operators and inspectors, within a strengthened regulatory framework. In coming to this view, we have considered the evidence of all the parties carefully and have taken legal advice from the Solicitor to this Investigation.

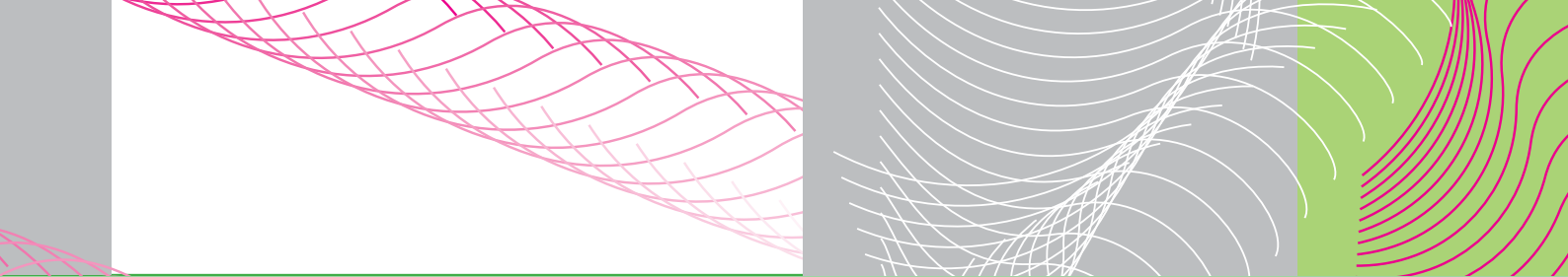
Our legal advice is that non-statutory guidance is not enforceable and farm operators are not obliged to follow it, even assuming that they all understand it. The guidance leaflet AIS23 carries the disclaimer 'This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do'. At present the regulatory approach to Open Farms depends on operators complying with their general HSWA duties and the requirements of regulations such as the Control of Substances Hazardous to Health Regulations 2002 (COSHH), which they need to understand. They are required to appoint a competent person to enable them to meet the requirements of health and safety law, although this need not be anyone with special expertise from outside the farm. It is clear to us from the findings of the joint HSE/LA inspection (i) conducted after the outbreak that Godstone Farm did not possess the necessary in-house expertise and understanding to manage risks to health.

We do not wish to make a case for yet more regulations being imposed on this essentially 'small firms' sector. That approach would not address the problems we have identified in the way of improving compliance. There is a better way of introducing more rigour into the system, in line with modern principles of Better Regulation, that would have the advantage of strengthening the regulatory framework without imposing any burden on business. An approved code of practice (ACoP) will provide a targeted, transparent, proportionate and consistent structure which will provide a basis for the advice which the Industry currently lacks. Such an ACoP will provide flexibility and can be easily reconfigured in the light of further scientific and public health knowledge. The clarity and certainty which will ensue from the ACoP will help farmers and will reassure the Industry and the public that steps have been taken to provide a definitive reduction in risk.

How should the regulatory regime support enterprises like Godstone Farm in meeting their statutory obligations? The recommendations of the Robens Committee (1), which led to the passing of the HSWA, supported the idea of codes of good practice being produced in collaboration between industry and regulators. The Act was to enable progressive replacement of overly prescriptive, outdated health and safety legislation that had accumulated over the previous century with a 'system of regulations and approved codes of practice'.

Numerous helpful codes of practice have since been produced in this way and approved by the HSE, giving them a special status in law. The value of codes of practice to operators in providing clarity and certainty about standards and how to comply with their legal obligations has already been discussed in Chapter 4.

We have noted that a code of practice approved under the Prevention of Accidents to Children in



Agriculture Regulations 1998 made only passing reference to *E. coli* O157. A code of practice has been approved under COSHH for the control of legionella but there is none for the control of *E. coli* O157.

We believe that there would be considerable advantages (and no additional cost to operators) from moving from reliance on non-statutory guidance to an ACoP dealing comprehensively with the *E. coli* O157 risk of infection at Open Farms, providing clear benefits to all concerned. The Open Farm industry's participation in developing an ACoP would engender a sense of ownership of standards.

We conclude that if a code of practice were subsequently approved under HSWA powers it would provide clarity and certainty to both operators and inspectors about standards expected at Open Farms and become a basis for assurance of visitors to farms about their compliance with health and safety law. Leadership by the national regulator will be required to achieve this.

We recommend that the HSE should take the lead in developing a code of practice for subsequent approval, involving the HPA and other relevant authorities, in close consultation with leading representatives of the industry.

9.3 Securing Compliance

Standards are essential to success but other steps will have to be taken to improve compliance by operators and effectiveness of regulatory inspections of Open Farms. These are discussed below.

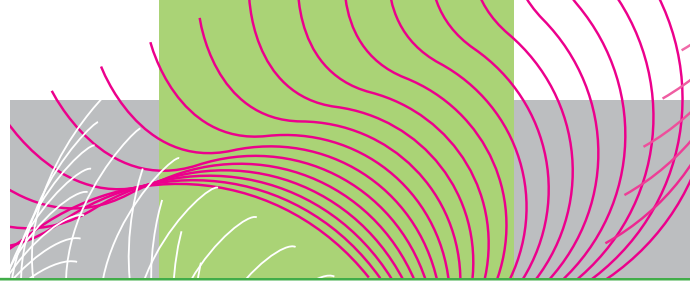
9.3.1 Accreditation

There are a number of voluntary schemes enabling a degree of self-regulation in various sectors. In the agricultural sector, Farming and Countryside Education (FACE) administers the Countryside Education Visits Accreditation Scheme (CEVAS) but this is limited to about 700 farms involved in the Government's programme to ensure learning outside the classroom (Chapter 3).

Accreditation may be of individuals or organisations and may be voluntary or statutory. The Open Farm operators we met expressed enthusiasm for a voluntary accreditation scheme for their sector that would enable independent inspection and auditing of standards and provide assurance about compliance to both operators and the visiting public. Conscious of the damage that another major outbreak of *E. coli* O157 would do to their industry, they were willing to pay the cost of annual inspections.

They drew our attention to a voluntary scheme developed some years ago for assuring safety at fairgrounds, which involves independent inspections of rides by accredited surveyors. They believed that a similar approach would be helpful to restoring and maintaining public confidence in health and safety at Open Farms. While we are not in favour of self-regulation alone as any guarantee that a risk such as arises from *E. coli* O157 is being kept under proper control, an ACoP, as we have recommended above, could provide essential standards as part of the underpinning of such a scheme (safety and other health-related issues as well as the *E. coli* O157 risk would also need to be addressed).

We conclude that it would be well worth fostering the development of a scheme that would allow the management of risks to health and safety at Open Farms to be independently audited and assured, on an annual basis. **We recommend** that the industry pursue this, their own idea, and that



the authorities help and encourage leading representatives of the Open Farm sector in fostering the development of a robust accreditation scheme for inspection of standards at Open Farms.

9.3.2 Definition of Open Farms

There is another challenge to be met, which is to find a solution to the problem of identifying Open Farms. That they are sometimes variously called 'petting farms', 'farm attractions', 'leisure farms', 'farm parks' or 'city farms' illustrates the difficulty of defining these businesses. Together with the lack of a national register of Open Farms (discussed below), it presented impediments to effective regulatory action when the HPA asked the HSE and LAs to visit all Open Farms in the wake of the Godstone outbreak. We believe that it is a weakness in the regulatory framework and that it is important that a solution be found. (The HSE itself seemed uncertain about whether some Open Farms might fall within its responsibility.)

In the Outline to our report we have defined Open Farms as 'those premises that maintain farm animals, actively attract visitors for leisure purposes, have visitor facilities and encourage, permit and allow animal contact, and such premises need not be open on a daily basis nor solely operating as commercial leisure activities'. Conscious of the terms of reference, this was for the purpose of scoping our investigation and drawing a practical boundary around a study that we could complete within a reasonable period.

We have therefore concentrated our attention on Open Farms such as the one at Godstone but wish to draw the attention of the regulatory authorities to other situations and premises where the general public may be brought into direct contact with agricultural animals.

A challenge lies in the changing nature of the Open Farm sector. It is young and still evolving as farmers diversify and enter the business of public entertainment. The metamorphosis may begin by opening a working farm occasionally to the public as an attraction in itself and then, as any profits allow, fresh attractions such as rare breeds and exotic animals, restaurants, adventure playgrounds, rides or demonstrations may be added, gradually changing the character of the business. At a point where the farm becomes mainly an entertainment business it will cease to fall under the regulatory attention of the HSE's inspectors and will become the responsibility of the relevant LA.

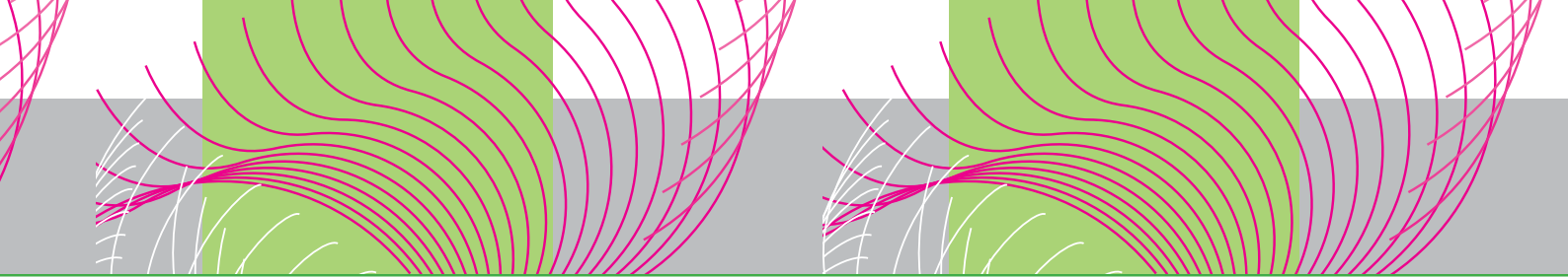
Furthermore, the grounds for deciding when a working farm has become primarily an entertainment facility are unclear.

The following definition, believed to be the most recent, was used by the regulators in the relevant instruction LAC 41/5:

'Open farms are commercial operations whose primary purpose is entertainment and which can be distinguished from conventional working farms (commercial agricultural undertakings) by a number of factors. The following features in isolation or combination are relevant:

- The farm attraction is open to the public by direct access
- The farm attraction is visited on a daily/throughout the year basis
- Provision of fixed facilities for visitors including handwashing
- Provision of animal petting areas; and
- Provision of rides and play amusements/facilities'.

We regard this definition as unsatisfactory. While some of the features are clearly relevant to the Open Farm sector we do not agree with them all for the control of risk. For example, we think the suggestion



that the premises need to be visited on a 'daily/throughout the year basis' is unhelpful and could lead to 'risky' premises being excluded from an inspection programme.

We have described in Chapter 3 circumstances where the general public may be brought into direct contact with animals. Some premises do not invite the public to have animal contact, but animal contact may be incidental (for example, farms that rent out their land for camping or similar activities, have public rights of way running through their property or are non-agricultural premises such as stables or riding establishments).

Additionally, some working farms occasionally participate in public events, such as Open Farm Sunday, organised by Linking Environment and Farming (LEAF). These could be excluded if they did not encourage, permit and allow farm animal contact but some working farms open to the public for a few days each year to allow them to see a particular farming activity, such as during the lambing season. Moreover, we are aware of mobile animal petting companies that move from venue to venue, advertising locations on the internet, and public houses that keep farm animals for petting by customers. Furthermore, some agricultural shows are very large events attracting many thousands of visitors. We would wish to encourage organisers of such events to undertake robust risk assessments guided by the principles we have proposed in Chapter 8.

We have not been able to examine any of these kinds of premises or activities in detail but, notwithstanding, we believe that in some of the circumstances mentioned above, the risks of *E. coli* O157 infection for visitors are likely to be considerably higher than from incidental exposure. Businesses responsible for these kinds of activities need to assess and manage risks to visitors arising from animal contact properly and be included within regulatory oversight.

We conclude that to promote effective inspection and awareness-raising programmes, the authorities need to develop a practical definition of Open Farms that takes risks as well as activities into account. The definition we have used for the scope of our investigation may be a useful starting point. **We recommend** that this issue be pursued in consultation with leading agricultural industry representatives.

9.3.3 Registration

It became very clear to us as we gathered evidence that there is no accurate figure available of the number of Open Farms. Most LAs will have only one or two farm attractions on their patch and it would be surprising if their EHOs did not know where these are. However, we understand there is still no national total available.

It is hard to understand how a national strategy to improve health and safety at these premises could be developed (and then be properly monitored and evaluated) without better information about the sector. This will be needed for planning campaigns to educate and raise awareness, reaching out to operators, or delivering collaborative inspection programmes of farms by the HSE and LAs. **We conclude** that this unsatisfactory regulatory situation needs to be remedied. A licensing regime (discussed below) would generate a list but a simpler and much less onerous solution would be registration of Open Farms.

We note that the National Farm Attractions Network (NFAN) keeps a voluntary register of its members but not all Open Farms are members; we are also concerned that a farm that intends to diversify its business and open to the public has no need to demonstrate that it meets any conditions for controlling risks to health and safety before it introduces animal contact to the general public. (As a good example of best practice overseas, we have learned that in Denmark the Ministry of Food, Agriculture and Fisheries (Animal Health Division) is responsible for certification of zoological gardens and of farms open to visitors and that there is requirement that all animals must be registered in the

equivalent of a County Parish Holding [CPH]. Visitors are able to check the health status of any farm before visiting and this information is openly available on the internet.)

We were told by Animal Health (AH), the executive agency of the Department for Environment, Food and Rural Affairs (Defra) which is responsible for animal health and welfare on farms, that they knew which ones were Open Farms. However, the evidence presented to us on the role and functions of AH with regard to Open Farms was less clear. They have a key role to safeguard public health from animal-borne disease and one of the four reasons for Government intervention described in the Defra Animal Health and Welfare Strategy is the protection of public health. We are aware that AH and LA Trading Standards Officers (TSOs) visit Open Farms for animal health and welfare and feedstuffs regulatory purposes but we heard little to suggest that their knowledge of farm locations and special expertise are brought to bear in support of the wider regulatory framework for protecting public health at Open Farms.

We are also aware that Defra is continuing to support the development by AH of a CPH database that is intended to maintain a picture of livestock location throughout Great Britain. Such a database might have the capability of providing information about numbers and locations of Open Farms to the regulatory authorities responsible for health and safety inspections (HSE and LAs).

We conclude that the absence of a national database of Open Farms, combined with lack of a clear definition, is an impediment to effective regulation of this evolving sector. **We recommend** that in addition to working out a definition, the several bodies with regulatory or representative interests in Open Farms should collaborate to establish a register, sharing any data that are available to them separately.

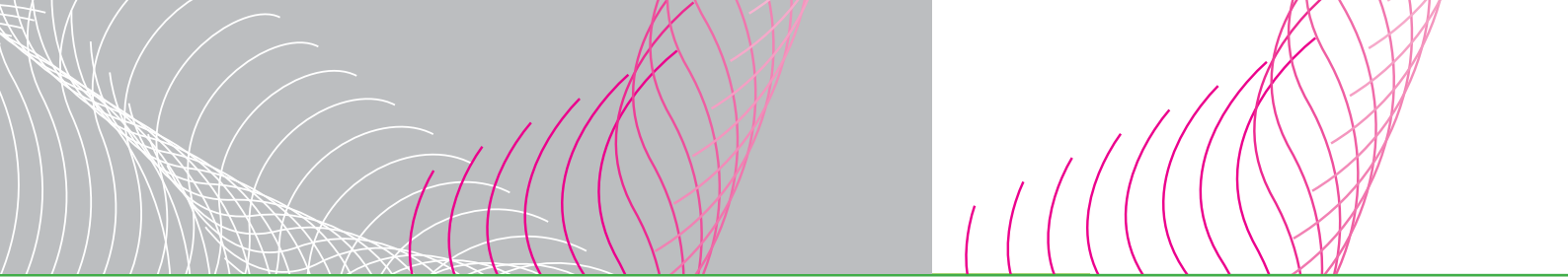
9.3.4 Licensing

An advantage of licensing is that conditions may be attached which are specific to a particular set of activities. We noted that after the Lyme Bay canoeing tragedy, in which four teenagers drowned, followed by prosecutions of an activity centre and its director for manslaughter, the Government introduced legislation to establish an Adventure Activities Licensing Authority (AALA), requiring businesses to obtain licences subject to regular inspection. The AALA has recently been merged with the HSE.

We noted that a licensing approach has already been adopted for zoos for animal welfare purposes and it is worth recording that some Open Farms are licensed under the Zoo Licensing Act 1981 (as amended). This is also the case in other countries such as in the USA, where States license 'petting zoos'. The 1981 Act requires inspection and licensing of zoos that are open to the public for more than seven days a year. Policy responsibility rests with Defra and AH maintains a register of zoo inspectors.

Responsibility for the day-to-day operation of the licensing system and the administration of the Act rests with LAs, who are required to carry out annual inspections. Tandridge District Council (DC) told us that they contracted with a specialist inspector to help them regulate the licensed zoos on their patch. Godstone Farm is not a licensed zoo.

The Act's definition of a 'zoo' has a wide scope, with licensed zoos ranging from traditional urban zoos and safari parks to small specialist collections such as farm parks with exotic species, butterfly houses and aquaria. Dispensations from licensing are allowed to small zoos. As a matter of interest we noted that Tandridge DC might have considered whether Godstone Farm fell into this category but there was no evidence that they had. On the other hand Horton Park, Godstone Farm's sister farm, which is



regulated by another LA, had been considered for zoo licensing dispensation.

We have considered whether a statutory licensing scheme should be introduced for the purposes of public (as distinct from animal) health and welfare. It is a resource-intensive approach to regulation and regulatory costs would need to be recovered. The option of licensing will need to be kept open, and may ultimately be the right way ahead for the sector if health and safety standards at Open Farms do not improve. But we are not recommending licensing of Open Farms at this time. We consider that a less burdensome measure – registration – will meet the regulatory need for information about these businesses, and that an ACoP will bring clarity, certainty and enforceability of standards from which improvements should follow.

9.3.5 Powers of Inspectors

While there was a perception among some of the affected families that the HPA could have acted to close Godstone Farm, this was mistaken. In fact the HPA has no enforcement powers of its own in this respect and is not a statutory enforcing authority, unlike the HSE and LAs. During the Godstone outbreak, there was uncertainty about whether the powers of EHOs provided by the HSWA were sufficient to close the premises entirely, or only to prohibit specific activities. Dealing with a public health risk under health and safety at work legislation may not seem entirely appropriate but was the only option pragmatically available; there was no closure power available in 2009 under public health legislation. It is notable that closure powers would have been available under food safety law if the problem had been one of food poisoning.

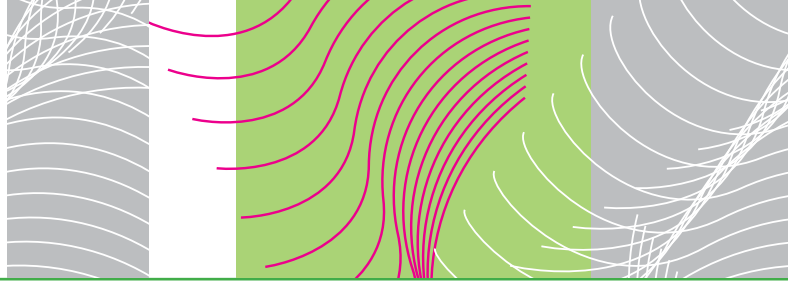
We asked for clarification and were told by the HSE and LACORS that decisions about using prohibition powers under HSWA 1974 to close premises need to be taken on a case by case basis. There needs to be evidence that shows there exists a risk of serious personal injury and that the only way to control that risk is to prohibit use of the premises, hence its closure. (This advice is set out more fully in an addendum (ii) to the notes of the investigation committee meeting held on 5 November 2009.)

Since the source of an *E. coli* O157 infection may not become clear for some time – indeed an Outbreak Control Team (OCT) may not have been convened until there are two cases with an epidemiological link to an Open Farm – the EHD will be considering whether infection could have arisen from water, food, the environment or contact with dirty animals or their faeces.

We recommend that in efforts to limit the potential for an Open Farm outbreak, as at Godstone Farm, the EHD should suspend visitors' contact with ruminant animals until the source of infection is pinpointed by further epidemiological investigation. It was notable that after this action was taken voluntarily by Godstone Farm operators on 4 September 2009 there were no further cases of infection even though the premises themselves remained open.

Most businesses will wish to do the right thing in the event of an outbreak and securing voluntary closure may often be the better and swifter course of action than use of regulatory powers. However, there needs to be a default position when financial pressures on a business to remain open become extreme, particularly during peak seasons when loss of revenue could mean business failure. Inspectors need to be ready and confident of being able to use their powers should they encounter reluctance or opposition to closure, in circumstances where that is essential for the protection of human health.

Since April 2010 a new health protection power has become available under the Health Protection (Part 2A Orders) Regulations 2010. This enables a LA to apply to a Magistrates' Court for an order



pursuant to S.45 I of the Public Health (Control of Diseases) Act 1984 to close premises which are or may be infected or contaminated and present or could present significant harm to human health.

We conclude that the authorities need to clarify how prohibition and closure powers under health and safety and public health laws should be used by EHOs and **we recommend** that clear advice be given to inspectors about them.

9.4 Working Together

9.4.1 Division of Enforcement Responsibility

We noted that the vast majority of agricultural holdings are the HSE's to regulate, but that Open Farms, whose main purpose is entertainment, are judged to be for LAs to inspect. We also noted that fairgrounds have remained the responsibility of the HSE in spite of their being for public entertainment. We considered whether, as most LAs have only a handful of Open Farms to inspect and their EHOs may require additional competence to do this effectively, it would be sensible for these to be transferred to the HSE lock, stock and barrel. The Regulations permit transfer of individual premises by agreement, but we were advised that a change in the law seems necessary for wholesale transfer. However, operators told us that they preferred to have contact with their local EHOs and clearly there is more benefit to be had from the closer attention they are likely to receive from a well trained and experienced local officer familiar with their business than from the rare visits we were told that working farms can expect from the HSE.

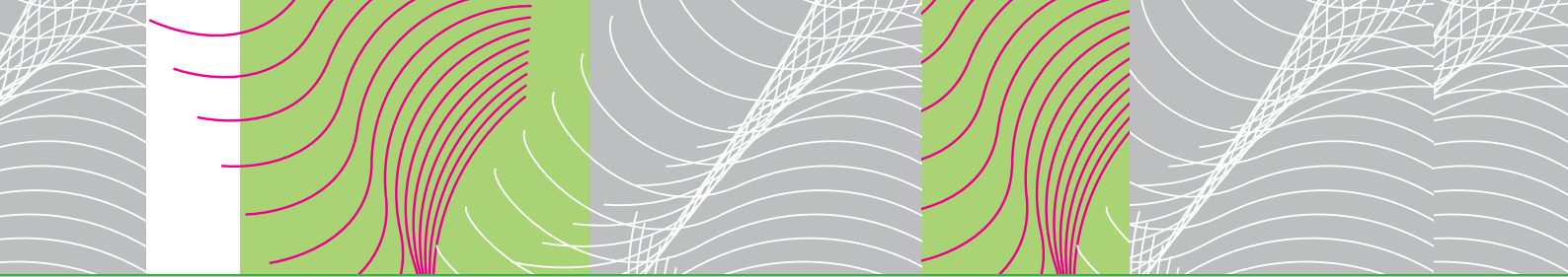
We conclude that provided EHOs acquire the competences required to inspect Open Farms effectively, with ready access to the HSE's expertise when needed (discussed below), there is no advantage to be had from the HSE becoming responsible for Open Farms.

9.4.2 Training and Competence of EHOs

Regulatory inspectors need to be both confident and competent. If LAs are to continue to have responsibility for health and safety at Open Farms **we conclude** that it will be important for EHOs to be confident about doing it well and have opportunities to acquire the necessary expertise.

Evidence in Chapter 8 of inspections at Godstone Farm and examination of the reports of OCTs' investigations into Open Farm outbreaks show that training for LA inspectors does not yet ensure the expertise necessary for assessment of Open Farms. In our view the failures to identify the shortcomings in the operator's COSHH assessment and to assess adequately the risks to the public were honest errors, accounted for by the lack of expert knowledge available at Tandridge EHD, amongst other factors identified earlier in this report. We note that in other areas LAs regularly make use of external experts to fulfil regulatory inspections. These include, for example, Zoo Inspectors (who are required to have a minimum of five years' experience) and Riding Establishment Inspectors (required to be either veterinary surgeons or qualified practitioners, with a minimum of five years' postgraduate experience).

We noted that the HSE is, commendably, sharing with LAs, with the support of the professional institutions, the Chartered Institute of Environmental Health (CIEH) and the Institution of Occupational Safety and Health (IOSH), a Regulators' Development Needs Analysis (RDNA) tool. We are aware of good training that organisations such as the CIEH already offer to EHOs in a variety of regulatory topics. We understand that the CIEH would be willing to consider developing training for regulatory



inspections of Open Farms and **we recommend** that the authorities pursue this with the CIEH or other training organisations that have the capacity to offer such training.

9.4.3 Availability of Expert Advice

In addition to the importance of individual expertise we were struck by the need for access to specialist advice for smaller LAs, such as Tandridge DC, who told us that they employed an external specialist Zoo Inspector to assist them with the inspection of the zoos, but no expert for their single Open Farm.

The Investigation found that LAs generally hold the expertise of the HSE's operational inspectors and specialists in high regard and their expert knowledge of agricultural health and safety and biological agents is not in doubt. The HSE has a number of sector groups, including one for agriculture and food based at the regional office in Nottingham (see **Appendix 3**). **We conclude** that this valuable regulatory asset should be regarded by all LAs responsible for Open Farms as a centre of expertise to be approached for advice on agricultural health and safety and for access to specialist advice on microbiological hazards likely to be present. **We recommend** that the HSE and LACORS publicise its availability.

We are aware that for some time LAs, supported by LACORS, have chosen one of their number to act as 'Home authority' for businesses such as national supermarket chains that have multiple premises in most LAs' territories and that there is a 'Home authority' database for LAs to deal with these. While this initiative is not in itself relevant to the several hundred separate small firms in the Open Farm sector it demonstrates LAs' ability to organise themselves when a regulatory problem in dealing with businesses arises. **We conclude** that in addition to the option of using the HSE's agriculture and food sectoral expertise it should be feasible for EHOs who are confident and have experience of dealing with Open Farms to be considered as 'lead experts' available to other less experienced or smaller LAs.

We recommend that LACORS establishes lead expertise in the area of Open Farm inspections.

9.4.4 Partnership between the HSE and LAs

We noted that PA Consulting Group was appointed to undertake an evaluation of the HSE and LA Partnership during 2008. It was commissioned by the HSE's Local Authority Unit and conducted jointly with representatives from LACORS, with the aim of enabling them to take a view of the way the partnership was working and how it could contribute to a new strategy for health and safety at work. The report (2) commented on work in progress including, among other things, an intention to conduct more joint inspections.

We agree that there is considerable regulatory value to be had from joint inspections by EHOs and HSE inspectors. Benchmarking and peer review can also be useful ways for a regulatory authority to check whether it is keeping up to the mark. We noted that a joint inspection after the Godstone outbreak was followed by service of Improvement Notices requiring remedial action that would have been better taken earlier. While availability of resources will always be a constraint on the amount of joint visiting that can be done, the Investigation concludes that if LAs are to remain responsible for inspecting Open Farms the HSE needs to consider whether it could offer more support of this kind.

We conclude that the Partnership agreement between the HSE and LAs provides a strong foundation for future collaborative regulatory actions to deal with the risk from *E. coli* O157, such as providing access to HSE expert advice (recommended above), awareness-raising programmes and joint

inspections. **We recommend** that the HSE and LACORS continue their collaboration with these objectives in mind.

9.4.5 Agencies Working Together

The complexity of the existing regulatory regime that surrounds Open Farms appears to have made it particularly vulnerable to failures of communication between regulatory agencies. While there appears, generally, to be good inter-agency co-operation during outbreak control incidents, actions for the prevention of outbreaks show a different picture.

We are aware that on an operational level, regular inspections of Godstone Farm were carried out by the Tandridge EHD, by Trading Standards and by AH. We are not aware, however, that there was any process of communicating reports between these departments/agencies that would have assisted in assuring a 'complete picture' of the operation of Godstone Farm. **We conclude** that a strategy of 'joined-up regulation' between the relevant agencies would provide more effective oversight of the operators' control of safety and provide opportunities for reducing the inspection burden on operators.

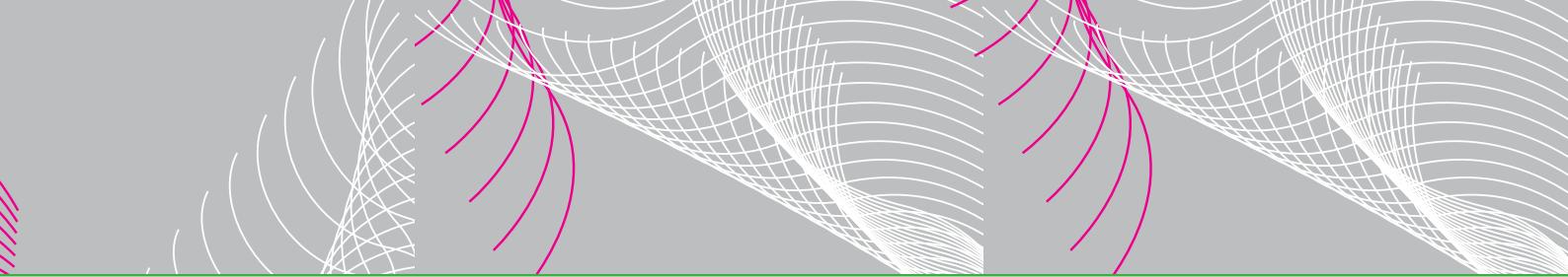
We understand that the HPA established an enhanced surveillance programme for *E. coli* O157 in 2009 and holds a comprehensive collation of material from previous outbreak reports. Furthermore, substantial work is being carried out by the Human Animal Infections and Risk Surveillance Group (HAIRS). Established in 2004, members of this group are from across the Devolved Countries and include the HPA, Defra, Veterinary Laboratories Agency (VLA) and Department of Health (DH), who meet monthly to consider the risk of zoonotic infections. However we are unaware of any system in place whereby the regulators (either the HSE or LAs) could readily access this information, which would clearly be essential to the development of an appropriate regulatory strategy.

Furthermore, although internal HPA documents identify core funded HPA service activities as including: 'The timely investigation of incidents, outbreaks and trends and clusters of disease'; and 'The provision of evidence-based specialist health protection advice for action across the full range of health protection hazards', we are unaware of any service document in place that would support the timely communication of infection occurrences to the regulatory bodies. We are informed that the HPA has taken steps to embed this requirement in its standard operating procedures.

Perhaps the most surprising example of lack of communication, however, is the dearth of inter-authority co-ordination which would enable information gained by LA inspectors during their inspections of premises to be shared more widely. There appears to be no process whereby information is collated and used to inform a co-ordinated regulatory strategy. The information gathered by inspectors appears to be greatly underutilised at present and could be used to add value to the inspection process if appropriate systems were in place.

This failure to communicate information or co-ordinate a unified regulatory strategy highlights difficulties that have arisen as the result of not having a single regulatory body. Dividing responsibility for Open Farms between the HSE and the LAs has resulted in the process and strategy for regulating Open Farms becoming disjointed. The HSE leads nationally in developing policy and strategies but inspects farms for which it is responsible quite infrequently, whereas the effectiveness of the more frequent inspections undertaken by EHOs is weakened by lack of specialist knowledge or experience of risks at these premises. The problem is exacerbated by failure to co-ordinate inter-agency activities aimed at prevention of outbreaks to the same level as inter-agency activity that follows an outbreak.

We conclude that a failure to co-ordinate information-sharing between regulatory bodies is



weakening the regulatory system in place, and that strengthening commitment to developing and sharing knowledge of best practices with other agencies would enhance the regulatory system.

We have commented earlier on the desirability of more joint inspections of farms by staff of the HSE and LAs. We have also been impressed by the public service function performed by Defra's VLA in giving support and advice to OCTs dealing with outbreaks of *E. coli* O157 from agricultural contacts. However, we were disappointed to find little evidence of information-sharing or joint working prior to an outbreak occurring. LAs are involved in animal health and welfare inspections on behalf of AH, and visits to farms for that purpose are carried out by TSOs. Again, we found little evidence of information-sharing between TSOs and their EHO colleagues.

Farms are subject to inspection by numerous agencies for various purposes and more 'joined-up' regulation would have benefits for operators as well as regulatory inspectors, and would go some way to relieving the burden that regulation is often perceived to place on small firms. This should reassure the visiting public that Government has 'got its act together'.

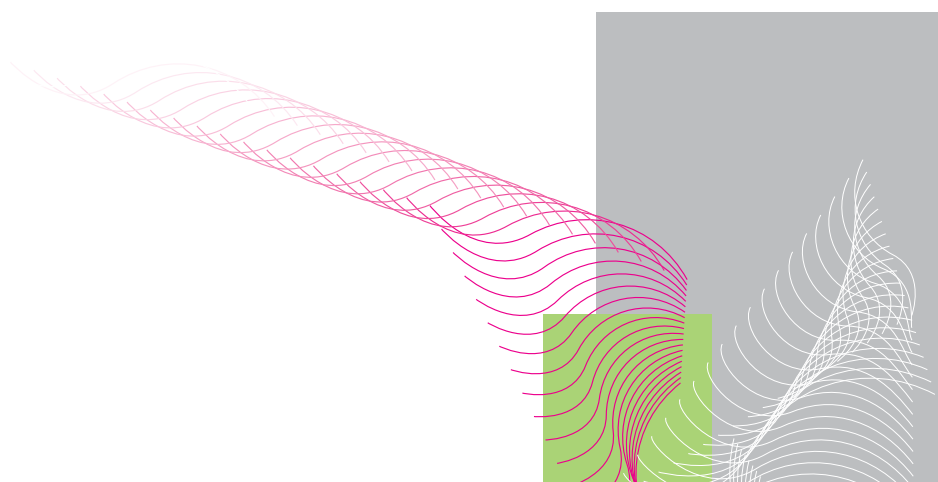
We recommend that the agencies should explore ways of working together in regulating Open Farms, clarifying mutual understanding of roles, responsibilities and relationships and, where necessary, cementing these with agreements such as the Partnership agreement referred to above or through memoranda of understanding.

9.5 References

1. Safety and Health at Work, Report of the Robens Committee, Cmnd 5034, 1972
2. HSE Research Report RR 680

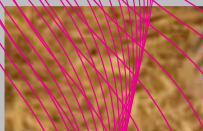
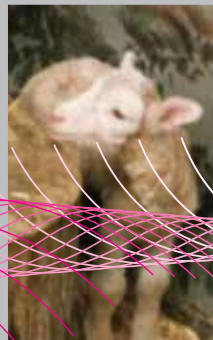
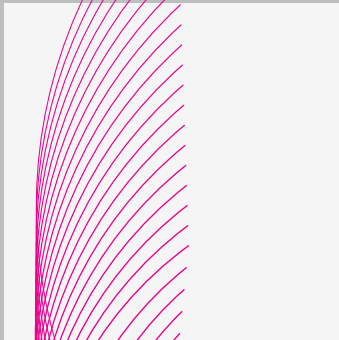
Independent Investigation documents available at www.griffininvestigation.org.uk

- i Feedback from visits undertaken by HM Principal Inspector, HSE to Godstone Farm, Godstone and Horton Park Children's Farm, Epsom on 21 September 2009
- ii Addendum to the notes of the Investigation Committee meeting held on 5 November 2009



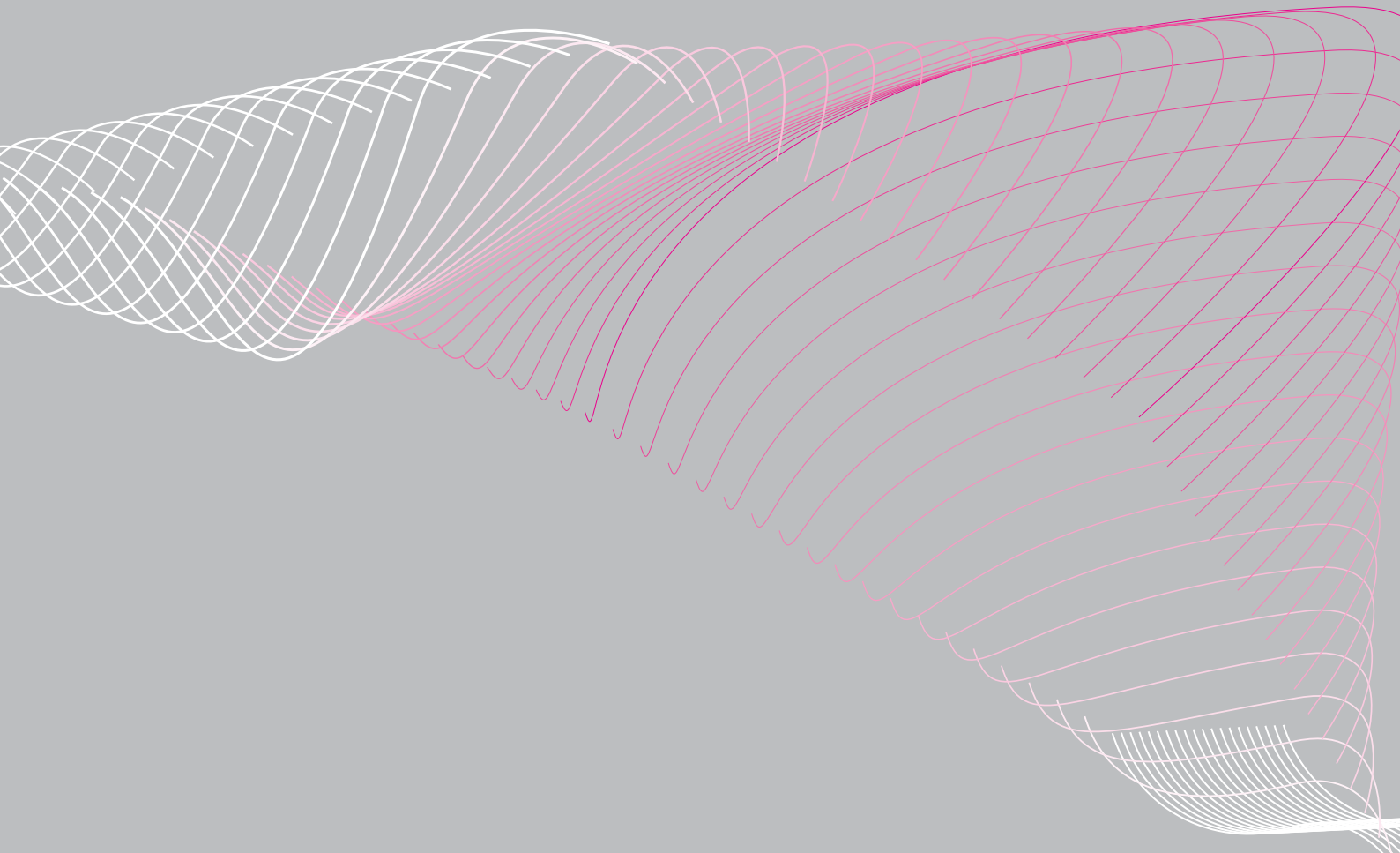
PART E CONCLUSIONS AND RECOMMENDATIONS

Chapter 10: Conclusions and Recommendations



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Chapter 10: Conclusions and Recommendations

- 10.1 The Outbreak in Perspective
 - 10.2 Identification and Control of Outbreaks
 - 10.3 Risk Perception, Risk Assessment and Risk Management
 - 10.4 Regulation, Inspection and Standards
 - 10.5 Awareness, Education and Training
 - 10.6 Further Research
 - 10.7 The Broader Context
 - 10.8 References
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Introduction

In this chapter we draw together the conclusions and recommendations of the Investigation. Our recommendations are summarised in Table 10.1. The judgements, conclusions and recommendations we have made that follow are based on evidence we have received. This evidence is presented in the earlier chapters of the Report, in the appendices and in background information which is accessible from the Griffin Investigation website.

We recommend that a multi-agency implementation committee be set up, co-ordinated by the Health Protection Agency (HPA), to ensure that the recommendations as specified in Table 10.1 are implemented.

10.1 The Outbreak in Perspective

In Chapter 7, **we conclude** that the Surrey 2009 *E. coli* O157 outbreak associated with animal contact at Godstone Farm was not exceptional, other than in terms of its size. This outbreak illustrates two important lessons, which we consider to be generally applicable with respect to Open Farms, rather than specific to this location and circumstances.

First, even with the earliest possible identification and control of the outbreak, around half of the cases of symptomatic infection in this outbreak would have already occurred even before any restriction or closure. This would still have been the largest recorded *E. coli* O157 outbreak ever to have occurred from animal contact in the UK. **We conclude** that this emphasises the importance, not only of prompt identification and control of outbreaks, but also of measures to reduce the risk of acquiring *E. coli* O157 infection on a day-to-day and season-to-season basis.

Second, the time course of the Godstone Farm outbreak clearly demonstrates that handwashing alone cannot be relied upon to prevent outbreaks of *E. coli* O157 infection acquired by contact with animals or their faeces. **We conclude** that there is a need to introduce measures to reduce the chance of contact with faecal matter as a primary measure. In addition, **we conclude** that there needs to be greater awareness of the risks of animal contact among farm owners, regulatory authorities and visitors to Open Farms.

While we have identified specific avoidable deficiencies in the management and control of the Surrey 2009 outbreak locally, we have also discovered the complexity of the regulatory regime relating to Open Farms. **We conclude** that a strategy of robust 'joined-up regulation' would provide more effective oversight of safety and provide opportunities for reducing the inspection burden.

10.2 Identification and Control of Outbreaks

At the time of the Godstone Farm outbreak, *E. coli* O157 infection was not a statutorily notifiable disease. However, since the introduction of the Health Protection (Notifications) Regulations on 6 April 2010, infectious bloody diarrhoea and haemolytic uraemic syndrome (HUS) are both notifiable diseases.

This change is welcome but will result in improved case-ascertainment and early identification of outbreaks only if the following **recommendations** are followed:

- General practitioners and all front line health professionals should suspect *E. coli* O157 infection in any child with bloody diarrhoea
- Clinical laboratories should report all presumptive cases of *E. coli* O157 infection promptly to the local Health Protection Unit (HPU)
- HPUs should ensure that the HPA's standard questionnaire is used to interview all cases of *E. coli* O157 infection and that this is sent promptly to the HPA Centre for Infections (CfI).

In Chapter 7, we note that in the very early stages of the Godstone Farm *E. coli* O157 incident, there was uncertainty and confusion about the size of the outbreak. **We conclude** that this uncertainty could and should have been avoided, both by proper functionality of HPZone (Chapter 2) and by robust handover arrangements, and that, had these deficiencies not occurred, the outbreak associated with Godstone Farm could have been identified earlier.

We recommend that HPU staff are required to log every case of *E. coli* O157 on HPZone as a matter of urgency and routine, and that the technical functionality of HPZone is reviewed. **We also recommend** that all HPUs and Environmental Health Departments (EHDs) should have robust handover arrangements in place, during working hours and out of hours, to ensure that details of recently reported *E. coli* O157 cases are communicated to the relevant staff.

In Chapter 7, **we conclude** that the convening of the outbreak control team (OCT) was exceptionally late in the course of the Godstone Farm outbreak. This delay is unacceptable, even taking into account the deficiencies in the flow of information that delayed initial recognition of the outbreak. **We further conclude** that, had the OCT been convened earlier, there would have been a more timely assessment of the public health risks and, almost certainly, more effective control of the outbreak.

We conclude that the failure to convene the OCT on 1 September, when both the HPU and EHD were aware of a cluster of four linked cases, represents a failure of public health leadership, and that the main responsibility for this failure lies with the HPU. **We also conclude** that the decision by the OCT that there was no ongoing risk was premature. The decision not to reconvene until 18 September shows a failure to appreciate the seriousness of the situation.

We recommend that an OCT should be convened by the consultant in communicable disease control (CCDC) as soon as two or more presumptive cases of *E. coli* O157 infection from different households but with a potential common link are identified. **We recommend** that the first OCT meeting should specifically assess the ongoing risk to the public based on:

- The possibility that there may be a preventable ongoing source of infection that may affect others
- The size and vulnerability of the population at risk
- The risk of secondary spread to household contacts
- The risk of secondary spread to other contacts, particularly children in pre-school childcare settings and in primary schools
- The availability of effective control measures.

We recommend that the first OCT meeting should review and decide what control measures are available, which activities should be ceased or closed, and who will be responsible for ensuring decisions are implemented.

We conclude that GPs and hospital clinicians serving the catchment area of Godstone Farm, including paediatric renal unit staff, should have been alerted much earlier to the occurrence of the

outbreak. **We recommend** that the first OCT meeting should discuss and agree an appropriate communication strategy for professional colleagues, the public and the media.

We recommend that the OCT should ensure that hypotheses with a clear focus on identifying the source and mechanism of spread of the infection are tested, wherever possible, by means of an analytical epidemiological investigation, and that this is carried out as a matter of urgency.

We conclude that there were unacceptable delays, both in carrying out this systematic epidemiological investigation of the Godstone Farm outbreak, and in initiating strict control measures at Godstone Farm. **We conclude** that, if action had been taken sooner to stop all contact with ruminants, a substantial number of *E. coli* O157 cases could have been prevented.

We recommend that animal contact, especially with ruminants, should be prioritised as the activity to be closed at the earliest suspicion of a farm-related *E. coli* O157 outbreak.

We note that circular HSG(93)56 appears not to have been revised since 1993 and we understand that the Faculty of Public Health and the HPA have recently written to the Department of Health (DH) to seek clarification. **We conclude** that it would assist future joint working if it were brought up to date. **We recommend** that HSG(93)56 should be revised to bring it up to date and jointly circulated to all local authorities (LAs).

We have been advised by the Chartered Institute of Environmental Health (CIEH) that structures within LA EHDs are changing rapidly and the post of Chief Environmental Health Officer (CEHO) often no longer exists. **We recommend** that to ensure swift and appropriately resourced response to an outbreak every LA should ensure that a senior post has been identified with responsibility for managing the LA's participation in outbreak control.

10.3 Risk Perception, Risk Assessment and Risk Management

As discussed in more detail in Chapter 8, the Health and Safety Executive (HSE) and Local Authorities Co-ordinators of Regulatory Services (LACORS) consider the risk of *E. coli* O157 infection among visitors to Open Farms to be 'low', and as such, insufficiently large to warrant additional action. **We conclude** that this perception of 'low' risk is potentially misleading and **we recommend** that it should be reassessed for several reasons:

- Although previous outbreaks associated with animal contact have generally been small, many sporadic cases of *E. coli* infection may be related to animal contact. The size of the problem may thus be underestimated
- While fatalities due to *E. coli* O157 infection contracted through animal contact have, thankfully, been few, the potential for very small numbers of organisms to cause serious illness and life-limiting conditions such as kidney failure, particularly in young children, should be taken into account in addition to the risk of death
- The Godstone Farm outbreak illustrates the potential for a single source to generate large numbers of cases over a short time period. During the two-week period when infected children visited the farm, the attack rate per child visit was about one in 100, a level that would clearly be considered as totally unacceptable, as detailed and discussed in Chapters 7 and 8

- The life-threatening complications (HUS) arising from the Godstone Farm outbreak were sufficiently common to saturate specialist clinical renal services for the whole of London and South East England
- Another outbreak on this scale would have serious consequences both for the economic viability of the Open Farm industry and for the credibility of the regulatory authorities.

We conclude that whereas the HSE believed that the existing regulatory strategy was the right one, it should have sought confirmation of whether the strategy was effective in controlling the numbers of *E. coli* O157 infections on Open Farms. Furthermore, there is currently no system of reporting in place from the LA to the HSE which would have assisted the HSE in this regard. While we recognise the considerable pressures on the HSE and the need to prioritise regulatory action, **we conclude** that the level of risk was not acceptable and that good practices in the Open Farm industry should have been more actively pursued by the regulators.

It is currently very difficult for families to make their own informed decisions about the risks posed by visiting an Open Farm. **We conclude** that public education on the risks of infection from *E. coli* O157 and the measures parents can take to protect their families is vitally important for their informed choice, and **we recommend** that public education on the risks of infections acquired by animal contact needs to be reinforced, both before and during the farm visit.

We conclude that the time course of the Godstone Farm outbreak clearly demonstrates that in the circumstances handwashing alone is insufficient to prevent outbreaks of *E. coli* O157 infection acquired by contact with animals or their faeces. Therefore, **we recommend** that parents of children visiting Open Farms are clearly informed, before entering animal contact areas, that:

- It is the parent or carer's choice whether their child is allowed to touch or feed the animals
- Touching or feeding farm animals can be a source of life-threatening infection, particularly in young children
- The only way to eliminate this risk entirely is for children to avoid contact with animals and their faeces
- It is primarily the parent or carer's responsibility to supervise the washing of their children's hands immediately after leaving the animal contact area, before eating or drinking on the farm, and after removing footwear
- Sanitising hand gels are not a substitute for thorough handwashing, but can be used after handwashing.

In addition to making such recommendations, we also wish to emphasise that owners/managers of Open Farms have a duty of care to their visitors who have an expectation to be in a safe environment.

We recommend that:

- Primary control measures should be aimed at preventing faeces and faecal material passing on to the public rather than aimed at the public washing off faeces. Reducing faecal contamination should primarily be the responsibility of the farm operator
- Handwashing, however remains the principal control measure available to the public and must be actively encouraged by the farm operator; a multi layered approach is the safest way of reducing harm. The farm operator, the public and the regulator all have a role to play in controlling the risk of infection

- To support effective handwashing, facilities should be directly located at areas of high risk, such as animal contact. Facilities should provide warm water, soap and paper towels and be at the correct heights for adults and children to use. Visitors should be prompted to wash their hands. Animal contact areas should be supervised, and staff should be trained in how to promote handwashing. Sanitising gels may be used only after thorough handwashing.

The Committee has searched for international standards and identified relevant guidance on the risk of *E. coli* O157 and Open Farms issued by the United States Centers for Disease Control and Prevention, by South Australia, by the Ontario Farm Animal Council and by some countries in northern Europe (see Chapter 4). While the guidance by HSE in AIS23 is to be commended so far as it goes, following consideration of these documents and evidence given elsewhere, **we conclude** that more should be done to reduce the risk as low as is reasonably practical. In particular, **we conclude** that for farm operators to use handwashing as a primary control measure at Open Farms is a misdirected approach and **we recommend** that operators of Open Farms should ensure that the layout and design of public areas on the farm are such that visitor contact with animal faeces is minimised or eliminated, in order to minimise exposure to *E. coli* O157.

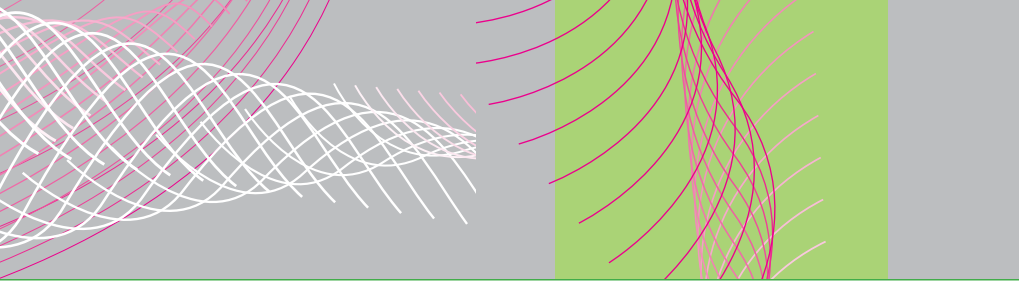
We conclude that the arrangements that we have been shown for ensuring that health and safety standards at Open Farms are being met are insufficiently rigorous to enable families to be confident that safe practices are in place. In Chapter 8, **we recommend** a number of operational changes that should be addressed as a matter of urgency to ensure the risk of infection with *E. coli* O157 at Open Farms is kept to a minimum, and thus to allow the public safely to enjoy and benefit from the experience of farm visits. These could form the basis of a code of good practice.

We conclude that an accreditation scheme, led by the farming industry, but based on a code of good practice agreed with the regulatory authorities, would assist the public in understanding which farm premises were operating to a known standard.

We note with concern that the Godstone Farm outbreak occurred on premises which were probably operating at or above the average health and safety standards for the sector; yet the owners and the regulators had failed to identify potentially remediable hazards despite a regular programme of previous inspections. **We conclude** that:

- The Godstone Farm operator, while somewhat familiar with the nature of the hazard and associated risks, and well meant, relied overmuch on the actions of the public, primarily through handwashing, and regarded the Tandridge EHD's reports as an endorsement of their procedures
- Godstone Farm showed little evidence that they appreciated the importance of their own actions in controlling the risks, and were not proactive in seeking out best practice on limiting the exposure of visitors to infection by *E. coli* O157. This is particularly surprising given the Farm's experience of an earlier *E. coli* O157 outbreak on the Farm in 2000
- The failure to provide suitable training to staff members renders Godstone Farm poorly placed to identify hazards on the Farm and to enact suitable control measures, as required under health and safety law
- The existing regulatory regime is insufficiently robust to ensure that a similar outbreak will not occur at an Open Farm in the near future.

We recommend that the LA processes of risk assessment be reviewed. This review should take place within the context of the inspection process and the regulatory framework. Where the level of public risk is considered high, it is reasonable for the regulator to have a higher expectation that procedures will be documented and that those procedures will be evidence of a robust system.



We heard evidence that inspection visits to Open Farms were often timed for periods of low activity in order to reduce the regulatory burden. **We conclude** that the potential for monitoring and controlling the public risk could be maximised if inspection visits were scheduled for times when the public risk can be predicted to be at its highest level. Protecting the public from harm should take precedence over reducing the regulatory burden for the farm operator.

We conclude that disparities between the findings of Tandridge EHD and HSE inspectors who visited Godstone Farm highlight flaws in the regulatory process. It appears to us that the current HSE policy of reducing the number of inspection visits and building on the use of industry awareness days now provides HSE inspectors with far fewer opportunities to observe current industry practices.

We recommend that HSE should review whether current inspection policy provides the HSE with sufficient knowledge of the Open Farm industry to be able to identify emerging risks; and whether the HSE strategy of using the AIS23 guidance document to provide management of the risks of *E. coli* O157 infection can be validated by information gained from the farming industry, the LA regulatory system, the HPA and the DH.

10.4 Regulation, Inspection and Standards

In Chapter 8, **we conclude** that current arrangements for regulatory oversight of Open Farms are insufficient to provide the public with the level of protection that they could reasonably expect, and that the existing regulatory regime is insufficiently robust in practice to guarantee that a similar outbreak will not occur at an Open Farm again in the near future. In Chapter 9, **we conclude** that if future outbreaks are to be prevented, a more rigorous approach towards securing compliance with standards will be needed by operators and regulators alike.

The issue of how a consistent, effective regulatory approach to Open Farms should be maintained, and how the regulators seek assurance that it is consistent and effective, needs to be addressed. **We recommend** this be done by the HSE and LACORS, taking the industry's views into account.

In Chapter 9, **we conclude** that the lack of a clear definition of Open Farms, and the lack of a national registration scheme, are impediments to effective regulation of this evolving sector, and could compromise the credibility of the regulatory system if further outbreaks of *E. coli* O157 or other infections were to occur and be traced to animal contact on Open Farms.

We conclude that to facilitate effective inspection and awareness raising programmes, the authorities need to develop a practical definition of Open Farms that takes risks as well as activities into account. The definition we have used for the scope of our investigation may be a useful starting point. **We recommend** that this issue be pursued in consultation with leading agricultural industry representatives.

Licensing may ultimately be the right way ahead for the UK's Open Farm industry but we are not recommending it at this time. **We conclude** that a less burdensome measure – registration – will meet the regulatory need for information about these businesses, and that an approved code of practice (ACoP) will bring clarity, certainty and enforceability of standards from which improvements should follow. **We recommend** that in addition to working out a definition the several bodies with regulatory or representative interests in Open Farms should collaborate to establish a register, sharing any data that is available to them separately.

We conclude that it would be well worth fostering the development of a scheme that would allow the management of risks to health and safety at Open Farms to be independently audited and assured, on an annual basis. Therefore, **we recommend** that the industry pursue this, as their own idea, and that the authorities help and encourage leading representatives of the Open Farm sector in fostering the development of a robust accreditation scheme for inspection of standards at Open Farms.

The regulatory option that has been applied so far to Open Farms relies on non-statutory guidance (primarily the HSE document AIS23) and compliance of farm operators with general duties and regulations such as the Control of Substances Hazardous to Health Regulations (COSHH). While the guidance in AIS23 is to be commended as far as it goes, **we conclude** that more needs to be done to reduce the risk of infection on Open Farms as low as is reasonably practicable.

We conclude that the content of *all* existing guidance touching on human health and safety at Open Farms (and other settings where the public come into contact with farm animals) needs to be reviewed, improved and clarified where necessary. This is primarily the business of the regulatory authorities and **we recommend** that the HSE and LACORS pursue this, developing appropriate control measures in close consultation with the HPA, the Department for Environment, Food and Rural Affairs (Defra) and leading, knowledgeable representatives of the industry.

However, we do not regard a review of guidance alone as a sufficient response to the lessons of the 2009 outbreaks. It should be the starting point for a more fundamental strengthening of the regulatory regime, but we do not see a need for yet more regulations.

We conclude that if a code of practice dealing comprehensively with the *E. coli* O157 risk were to be developed for approval by the HSE, there would be clear benefits of clarity and certainty about standards for Open Farm operators, enforcing authorities and members of the public and that this would be in line with principles of Better Regulation.

We recommend that the HSE should take the lead in developing a code of practice for subsequent approval, involving the HPA and other relevant authorities, in close consultation with leading representatives of the industry.

We conclude that a more rigorous approach to securing compliance needs to be taken by both operators and inspectors, within such a strengthened regulatory framework. A strategy of 'joined-up regulation' between the relevant agencies would provide more effective oversight of the operators' control of safety and provide opportunities for reducing the inspection burden on operators.

We conclude that strengthening a management commitment to developing and sharing knowledge of best practices with other agencies would enhance the regulatory system. The partnership agreement between the HSE and LAs (LACORS) provides a strong foundation for future collaborative regulation of risks from *E. coli* O157 on farms, and **we recommend** that HSE and LACORS continue their collaboration with these objectives in mind.

We conclude that, provided EHOs acquire the competences required to inspect Open Farms effectively, with ready access to the HSE's expertise when needed (discussed in section 10.5.2 below), there is no advantage to be had from the HSE becoming responsible for Open Farms.

In general, **we recommend** that all the agencies involved should explore ways of working together in regulating Open Farms, clarifying mutual understanding of roles and relationships and, where necessary cementing these with agreements, such as the partnership agreement referred to above, or through memoranda of understanding.



10.5 Awareness, Education and Training

10.5.1 Public Awareness

The majority of the parents who gave evidence stated they were largely unaware of the risks of *E. coli* O157 infections through animal contact or farm visits. They were attending for a fun day out and their perception was that the risk that they and members of their family would be exposed to was minimal. It was also evident to the Investigation that exposure to livestock faeces is common among the causes of human *E. coli* O157 infection, and some of the sporadic infections whose source cannot be identified are probably due to livestock exposure.

We conclude that there is generally a low level of understanding of the risk of *E. coli* O157 infection from contact with farm animals or the farm environment. This view is supported by work carried out by the University of Aberdeen through interviews with countryside visitors in different parts of the UK. **We also conclude** that more needs to be done to raise public awareness of the risks of *E. coli* O157 from animal contact and that this would substantially reduce the risks across the wide variety of circumstances where the public may be exposed to *E. coli* O157.

It is our view that there is no simple means to raise public awareness but we considered that the evidence of the charity Haemolytic Uraemic Syndrome Help (HUSH) and research by University of Aberdeen which found that awareness is somewhat higher in Scotland both indicate that it is a feasible objective. All stakeholders, be they farmers, countryside residents, countryside visitors, regulators or the media need to acknowledge their part in this process.

We conclude that the media have a key role to play in ensuring the following messages are simply communicated:

- *E. coli* O157 is frequently carried in the gut of animals, especially cattle, sheep and goats and other ruminants, and will be excreted in faeces
- *E. coli* O157 has been detected in samples of saliva from ruminants
- Infection by *E. coli* O157 may arise from contaminated food, water, from direct contact with animals or their environments
- Children and the elderly are especially vulnerable and deaths have occurred from infection by *E. coli* O157
- Infection from *E. coli* O157 may be reduced when visiting the countryside or agricultural environments by avoiding any contact with animal faeces, and by ensuring that good hygiene practices are in place and are scrupulously followed.

We recommend that Open Farm operators do more to raise public awareness of the risks when arriving at a farm attraction and use a variety of means to communicate this information. The responsibility of the accompanying adult should be spelled out, emphasising the parent/carer's decision to allow children to have animal contact.

By chance the Investigation discovered that in June 2003, in connection with its 'Farm Safe' programme, the HSE had posted on its website a four-minute video called Open Farms Healthy Children, which specifically addressed *E. coli* O157. This may still be found on the website (www.hse.gov.uk) but no witnesses drew it to our attention and none of the operators we met had ever seen it. We also found that the HSE's publication *Farmwise - your essential guide to health and safety in Agriculture* (a free

68-page advisory leaflet reference INDG 427 revised 5/09 and available online) contains a reference to a package of HSE agricultural DVDs called Kidsafe (reference ISBN 978 0 7176 6221 0).

We conclude that if funding is available to promote health and safety at farms there is a place for an up-to-date video or DVD, perhaps produced by an educational body such as Farming and Countryside Education (FACE), that could be shown to visitors as part of an induction to what they will see at a farm attraction and communicate risks and precautions in an acceptable, non-frightening way. **We recommend** that the authorities concerned should give this serious consideration together with the industry.

10.5.2 Professional Education and Training

A common theme that emerged from interviews with parents was the lack of urgency with which GPs regarded symptoms of bloody diarrhoea and stomach cramps (Chapter 6). Acute bloody diarrhoea is a rare event in previously healthy children, but should be considered as a medical emergency.

We conclude that there needs to be greater awareness among GPs of the importance of symptoms of bloody diarrhoea and stomach cramps in young children and of the need to refer patients to hospital as soon as possible when the risk of *E. coli* O157 infection is high or its consequences are likely to be severe.

We recommend that the HPA considers ways to increase awareness among GPs of the importance and seriousness of acute bloody diarrhoea in previously healthy children. We recommend that GPs refer children with acute, painful, bloody diarrhoea urgently to hospital both to ensure appropriate clinical management and to reduce the risk of spread within the household.

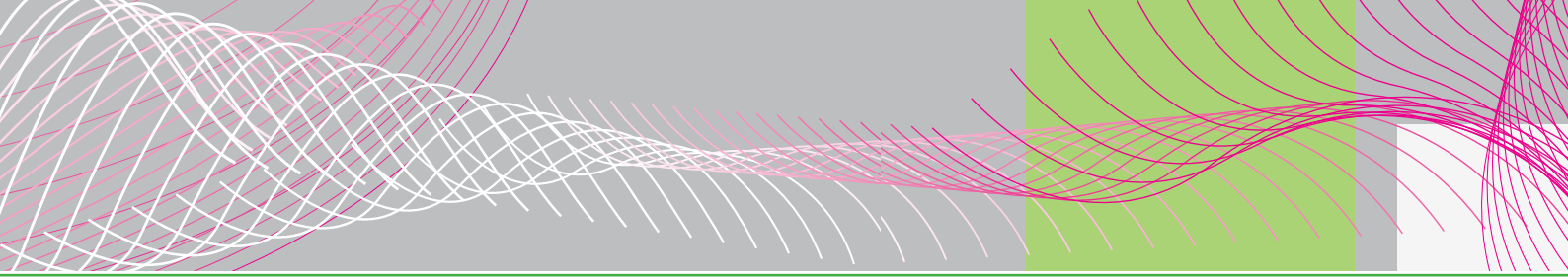
Given the complexity of roles, responsibilities and regulations relating to inspection and potential closure of Open Farms, **we conclude** that greater clarity is needed on how prohibition and closure powers should be used by environmental health officers (EHOs) under existing public health and health and safety laws. **We recommend** that the regulatory authorities communicate the practical options clearly to inspectors.

We conclude that adequate inspection of Open Farms by LAs, under current legislation, is dependent upon EHOs acquiring the competencies required for this specialist activity, and **we recommend** that the regulatory authorities develop training in these competences for EHOs. **We also recommend** that staff training in conducting risk assessments should be reviewed, and that the benefits of 'on the job' training with inspectors who hold agricultural expertise should be considered. **We recommend** that the authorities pursue this with the CIEH or other training organisations that have the capacity to offer such training.

Additionally, **we recommend** that HSE and LACORS publicise the availability of expert advice on agricultural health and safety and the microbiological hazards likely to be present on farms, and that sharing of expertise across LAs should be encouraged, through the identification of 'lead inspectors' with specialist knowledge of Open Farms.

10.5.3 Education of Farm Operators and their Staff

HSE Safety and Health Awareness Days (SHADs) are practical demonstrations on the everyday hazards that farmers face. These are a very positive aspect of the work of the HSE and there would be benefit in expanding their focus to encompass Open Farm operators.



HSE currently has an interactive Risk Assessment Tool, free to users, which can help guide farmers through the areas to be considered in carrying out a risk assessment. This type of tool would be very useful if it could be expanded to give more detail to farmers operating leisure attractions and Open Farms.

Training of farm owners and staff for ALL types of farms and ALL types of visits through the FACE-run accreditation scheme, the Countryside Educational Visits Accreditation Scheme (CEVAS), should be considered.

The HSE has suggested to the Investigation that relevant guidance is contained in the Advisory Committee on Dangerous Pathogens (ACDP) document *Infection at work: Controlling the Risks – a guide for employers and the self employed on identifying, assessing and controlling the risks of infection in the workplace*. This document provides good general advice to form the basis for specific risk assessment.

We recommend that a single integrated framework is assembled for use by Open Farm operators and that training is made available to support risk assessment.

10.6 Further Research

We recommend the development of research in the following areas:

10.6.1 Microbiological Investigations

In Chapter 5 it is apparent from microbiological testing that the strain of *E. coli* O157 associated with the outbreak had genes for verocytotoxin (VT) 2, was of phage type (PT) 21/28 and was present in a high proportion of animals. More detailed analysis by variable number tandem repeat (VNTR) and pulsed field gel electrophoresis (PFGE) confirmed an outbreak strain. We heard no evidence that this strain of *E. coli* O157 was particularly unusual but we know of research that has suggested a subpopulation of *E. coli* O157 (referred to as clade 8) may be associated with more severe human disease (1).

While we consider that it is a long term goal to understand the virulence mechanisms of *E. coli* O157 it is important that the isolates of *E. coli* O157 recovered from Godstone Farm are examined to show whether they too belong to clade 8. We also know that the complete genome sequence of *E. coli* O157:H7 has been available since 2001 (2). It is important that the UK reference laboratories share their epidemiological information and collections of *E. coli* O157 isolates to facilitate the sequencing of representative isolates and, through the availability of complete genome sequences, to facilitate collaborative research into the questions of what is the molecular basis for the organism's virulence and its ability to spread among animal populations. The answers may ultimately be relevant to the development of diagnostics, therapeutics or vaccines.

We recommend that HPA examines representative *E. coli* O157 isolates from Godstone Farm to determine their molecular characteristics.

We recommend that the UK research funding bodies consider funding collaborative applications from the reference laboratories, research microbiologists and epidemiologists to examine *E. coli* O157 isolates and the molecular basis for their virulence which underpins their ability to spread among animal populations.

10.6.2 Clinical Investigations

Rapid identification and control of outbreaks of *E. coli* O157 infection are crucial in limiting the impact of community-acquired outbreaks upon affected individuals and their families, and on primary, secondary and tertiary health services.

We recommend that research into rapid methods of microbiological diagnosis and rapid detection of acute kidney failure and coagulopathy, is encouraged. Clinical research into predicting which children with *E. coli* O157 infection will develop HUS and into the use of monoclonal antibody directed against verocytotoxins should be given high priority.

10.6.3 Epidemiological Investigations

The large size of the Surrey 2009 outbreak offers an unusual opportunity to investigate the epidemiology of *E. coli* O157 infection and, particularly, its relationship to animal contact. A point of particular interest, from both biomedical and policy perspectives, is whether previous animal exposure might protect against symptomatic infection in the context of an established outbreak. This could be evaluated by detailed analysis of the case-control data from the Godstone Farm outbreak. Additionally, the large numbers of affected cases illustrate the full spectrum of disease and its complications, and may be informative for a health economic assessment.

We recommend that a detailed analysis of the epidemiological and microbiological data from Godstone Farm outbreak is completed and published in the scientific literature.

We recommend that a full health economic assessment of the Surrey 2009 outbreak should be carried out and considered in relation to the costs of prevention borne by farm industry, their insurers and regulatory authorities and the benefits to these groups and the general public.

Outbreak reports are a valuable learning opportunity and often identify new hazards or make useful recommendations. **We recommend** that the HPA devises a system for ensuring that OCT reports relating to outbreaks of *E. coli* O157 are properly collated and widely disseminated.

10.6.4 Veterinary Investigations

A five-point plan has been developed from Defra-commissioned research to reduce the carriage of *E. coli* O157 (3). This plan identifies the provision of dry and clean bedding, and maintaining animals in stable rearing groups as the two most important measures. We were also impressed by the use of vaccines to reduce both the numbers of positive animals and the levels of *E. coli* O157 being shed. The vaccine approach for control is one that has been pursued in cattle in North American feedlots.

We consider that while vaccine control of *E. coli* O157 is not immediately applicable in the UK, such control may be of considerable relevance to the agricultural industry and the wider issue of *E. coli* O157 control. We are also concerned to establish if the identification of 'super-shedder' animals on Open Farms may be explored with the five-point plan as a means of reducing the likelihood for the spread of *E. coli* O157.

We recommend that Defra studies the feasibility for vaccine control of *E. coli* O157 in the UK, and identifies the obstacles to implementation.

We recommend that Defra commissions studies to identify whether the microbiological testing of cattle, sheep and goats with an enumeration of *E. coli* O157 and the implementation of farm hygiene practices is a practical means for reducing the risk of *E. coli* O157 on Open Farms.



10.7 The Broader Context

In this section, we review how our conclusions and recommendations compare with those of other recent reports on *E. coli* O157 outbreaks in the UK, and consider how the principles of risk management that we have discussed for Open Farms may apply more generally to recreational use of the rural environment.

The OCT report from the outbreak in the South West Region 2009 (Chapter 1) recommends improvements to documentation of affected cases, to inter-agency working, and to national guidance on testing of cases and contacts. The OCT considered that greater clarity was needed on the definition of a petting (open) farm, on standards of good practice, and on criteria for reopening after closure of a farm during an outbreak of infectious disease. These three issues have been addressed in greater detail in our recommendations.

The difficulty in establishing criteria for reopening, in a setting where risk can never be fully eliminated, was also highlighted in the OCT report of the outbreak in Yorkshire and the Humber (Chapter 1). Lack of a national set of criteria led to a need for rapid local assessment which placed strains on the resources of the LA. In line with our recommendations, this OCT saw value in mutual support among EHDs, across LA boundaries, and sought clarity both nationally and at a local level on risk assessment and the enforcement powers available to LAs in the context of Open Farms.

The OCT report relating to the outbreak in the North West Region 2009 (Chapter 1) focused its recommendation on the prevention of faecal contamination in public areas, as a pre-requisite for controlling the risk from *E. coli* O157 on Open Farms. They pointed out that if the public environment is contaminated, there will be a greater reliance on secondary control measures such as handwashing.

We concur strongly with this view, as the Godstone Farm outbreak demonstrates clearly that reliance on handwashing alone is insufficient to prevent transmission of infection when there is close contact between children and ruminant animals.

It is evident to the Investigation that exposure to livestock faeces is common among the causes of human *E. coli* O157 infection. Indeed, we heard that many of the sporadic infections (1,000+ in UK per annum) whose source cannot be identified may be due to livestock exposure. During the course of our work, we have focused our attention on Open Farms as exemplified by Godstone Farm. However, we have described in Chapter 3 the circumstances where the general public is brought into direct contact with animals and these should not be forgotten, particularly in view of the complicated regulatory arrangements that are currently in place for their regulation (Chapter 4). There are also circumstances where farms do not invite the public to have animal contact but where animal contact may be incidental.

The Scottish Task Force on *E. coli* O157 (4), which reported in June 2001, took a broad perspective in an attempt to understand why cases of this infection had been more numerous in Scotland than in other parts of the UK. Among their varied recommendations are several which are relevant to animal exposure and the rural environment.

We concur with the Scottish Task Force Report (4) that the starting point must be to assume that all ruminant animals are maintaining and excreting *E. coli* O157 and that risk assessments and any preventative or remedial actions have to be based on this assumption. The Scottish Task Force Report has a series of recommendations for access and use of rural land. **These recommendations are to be commended.**

We are aware of some concerns expressed in the media that it is feasible for *E. coli* O157 to persist for longer than three weeks on land. However, we agree with the comments made by the Chair of

the Scottish Task Force which were that the recommendations were intended to be practical and proportionate. We are additionally aware that some organisations have adopted the three-week period as their operational standard. Although there is some suggestion of infection having arisen after contact with agricultural land despite adherence to the three-week recommendation, **we conclude** that the three-week period should be reinforced as a benchmark. However, **we recommend** that HPA investigates the circumstances where *E. coli* O157 infection arises after contact with animal pasture to determine whether a period of three weeks is sufficient to control the risk of infection.

In May 2009, the US Centers for Disease Control and Prevention (CDC) published a *Compendium of Measures to Prevent Disease Associated with Animals in Public Settings* (5), which offers a more general perspective on prevention of zoonotic infections. This report considers education to be essential to reducing risks associated with animal contact in public settings. The Scottish Task Force Report (6) also has a series of recommendations and a concluding chapter on public awareness and education.

We concur with both reports that educational messages need to be clear and concise, appropriately targeted in terms of format and reinforced at the point of exposure. **We also commend** the recommendations of the CDC report on design of animal contact areas.

The Report of the Public Enquiry into the September 2005 outbreak of *E. coli* O157 in South Wales, published in 2009 (6), although primarily addressing foodborne transmission, makes two research recommendations, which we endorse. The first is to validate VNTR typing of *E. coli* O157 as a more rapid and less labour-intensive laboratory method than PFGE. The second is to investigate the feasibility of identifying 'super-shedder' cattle, as a potential means of reducing the likelihood of spreading *E. coli* O157 infection to other cattle, and thereby to the food chain.

This second recommendation serves to emphasise that the primary source of this organism, even in foodborne or waterborne outbreaks, is ruminant animals and their faeces. In this report, we have argued that the risk of *E. coli* O157 infection from animal contact is avoidable, and we believe that if no action is taken there will be further outbreaks of this life-threatening disease.

10.8 References

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2. Perna NT, Plunkett III G, Burland V, Mau B, Glasner JD, Rose DJ, Mayhew GF, Evans PS, Gregor J, Kirkpatrick HA, Posfai G, Hackett J, Klink S, Boutin A, Shao Y, Miller L, Grotbeck EJ, Davis NW, Limk A, Dimalantak ET, Potamousis KD, Apodaca J, Anantharaman TS, Lin J, Yen G, Schwartz DC, Welch RA, Blattner FR. Genome sequence of enterohaemorrhagic *Escherichia coli* O157:H7. Nature 2001, 409: 529-34.
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4. Scottish Task Force on *E. coli* O157. Final report, June 2001. Available on: www.food.gov.uk/multimedia/pdfs/ecol/taskfinreport.pdf
5. Centers for Disease Control and Prevention. Compendium of measures to prevent disease associated with animals in public settings, 2009. Morbidity & Mortality Weekly Report 2009;58 (RR-5):1-21.
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Table 10.1: Summary of recommendations

Summary of Top Six Recommendations:

- Farm operators should ensure that the layout and design of public areas are such that visitor contact with animal faecal matter (particularly ruminant) is minimised or eliminated
- There is a need to raise public awareness of the potential infection risks when arriving at a farm attraction, emphasising the parent/carer's decision to allow children to have animal contact
- There should be a reassessment of the risk of *E. coli* O157 infection as 'low'. Its probability may be low but the impact is high and the consequences very severe
- An Approved Code of Practice (ACoP) should be developed for the Open Farm industry, involving relevant authorities and in close consultation with leading representatives of the industry to underpin the industry's initiative in establishing an accreditation scheme
- The regulatory agencies and others should explore ways of working together in regulating Open Farms clarifying roles, responsibilities and relationships
- Research should be pursued to assist clinicians in the rapid diagnosis of *E. coli* O157 and the identification of and treatment for children likely to develop severe complications of the infection. Research should also be undertaken aimed at preventing or limiting carriage of the organism in animals.

No.	Recommendation	Responsible authority(ies)
	Identification and Control of Outbreaks	
1	All healthcare practitioners at initial point of care or referral of a child with bloody diarrhoea should suspect <i>E. coli</i> O157 infection and should refer the patient to specialist care as soon as possible. This is particularly important in the outbreak situation	NHS (clinical services)
2	Clinical laboratories should report all presumptive cases of <i>E. coli</i> O157 infection promptly to the local HPU	NHS (laboratories)
3	HPUs should ensure that the HPA's standard questionnaire is used to interview all cases of <i>E. coli</i> O157 infection and that this is sent promptly to the HPA Centre for Infections	HPA (HPUs)
4	HPU staff should be required to log every case of <i>E. coli</i> O157 on HPZone as a matter of urgency and routine, and the technical functionality of HPZone should be reviewed	HPA (HPUs)
5	All HPUs and EHDs should have robust handover arrangements in place, during working hours and out of hours, to ensure that details of recently reported <i>E. coli</i> O157 cases are communicated to the relevant staff	HPA (HPUs), LAs (EHDs)
6	An OCT should be called by the CCDC as soon as two or more presumptive cases of <i>E. coli</i> O157 infection from different households but with a potential common link are identified	HPA (CsCDC)
7	The first OCT meeting should specifically assess the ongoing risk to the public, consider what control measures are available, decide which activities should be prohibited or improved, and should identify who is responsible for ensuring each of its decisions are implemented	HPA (OCTs)
8	The OCT should ensure that hypotheses with a clear focus on identifying the source and mechanism of spread of the infection are tested, wherever possible, by means of an analytical epidemiological investigation, and that this is carried out as a matter of urgency	HPA (OCTs)

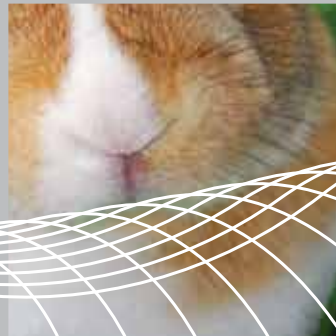
No.	Recommendation	Responsible authority(ies)
9	The first OCT meeting should discuss and agree an appropriate communication strategy for professional colleagues, the public and the media	HPA (OCTs)
10	Animal contact, especially with ruminants, should be prioritised as the activity to be closed at the earliest suspicion of a farm-related <i>E. coli</i> O157 outbreak	HPA (OCTs), LAs (EHDs)
11	HSG(93)56 (<i>Public health: responsibilities of the NHS and the roles of others</i>) should be revised to bring it up to date and jointly circulated to all local authorities	DH
12	Every LA should ensure that a senior post has been identified with responsibility for managing the LA's participation in outbreak control	LAs
Risk Perception, Risk Assessment and Risk Management		
13	There should be a reassessment of the risk of <i>E. coli</i> O157 infection as 'low'. Its probability may be low but the impact is high and the consequences very severe	HSE, HPA
14	Public education on the risks of infections acquired by animal contact needs to be reinforced, both before and during the farm visit	HPA, DH, farm owners
15	Parents of children visiting Open Farms are clearly informed, before entering animal contact areas, that: • Touching or feeding farm animals can be a source of life-threatening infection, particularly in young children • The only way to eliminate this risk entirely is for children to avoid contact with animals and their faeces • It is the parent or carer's choice whether their child is allowed to touch or feed the animals • It is primarily the parent or carer's responsibility to supervise the washing of their children's hands immediately after leaving the animal contact area, before eating or drinking on the farm and after removing footwear • Sanitising hand gels do not provide adequate protection alone. They are not a substitute for thorough handwashing but can be of value if used as an additional measure	Farm owners, HSE/ LAs

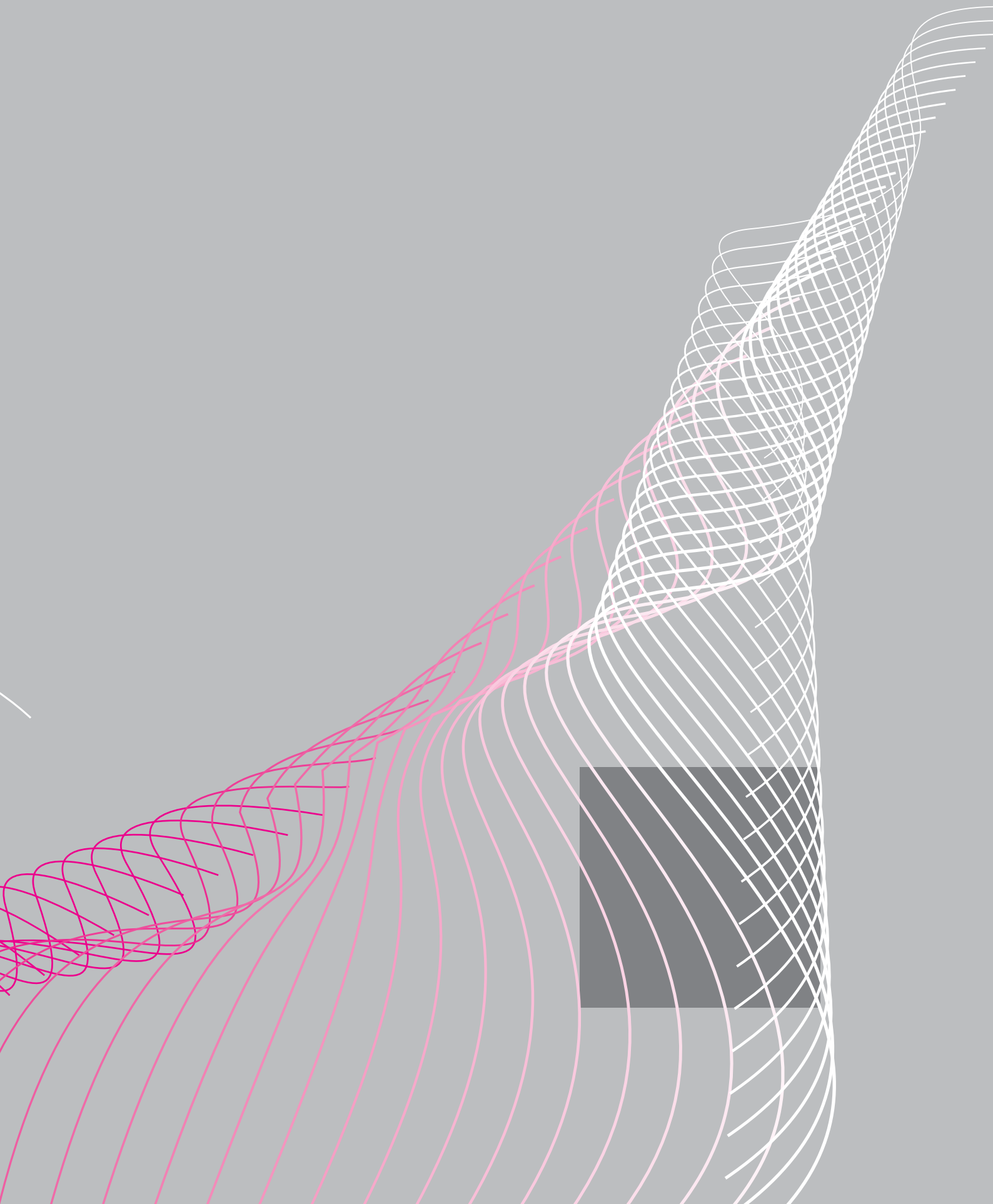
No.	Recommendation	Responsible authority(ies)
16	In discharging their duty of care to visitors, owners/managers of Open Farms should note that: • The farm operator, the public and the regulator all have a role to play in controlling the risk of infection • Primary control measures should be aimed at preventing public contact with faecal matter, rather than at the public washing off the faeces. This should primarily be the responsibility of the farm operator • Handwashing must be actively encouraged as the principal control measure available to the public, in order to further reduce the possibility of contamination • To support effective handwashing, facilities should be directly located at areas of high risk, such as animal contact. Facilities should provide warm water, soap and paper towels and be at the correct heights for adults and children to use • Animal contact areas should be supervised and visitors should be prompted to wash their hands. Staff should be trained in how to promote handwashing, and should advise the public that sanitising gels should only be used only as an additional measure	Farm owners, HSE, LAs
17	Operational changes are to be addressed as a matter of urgency to ensure the risk of infection with <i>E. coli</i> O157 at Open Farms is kept to a minimum. Operators of Open Farms should ensure that the layout and design of public areas on the farm are such that visitor contact with animal faecal matter is minimised or eliminated	Farm owners, HSE, LAs
18	The LA processes of risk assessment should be reviewed and this should take place within the context of the inspection process and the regulatory framework. A single integrated framework should be assembled for use by Open Farm operators and training made available to support risk assessment	HSE, LAs, supported by HPA, farm owners
19	A review should be carried out to establish whether current inspection policy provides the HSE with sufficient knowledge of the Open Farm industry to be able to identify emerging risks; and whether the HSE strategy of using the AIS23 guidance document to provide management of the risks of <i>E. coli</i> O157 infection can be validated by information gained from the farming industry, the LA regulatory system, the HPA and the DH	HSE

No.	Recommendation	Responsible authority(ies)
	Regulation, Inspection and Standards	
20	Consider how a consistent, effective regulatory approach to Open Farms should be maintained, and how the regulators seek assurance that it is consistent and effective, taking the industry's views into account	HSE, LACORS
21	Agree a working definition of an Open Farm in consultation with leading agricultural industry representatives	HSE, HPA, Defra (AH), Industry reps
22	Bodies with regulatory or representative interests in Open Farms should collaborate to establish a register, sharing any data that is available to them separately	HSE, LACORS, Defra (AH), supported by HPA, NFAN, NFU
23	Authorities should help and encourage leading representatives of the Open Farm sector in fostering the development of a robust accreditation scheme for self-regulation of standards at Open Farms	HSE, LACORS, HPA, Industry reps
24	The content of all existing guidance touching on human health and safety at Open Farms needs to be reviewed, improved and clarified where necessary	HSE, LACORS, Defra, HPA, Industry reps
25	HSE should take the lead in developing an Approved Code of Practice (ACoP) for the Open Farm industry	HSE lead with Industry reps
26	Clarify how prohibition and closure powers under both health and safety and public health laws should be used by EHOs and give clear advice to inspectors about the practical options relating to closure of farm premises	HSE, LACORS
27	Review and revise staff training in conducting risk assessments, and consider the benefits of 'on the job' training with inspectors who hold agricultural expertise. Develop training in competences for EHOs involved in inspection of farm premises, in liaison with the CIEH or other training organisations that have the capacity to offer such training	LACORS, LAs, HSE, CIEH
28	Publicise the availability of expert advice on agricultural health and safety and the microbiological hazards likely to be present on farms, and encourage sharing of expertise across LAs through the identification of 'lead inspectors' with specialist knowledge of Open Farms	LACORS
29	HSE and LACORS should continue their collaboration to provide a strong foundation for future regulation of risks from <i>E. coli</i> O157 on Open Farms	HSE, LACORS
30	Explore and clarify ways of working together in regulating Open Farms, and develop mutual understanding of roles, responsibilities and relationships	LACORS lead with LAs, HSE, HPA Defra/AH
	Awareness, Education and Training	
31	Clearly publicise the risk of infection caused by <i>E. coli</i> O157, emphasising that: <i>E. coli</i> O157 is frequently carried by animals, especially cattle, sheep and goats and other ruminants - Infection by <i>E. coli</i> O157 may arise from contaminated food, water, from direct contact with animals or their environments - Children and the elderly are especially vulnerable and that deaths have occurred from infection by <i>E. coli</i> O157 - Infection from <i>E. coli</i> O157 may be reduced when visiting the countryside or agricultural environments by avoiding any contact with animal faecal matter and by ensuring that good hygiene practices are in place and followed	Mass media, HPA, DH, DCFS

No.	Recommendation	Responsible authority(ies)
32	Raise public awareness of the risks when arriving at a farm attraction and use a variety of means to communicate this information. The responsibility of the accompanying adult should be spelt out, emphasising the parent/carer's decision to allow children to have animal contact	Farm owners
33	Explore ways to help farm operators communicate information on infection risks to visitors using a multi-media approach	Industry reps, HSE, HPA, FACE
34	Consider ways to increase awareness among GPs and all front line healthcare practitioners of the importance and seriousness of acute bloody diarrhoea in previously healthy children	HPA (Primary Care Unit), DH
	Further Research	
35	Examine <i>E. coli</i> O157 isolates from Godstone Farm to determine their molecular characteristics	HPA
36	Encourage the funding of collaborative applications from reference laboratories, research microbiologists and epidemiologists to examine <i>E. coli</i> O157 isolates and the molecular basis for their virulence	Research councils and government departments
37	Encourage research into rapid methods of microbiological diagnosis and rapid detection of renal failure and coagulopathy. High priority should be given to clinical research into predicting which children with <i>E. coli</i> O157 infection will develop acute kidney failure and into the use of monoclonal antibody directed against verocytotoxins	Medical research funding agencies, clinical research networks
38	Complete and publish a detailed analysis of the epidemiological and microbiological data from the Godstone Farm outbreak in the scientific literature	HPA
39	Carry out a full health economic assessment of the Surrey 2009 outbreak. Consider the costs of prevention to be borne by the farm industry, their insurers and the regulatory authorities and the benefits to these groups and the general public	HPA, DH, Defra
40	Devise a system for ensuring that OCT reports relating to outbreaks of <i>E. coli</i> O157 are properly collated and widely disseminated	HPA
41	Study the feasibility of vaccine control of <i>E. coli</i> O157 in ruminant animals in the UK, and identify the obstacles to its implementation	Defra
42	Commission studies to identify whether the microbiological testing of cattle, sheep and goats with an enumeration of <i>E. coli</i> O157 and the implementation of farm hygiene practices is a practical means for reducing the risk of <i>E. coli</i> O157 on Open Farms	Defra
43	Investigate the circumstances where <i>E. coli</i> O157 infection arises after contact with animal pasture, to determine if a period of three weeks is sufficient to control the risk of infection	VLA, HPA

APPENDICES





APPENDIX I

Investigation Committee

1. Chairman:

Professor George Griffin

Head of Division, Cellular and Molecular Medicine
and Head of Centre for Infection

St George's, University of London

Expertise: Professor of Infectious Diseases and Medicine, practising infectious diseases clinician,
Chair of the Advisory Committee on Dangerous Pathogens

Committee members:

2. Dr Meirion Evans OBE

Senior Lecturer in Epidemiology and Public Health

Cardiff University and

Honorary Regional Epidemiologist

Public Health Wales

Expertise: Public health doctor with expertise in outbreak investigation

3. David Eves CB

Formerly Deputy Director General and Chief Inspector at the Health and Safety Executive

Expertise: Health and safety consultant

4. Karen Jones

Safety Inspector

Expertise: Risk assessment and safety management. Lay member of the Advisory Committee on
Dangerous Pathogens

5. Dr Chris Low

Animal Health Research Group Manager

Scottish Agricultural College

Expertise: Veterinarian. Expert on *E. coli* carriage in animals

6. Professor David Strachan

Professor of Epidemiology

St George's University of London

Expertise: Epidemiologist and public health doctor

7. Scientific Secretariat: Dr Isobel Rosenstein



APPENDIX 2

List of Contributors to the *E. coli* O157 Independent Investigation

The Investigation Committee expresses sincere thanks to all of the organisations and individual experts who have given evidence and great thought in their contributions to this Investigation.

Organisations:

Animal Health (AH)
Chartered Institute of Environmental Health (CIEH)
Department for Environment, Food and Rural Affairs (Defra)
Farming and Countryside Education (FACE)
Godstone Farm
Haemolytic Uraemic Syndrome Help (HUSH)
Health Protection Agency (HPA)
Health Protection Scotland (HPS)
Health and Safety Executive (HSE)
Local Authorities Co-ordinators of Regulatory Services (LACORS)
National Farmers' Union (NFU)
National Farm Attractions Network (NFAN)
NHS Direct
Public Health Wales (PHW)
Paediatric Nephrology Services, Evelina Children's Hospital
Paediatric Nephrology Services, Great Ormond Street Hospital
Public Health Agency for Northern Ireland (PHA-NI)
Scottish Agricultural College (SAC)
Tandridge District Council
Veterinary Laboratories Agency (VLA)
Veterinary Medicines Directorate (VMD)

Individual Experts:

Professor Brian Duerden, Inspector of Microbiology and Infection Control, Department of Health
Dr Colette Jones, Post Doctoral Research Fellow, University of Aberdeen
Professor Hugh Pennington, Emeritus Professor of Bacteriology, University of Aberdeen
Dr Mark Taylor, Birmingham Children's Hospital NHS Foundation Trust

Individuals:

The families of the children affected by the *E. coli* O157 outbreak at Godstone Farm

Legal Advice:

Gerard Hanratty, Partner, Capsticks Solicitors, LLP

APPENDIX 3

Organisations Involved in the Investigation and Management of Outbreaks associated with Open Farms

The Health Protection Agency (HPA)

The HPA's role is to provide an integrated approach to protecting UK public health through the provision of support and advice to the NHS, LAs, emergency services, other Arm's Length Bodies (1), the Department of Health (DH) and the Devolved Administrations. The Agency was established as a special health authority (SpHA) in 2003.

On 1 April 2005, the Agency was established as a non-departmental public body, replacing the HPA SpHA and the National Radiological Protection Board (NRPB) and with radiation protection as part of health protection incorporated in its remit.

The HPA comprises a network of Local and Regional Services (LaRS), a network of laboratories (the Regional Microbiology Network) and four national centres, the Centre for Infections (CfI) at Colindale, the Centre for Emergency Preparedness and Response (CEPR) at Porton, the Centre for Radiation Chemical and Environmental Hazards (CRCE) at Chilton and the National Institute of Biological Standards and Control (NIBSC) at South Mimms. There is also a small central office based in London. The HPA works closely with colleagues employed in similar organisations in the Devolved Administrations, namely Health Protection Scotland, Public Health Wales and the Public Health Agency for Northern Ireland.

LaRS often provide the HPA contact point for other Agencies and comprise 26 Health Protection Units (HPUs) spread throughout England and nine regional offices.

HPUs represent the local face of the HPA. They are staffed by consultants in communicable disease control (CsCDC), health protection practitioners and other specialist practitioners who work directly with primary care trusts (PCTs), acute hospital trusts and local authorities (LAs) in their area to deliver local health protection services. HPUs continually monitor health issues in their local area and give advice and support to the local NHS, civil and emergency authorities if a medical or environmental incident happens. They are able to respond to incidents around the clock. HPUs have two types of work: proactive and reactive. Proactive work aims to prevent health incidents from happening and includes:

- Leading or supporting local and regional multi-agency work providing authoritative guidance and leadership in the assessment and management of communicable disease in local populations
- Providing specialist advice to both commissioners and providers relating to the implementation of new and existing national vaccination policy
- Helping prevent healthcare-associated infections such as MRSA.

Reactive work aims to minimise the risk to the general public when an incident occurs and includes:

- Advising how to stop infectious diseases such as meningitis, hepatitis, or measles from spreading
- Investigating and managing outbreaks, and recommending ways to prevent them happening again
- Tracing people who may be contacts or carriers of an infectious disease or be contaminated with chemicals or radiation
- Compiling statistics on notifiable diseases such as food poisoning.

Each HPU is supported by one of nine regional offices each with a Director; regional management team and specialists in epidemiology, microbiology and health emergency planning. The regional teams co-ordinate the activities of HPUs in their area and assist local Regional Directors of Public Health by providing logistical support and technical expertise to help manage the response to major incidents. HPUs also use the Regional Microbiology Network (RMN) for laboratory analysis.

The RMN comprises eight Regional Microbiology Laboratories. In addition, 37 hospital microbiology laboratories participate as HPA Collaborating Laboratories. Together these laboratories provide frontline diagnostic and public health microbiology services to NHS Trusts, HPUs and LAs including advice.

Specialist support for dealing with gastrointestinal infections such as *E. coli* O157 is provided by the Gastrointestinal, Emerging and Zoonotic Infections (GEZI) Department at Cfl. GEZI undertakes a range of activities including co-ordinating zoonoses activities across the HPA, providing support for zoonoses surveillance, and horizon scanning and assessment of infectious disease threats.

The Epidemiological Services Section of GEZI collects, collates and analyses data on cases of gastrointestinal infections (including *E. coli* O157) in England. Since January 2009 it has operated an enhanced surveillance scheme for *E. coli* O157 infections. This aims to collect a standard minimum dataset on cases in order to identify linkages that are not immediately apparent, to improve outbreak recognition and investigation, to better understand the epidemiology, and to quantify the health impact of *E. coli* O157.

The Laboratory of Gastrointestinal Pathogens (LGP) in GEZI provides reference services for a wide range of gastrointestinal, food and waterborne pathogens including *E. coli* O157. Presumptive strains of *E. coli* O157 are sent to the laboratory from NHS and other laboratories for confirmatory tests including serotyping, phage typing and testing by polymerase chain reaction (PCR) for the presence and type of verocytotoxin gene.

(1) The use in the UK of executive agencies charged with service delivery functions has arisen alongside so-called non-departmental public bodies (NDPBs). These agencies do not usually have a legal identity separate from that of their parent department and, unless they have trading fund status, their accounts form part of the accounts of the parent department. The NHS also has bodies called special health authorities, technically neither NDPBs nor executive agencies. The Department of Health chooses to designate all three types as 'arm's length bodies'. The term NDPB is often employed to identify numerous organisations with devolved governmental responsibilities. The UK Government's definition in 1997 of a NDPB or quango was: 'A body which has a role in the processes of national Government, but is not a Government department or part of one, and which accordingly operates to a greater or lesser extent at arm's length from Ministers.' The HPA is an executive NDPB of the DH.

Animal Health

Animal Health (formerly the State Veterinary Service) is an executive agency of the Department for the Environment, Food and Rural Affairs (Defra). It is primarily responsible for ensuring that farm animals in Great Britain (its remit excludes Northern Ireland) are healthy, disease free and well looked after. It operates through a network of 24 divisional offices, each consisting of veterinary officers, animal health officers and administrative staff and, in some cases, specialist inspectors. Animal Health implements government animal health and welfare policies on farms, at livestock markets and during transport throughout Great Britain. Livestock are allowed to move between registered premises under general licence. However animals cannot be moved to unregistered premises such as a school. For this a performance licence is required. This is to ensure Animal Health is aware of the location of animal stock in the event of a disease outbreak.

Animal Health has a role in regulating animal welfare on Open Farms and inspectors may visit once or twice a year to inspect animal health, disease risks and licences. However, the main emphasis is on disease control, biosecurity and the enforcement of animal feed-related legislation, not on the inspection of premises in relation to human health and safety issues. Its remit only relates to statutorily notifiable and reportable animal diseases, such as salmonella infection, and does not include *E. coli* O157.

Veterinary Laboratories Agency (VLA)

The VLA is also an executive agency of Defra. It provides animal disease surveillance and diagnostic services in England and Wales and undertakes veterinary scientific research. It is the national and international reference laboratory for a wide range of animal diseases. It comprises a network of 15 regional veterinary laboratories, surveillance centres in the School of Veterinary Science, University of Liverpool, and the Royal Veterinary College, University of London, and a large central facility near Weybridge in Surrey. The VLA, on behalf of Defra, provides laboratory and field support to the HPA in the investigation and diagnosis of a range of zoonoses, including outbreaks of *E. coli* O157 at Open Farms.

Local Authorities (LAs)

LAs are responsible for regulating the safety of Open Farms. District Councils and unitary authorities are responsible for:

- Supporting the investigation of communicable disease outbreaks in their area
- Enforcing legislation on food safety and hygiene
- Health and safety at work including shops, offices, hotels and restaurants, and Open Farms
- Licensing of animal establishments, including pet shops
- Responding to pest control issues.

These functions are usually carried out by environmental health officers (EHOs) based in the LA's environmental health, environmental protection, or regulatory services department. The HPU will lead the response to a local outbreak of *E. coli* O157 but the LA, through its Chief Environmental Health Officer (CEHO) will provide logistical support and technical expertise, as well as remaining responsible for any enforcement action required.

County councils and unitary authorities are responsible for enforcing legislation relating to the health and welfare of farmed animals. These functions are usually carried out by trading standards officers (TSOs) who carry out farm inspections and work closely with Animal Health inspectors. The Local Authorities Co-ordinators of Regulatory Services (LACORS) is part of the Local Government Association (LGA). LACORS is not a regulatory body but provides a communication channel between government and LAs and seeks to ensure uniformity of enforcement by providing advice and guidance to regulatory services. It appoints some LA experts as Lead Officers, contacts who will advise other officers.

Health and Safety Executive (HSE)

The HSE is an independent regulator which acts in the public interest to reduce work-related death and serious injury in Great Britain's workplaces (its remit excludes Northern Ireland). The HSE is responsible for ensuring that risks in the workplace are properly controlled. This includes protection from infectious hazards that may be encountered in workplaces such as commercial farms, factories, hospitals and schools. This is carried out through inspection and the use of statutory powers, and the regulation of risk through risk assessment. It employs specialists to assist its inspectors including experts in microbiological hazards.

The HSE does not have enforcement responsibility in the service sector such as Open Farms where commercial agriculture is not the main enterprise, offices and shops (including pet shops). These situations are covered by LAs.

The HSE is responsible for most industrial sectors including commercial agriculture. It is assisted by a number of advisory committees which include industry and trade union representatives. The HSE has established groups of inspectors specialising in each sector. These groups, also known as Sectors, are based among the HSE's regional centres. They service the advisory committees, lead discussions with employers and relevant trade associations and trade unions, set operational policy, advise operational staff on inspection priorities and publish guidance. The HSE's Agriculture and Food Sector is based at Nottingham and services the Agriculture Industry Advisory Committee.

NHS Primary Care Trusts (PCTs)

PCTs are given primary responsibility by the NHS for the health of their local population. The HPA provides health protection services to PCTs to assist them in meeting their responsibilities, as outlined in the Framework Agreement between the HPA and local NHS. The HPU will lead the response to a local outbreak but the PCT, through its Director of Public Health (DPH) will provide additional support such as co-ordinating the primary care response and sometimes providing a spokesperson for the media.

APPENDIX 4

Non-Regulatory Organisations Relating to Open Farms

Access to Farms

- Access To Farms (ATF) was a partnership of 15 national organisations and is now understood to be part of FACE (see below)
- Set up by the **Federation of City Farms** in 1999 (see below)
- Aims to improve quality of educational access to farms by schools.
- Shares information and good practice
- Provides training and accredits farms that work with school groups
- Manages the most comprehensive online database of educational farms
- The database is hosted by the **Growing Schools** programme (see below)
- ATF has 15 national partner members:
 - Country Land & Business Association (CLA)
 - Countryside Foundation for Education (CFE)
 - Department for Children, Schools and Families (DCSF)
 - Department for Environment, Food and Rural Affairs (DEFRA)
 - Farming And Countryside Education (FACE)
 - Farms for Schools (FFS)
 - Federation of City Farms and Community Gardens (FCFCG)
 - Groundwork UK (GW)
 - Linking Environment And Farming (LEAF)
 - National Farmers Union (NFU)
 - National Farm Attractions Network (NFAN)
 - Natural England (NE)
 - The Country Trust (CT)
 - The National Trust (NT)
 - The Soil Association (SA).

Growing Schools

<http://www.growingschools.org.uk>

- Educational resource to support teachers using the 'outdoor classroom'
- Supported by UK Government's Dept of Children, Schools and Families
- Hosts a searchable online database of educational farms (see above)
- Includes the Get Your Hands Dirty support pages with materials on keeping cattle, alpaca and pigs
- Supports the **School Farms Network** (see next page).



Countryside Educational Visits Accreditation Scheme (CEVAS)

<http://www.face-online.org.uk/cevas>

- Run by the **Access to Farms** partnership scheme
- Established in 2003 to help farmers and growers ensure that schools are guaranteed safe and worthwhile visits to all kinds of farms
- The scheme is in two parts:
 - Training and accreditation for farm staff
 - Endorsement of farm premises as appropriate for school visits
- The training course is accredited through the National Open College Network
- It may be studied at a two day regional training event or using an online distance learning package.
- The course comprises an introduction and three integrated units:
 - Unit 1: Preparing for Farm Visits
 - Unit 2: Food, Farming and the Countryside in the National Curriculum
 - Unit 3: Talking to Pupils, Students and Teachers
- Approximately 1,000 farmers have now passed through the scheme and are qualified
- They are entitled to display the trained personnel logo
- Administered by **Farming and Countryside Education (FACE)** (see below).

Farming and Countryside Education

<http://www.face-online.org.uk>

- Registered charity with over 80 partner membership organisations
- Aims to educate children and young people about food and farming in a sustainable countryside
- Administers the CEVAS accreditation scheme (see previous)
- Provides workshops, seminars, support and advice for farmers
- Provides curriculum resources and training for teachers
- Promotes educational resources and activities of members
- Represents members on government committees and contributes to government policy development
- Provides help with education projects
- Funds research through partnership with co-funders.

Federation of City Farms and Community Gardens

<http://www.farmgarden.org.uk/home>

- Charity supporting community-managed farms, gardens & allotments
- Represents around 120 city farms
- On-line listing and maps showing distribution of member farms.
- Various publications, mostly starter packs and educational resources
- Operates the **School Farms Network** which offers support to c. 70 school farms (often on school premises)
- Set up the **Access to Farms** partnership in 1999 (see previous).

Farms for Schools

<http://www.farmsforschools.org.uk>

- Registered charity, partner of The Countryside Foundation for Education.
- Produce guidance leaflets:
 - Guide for hosts planning countryside events involving schools
 - Guide for teachers visiting countryside events involving schools
- Produce educational resources and run an annual conference
- Maintain an on-line register of farms meeting FFS requirements (c. 120 members throughout UK, including Godstone Farm).

Think Food and Farming

<http://www.thinkfoodandfarming.org.uk>

- Legacy of the Year of Food and Farming
- Project led by **Farming and Countryside Education (FACE)** (see above)
- Promotes school visits to farms
- Encourages farmers to open farms to school visits
- Provides information and links on open farm visits
- Produces detailed booklet for teachers and farmers on planning school visits.



The Co-op

<http://www.co-operativemembership.coop/en/fromfarmtofork>

- The Co-op is the largest farmer in the UK
- This initiative promotes visits to The seven Co-op farms in England and Scotland
- Provide educational resources to schoolchildren and teachers.

The Country Trust

<http://www.countrytrust.org.uk>

- Registered educational charity
- Organises visits for inner city children to farms, estates and other rural locations either as day or residential visits.

Farms for City Children

<http://www.farmsforcitychildren.co.uk>

- Small registered charity operating three farms in Devon, Pembrokeshire and Gloucestershire
- Offer week long farm visits to city children.

National Farm Attractions Network

<http://www.farmattractions.net/about.htm>

- Independent cooperative group for owners of farm and rural attractions
- Provides support to Farm and Rural Diversification Enterprises
- Grant funded by Defra
- Represents members' interests
- Provides advice on legal and insurance matters, health and safety, marketing, etc
- Keeps register of members
- Produces newsletters and holds national conference for members
- Maintains an online register of member farms
(c. 200 members throughout UK, including Godstone Farm).



Open Farm Sunday

<http://www.farmsunday.org/ofs/home.eb>

- Annual event to support farm produce. Next is on 13 June 2010
- Run by Linking Environment and Farming (LEAF), a national charity
- Searchable database of events and participating farms
- Many are open one-time only for individuals and/or groups
- Supported by Defra, Scottish Natural Heritage, Nature England and numerous commercial sponsors.





Avoiding ill health at open farms – Advice to farmers (with teachers' supplement)

Agriculture Information Sheet No 23 (revised)

Introduction

This information sheet provides advice for farmers and others responsible for open farms, or farms which run open days, on practical steps to reduce the risk of ill health to visitors.

Ill health following visits to open farms is unusual. Such visits play a valuable part in the education and development of children, and are an enjoyable experience for many people.

Teachers and others who organise visits to farms should also read the separate supplementary sheet which forms part of this advice, to help them make sure that children do not become ill as a result of visits.

Background

All animals naturally carry a range of micro-organisms, some of which can be transmitted to humans, where they may cause ill health. Some organisms which may be contracted on farms, such as the verocytotoxin-producing bacterium *Escherichia coli* O157 (*E coli* O157), present a serious hazard and potentially cause severe disease (and more recently *E coli* O26). ***E coli* O157 in particular can cause severe illness in young children.** Good general cleanliness around the farm, separating eating and contact areas, adequate hand-washing facilities, information for staff and visitors, and proper supervision of animal contact and hand washing are all essential.

Cattle herds may carry the bacterium, and there have been cases of human ill health following contact with animals carrying it. Very low numbers of *E coli* O157 can cause infection and so it is important that farmers control the risks to visitors. Controlling the risks from *E coli* O157 will control the risks from most other organisms carried by animals which are transmissible to humans by hand to mouth.

The law

If you open your farm to the public, including for charity events, you have duties under health and safety law. The Control of Substances Hazardous to Health (COSHH) Regulations 2002 (as amended) require an employer or self-employed person to:

- assess the risks to employees, self-employed people and the public from exposure to hazardous substances, including micro-organisms; and
- take appropriate action to prevent or adequately control that exposure.

The remainder of this sheet gives advice on complying with these Regulations.

Assessing the risk

Your COSHH assessment is the essential first step in deciding what controls you need. Remember that:

- current veterinary and medical opinion is that farmers should assume that all ruminants (cattle, sheep, goats and deer) carry *E coli* O157;
- *E coli* O157 is found in a range of other animals including geese and seagulls;
- there are no tests in the live animal to prove that it is free of *E coli* O157 infection. A negative test does not mean the animal is free of infection. Animals which have previously tested negative may therefore begin to excrete the organism at a later date;
- *E coli* O157 may be introduced to your farm at any time by new stock, wild birds and animals, or by visitors such as delivery drivers who have visited other farms;
- young stock, or stock under stress because of pregnancy, unfamiliarity with people etc are more likely to excrete *E coli* O157;
- *E coli* O157 can persist for long periods outside the animal – up to 150 days in soil and 90 days in cattle faeces. Other animals on the farm, including pets, can therefore easily acquire the bacterium;
- visitors are most likely to be infected with *E coli* O157 from contact with animals or their faeces.

Controlling the risk

Given the advice above, assume that your animals carry *E coli* O157, and put controls in place to minimise the risk of visitors being contaminated by it, eg when:

- contacting animals in petting areas or during bottle feeding;
- touching gates or animal pen divisions contaminated with faeces;
- walking through areas contaminated with faeces and later removing footwear.

Contact with infected animals or their faeces in any of these ways can result in visitors accidentally ingesting the bacterium and suffering ill health if, without thoroughly washing their hands, they:

- put contaminated fingers in their mouths (including thumb sucking and nail biting). **Remember that children are very likely to do this;**
- smoke;
- touch their food.

Your controls should therefore concentrate on the following:

- farm layout and routes, including areas to which visitors should not have access;
- animal contact;
- siting of eating areas;
- washing facilities;
- information and signs;
- training and supervision;
- livestock management procedures;
- manure and compost heaps.

Farm layout and routes

- Decide which areas you want visitors to access.
- Make sure that routes around the farm divert visitors from non-access areas, eg parts of the farm where work is going on.
- Consider how you will prevent entry to non-access areas. Fencing is one solution.
- Route visitors to washing facilities as they leave any animal contact area, just before they access eating areas and before leaving the farm.
- Consider whether you can avoid routing visitors across farm tracks used regularly by stock. If this is not possible then make sure that visitors do not have to tread through any build-up of faeces. For example, scrape and wash down tracks after each milking, or provide duckboards or similar so that visitors avoid contaminating their footwear.
- Keep the farm as clean as practicable and ensure areas to which visitors have access are free from any build-up of faeces.

Animal contact

- Decide where visitors should be able to pet and feed animals, and which animals will be involved.
- Exclude visitors from non-contact areas, or install double fencing to prevent contact. Adequate fencing might include your existing fencing, plus hurdles or sheep or pig netting (to a height of around 1 m, properly erected and maintained).
- Make sure that contact areas are free from any build-up of faeces.
- Clean and disinfect pen divisions and gates in animal contact areas whenever animals are moved in or out of them.

Eating areas

- Discourage visitors from eating (including sweets) or drinking in animal contact areas.
- Make sure that visitors have to pass through or by washing facilities before going to eating areas.
- Site eating or picnic facilities away from areas where animals are likely to be contacted, and preferably at the end of the farm trail, or outside the main areas of the open farm.
- Exclude domesticated fowl, farm dogs etc from eating areas. They are likely to be contaminated with faeces and may contaminate eating areas. Consider wing clipping, double gates into eating areas and adequate fencing.
- Clear discarded food from eating areas to discourage wild birds from feeding and contaminating the area.
- Position ice-cream, sweet kiosks etc in the 'clean' areas of the farm, such as the eating areas or at the exit where visitors have passed washing facilities, and remind visitors using the kiosks, by notices or verbally, to wash before touching or eating purchased food or sweets.

Washing facilities

All open farms, but especially those where visitors are encouraged to contact animals, will need washing facilities. The numbers of facilities and their location is crucial to preventing ill health. Facilities can be individual basins, or troughs or pipes with a number of running water outlets. They need to be provided and easily accessible at:

- areas for intentional contact (petting barns etc). If there is a one-way system for visitors through the

contact area they should be provided immediately adjacent to the exit; if there is a two-way flow of visitors they should be provided immediately adjacent to entrances and exits. A one-way system may help to ensure that washing facilities are properly used;

- eating areas;
- the exit to the premises, where visitors may contaminate their hands removing footwear. If this is not possible (eg at sites with multiple exits) then provide signs advising visitors to wash their hands before they leave the premises;
- other areas where you expect contact to take place, eg those where young stock are housed. If you double-fence animals kept outside the contact area, so that contact is not likely, you may not need to provide washing facilities in those areas.

An acceptable way of estimating the capacity of the washing facilities is to:

- estimate the maximum number of visitors expected or permitted at one time;
- consider how many visitors will be in animal contact areas at any time – you may already limit numbers of visitors in these areas to allow them time to enjoy the experience with the animals;
- assess the rate at which visitors will leave contact areas, eg in large groups such as school parties or a few at a time;
- estimate the time taken to wash hands effectively, remembering that a thorough hand wash may take up to two minutes.

If you estimate that, for instance, 30 people will leave a contact area every 15 minutes, and each person will take two minutes to wash their hands, you should provide enough washing facilities for four people to use at one time (30×2 divided by $15 = 4$). Make similar calculations for other locations around the farm, eg at main exits or entrances to eating areas.

You can supplement permanent facilities with temporary ones at busy times, eg just before the summer holidays, but facilities should:

- be accessible by all visitors, ie at the right heights for both children and adults or with raised standing areas provided for children. Check these do not present tripping or falling hazards;
- have running water, preferably warm. It is easier to create soap lather with warm water, and it may encourage visitors, especially children, to wash more thoroughly. Warm water supplies should be

fitted with a means of restricting the temperature to around 43°C to avoid scalding;

- have liquid soap. Bactericidal soaps are not necessary;
- have paper or roller towels. Hot-air hand-dryers are suitable but may lead to queues which discourage visitors from washing their hands. Reusable hand towels are not suitable;
- be properly maintained and cleaned at least daily – contact with contaminated hand-operated taps can transfer bacteria from tap to person. Replenish paper towels as necessary.

Do not provide buckets or troughs of water which are reused by several people – they do not allow effective hand washing, and reusing water can spread bacteria among those using it. Adding a disinfectant to the water does not make the practice acceptable. Using cleansing gels or wipes is **not** a substitute for proper hand washing.

Consider how you can encourage your staff and parents, teachers etc to make sure that children and other visitors wash their hands properly.

Information and signs

- Information should include at least notices at all entrances to the premises to remind visitors of the need for good hygiene, and request that they only eat or drink in the designated areas.
- Signs should be erected in appropriate places reminding visitors to wash their hands when leaving animal contact areas, before eating, and when leaving the farm.
- Washing facilities should have signs giving full instructions on proper hand washing.
- Consider whether leaflets, or pre-visit packs for schools, may be useful to advise visitors of good hygiene precautions (and other site rules).
- Remember that young children may put dummies or toys in their mouths, and remind accompanying adults not to put dummies that have fallen to the ground back into their children's mouths.

Training and supervision

- Staff should be trained and instructed on what visitors should or should not do.
- Provide guidance to staff on how to explain the hygiene message to visitors.
- Make sure staff know what to do if visitors won't co-operate, and how to handle aggressive visitors.

- Provide supervision in contact areas. The number of supervisors will depend on the size of the contact area and the number of visitors permitted or expected in that area at one time.
 - Make sure that children are supervised while they wash their hands. Although this is the responsibility of parents or teachers, in some cases farm staff may need to help in supervising.
 - Remind supervisors in animal contact areas (who may also be there to protect the animals) to ensure that visitors do not eat in those areas.
 - Supervisors should discourage visitors (especially children) from putting their fingers in their mouths, or kissing the animals.
 - arrange the 'open' part of the farm so that visitors cannot pass through or close to any areas in which animals are kept; or
 - arrange routes through areas where animals are kept so that contact with them is not possible, eg by putting fencing between the normal barriers around the animal pens, barns etc and the visitor access route; and
 - double-fence areas to which the public have access for picnics etc, so that animals in adjacent fields or pens cannot be touched from those areas.
- Remember that children will want to contact the animals and so fencing should be of a standard they will find difficult to overcome (see 'Animal contact').

Livestock management procedures

- Arrange regular visits from a vet to check on the health of stock, especially for zoonoses such as salmonellosis, cryptosporidiosis, orf or ringworm (see AIS2 *Common zoonoses in agriculture*).
- Assess whether animals are healthy before moving them to contact areas, but remember that animals carrying *E coli* O157 do not suffer ill-health effects.
- Do not put animals that have just given birth, or been born, in contact areas.
- Remove animals showing signs of ill health, such as diarrhoea or stress, from contact areas.
- Keep animals clean, and in clean conditions.
- Consider whether replacement stock should come from within the farm rather than being bought in. If stock are purchased, isolate them from other animals on the farm for one month.

Manure and compost heaps

- Position manure or compost heaps away from areas that visitors access, or fence them off.
- Make sure visitors do not climb on the manure or compost, or walk through the liquid run-off.
- Do not allow visitors to bag their own compost – bag it up ready for them.
- Clean tools regularly.

'No contact' farms

If visitors to your farm are not expected or invited to have contact with any of the animals (eg many farms which open for single days, perhaps at lambing) consider whether you need to:

Sources of advice for farmers

More and more farms are diversifying and opening to visitors. Farms that open regularly should consider permanent arrangements and an accreditation course such as the Countryside Educational Visits Accreditation Scheme (CEVAS) (see www.face-online.org.uk/cevas).

Farms for Schools (Tel: 01422 885566), the Federation of City Farms and Community Gardens (Tel: 0117 923 1800) and the National Farm Attractions Network (Tel: 01536 513397) all provide advice and other services to open farms.

Other advice is available from Defra/Scottish Government, veterinary surgeons, or the enforcing authority for health and safety legislation for your premises. Where the open farm is part of a commercial farm this will normally be HSE; in other cases it will be the local authority for your area.

Further information

HSE priced and free publications are available by mail order from HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA Tel: 01787 881165 Fax: 01787 313995 Website: www.hsebooks.co.uk (HSE priced publications are also available from bookshops and free leaflets can be downloaded from HSE's website: www.hse.gov.uk.)

For information about health and safety ring HSE's Infoline Tel: 0845 345 0055 Fax: 0845 408 9566 Textphone: 0845 408 9577 e-mail: hse.infoline@natbrit.com or write to HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG.

This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

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Avoiding ill health at open farms – Advice to teachers

HSE information sheet

AIS23 Supplement (revised)

This supplement to AIS23 *Avoiding ill health at open farms – Advice to farmers* advises teachers and others who organise visits for children to farms on controlling the risk of infections from the animals the children may contact during their visit.

All animals naturally carry a range of micro-organisms, some of which can be transmitted to humans, where they may cause ill health. Some infections which may be contracted on farms, such as the bacterium *Escherichia coli* O157 (*E coli* O157 and also more recently *E coli* O26), present a serious hazard and potentially cause severe disease which may be particularly acute in young children.

While the hazard from infection resulting from a farm visit is real, the risks are readily controlled by everyday measures. The following sensible steps will help make your visit even more safe, healthy and enjoyable.

Before your visit:

- read and understand the advice in the main AIS23 information sheet, and discuss visit arrangements with the farm management. Assure yourself that the facilities provided match the recommendations in AIS23;
- complete a risk assessment which will help you to decide the appropriate level of adult supervision for the group. Staffing ratios for visits are difficult to prescribe as a range of factors need to be taken into account including the age, ability and characteristics of the group, the mode of travel, the nature of the activities planned, and the experience of the teachers and other adults in off-site supervision. In addition to the teacher in charge, there should be enough supervisors to cope with an emergency. Further advice may be obtained from your local education authority or the Department for Children, Schools and Families (www.lotc.org.uk);
- discuss with the supervisors, who may be parents or staff of the school, creche etc, their role during the visit. They must understand the need to make sure that the children wash, or are helped to wash, their hands thoroughly after contacting animals, and follow the other rules suggested below;
- discuss with pupils the rules for the visit, stressing that they must not eat or chew outside the areas in which you permit them to do so;
- make sure that pupils wear appropriate clothing, including sturdy outdoor shoes (not sandals) or wellington boots if possible;
- check that cuts, grazes etc on children's hands are covered with a waterproof dressing.

During and after the visit, make sure that the children:

- do not kiss animals;
- always wash their hands thoroughly before and after eating, after any contact with animals and again before leaving the farm;
- eat only food that they have brought with them, or food for human consumption they have bought on the farm, in designated areas, and never eat food which has fallen to the ground, or taste animal foods;
- do not suck fingers or put hands, pens, pencils or crayons etc in mouths;
- clean or change their footwear before leaving, remembering to wash their hands after any contact with animal faeces on their footwear.

Check that the children stay in their allocated groups during the visit, and that they:

- do not use or pick up tools (eg spades and forks) unless permitted to do so by farm staff;
- do not climb on to walls or animal pens etc;
- listen carefully and follow the instructions and information given by the farm staff;
- approach and handle animals quietly and gently;
- do not chase, frighten or torment the animals.

Remember:

- the children are your responsibility during the visit;
- you should supervise them during the visit, especially during hand washing to make sure that each child washes and dries their hands thoroughly. Farm staff may be able to help with this supervision;
- allow plenty of time before eating or leaving so that the children do not have to rush.

If a member of your group shows signs of illness (eg sickness or diarrhoea) after a visit, advise them or their parent/guardian to visit the doctor and explain that they have had recent contact with animals.

Further information

Extra copies of this information sheet and supplement are available free from HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA. Tel: 01787 881165 Fax: 01787 313995. Website: www.hsebooks.co.uk



Common zoonoses in agriculture

Agriculture Information Sheet No 2 (revised)

Introduction

All farm animals naturally carry a range of diseases, some of which can also affect humans. These diseases are known as **zoonoses**, and if you work with animals your health may be at risk from them. Although some of these diseases (eg anthrax, brucellosis and rabies) are not common in Great Britain, good occupational hygiene practices will protect against them, as well as other more common zoonoses such as leptospirosis, orf or ringworm.

Diseases transmitted from animals to humans can also affect visitors to farms - especially children or the elderly, who are more vulnerable to infection. These illnesses include those resulting from infection with the organisms *Escherichia coli* O157 (*E coli* O157) and *Cryptosporidium parvum*.

If you open your farm to the public you should take special precautions to make sure that they are not made ill by zoonoses. Advice on those precautions is in Agriculture Information Sheet AIS23 (revised) *Avoiding ill health at open farms - Advice to farmers (with teachers' supplement)*.¹

This information sheet advises on:

- legal requirements to control the risk of zoonoses in humans;
- husbandry practices which may reduce the risk;
- good occupational hygiene practices to control the spread of zoonoses, including using personal protective equipment (PPE); and
- some of the most common zoonoses.

If you think that you are ill because you have contracted a disease from an animal, you should consult a doctor quickly. Tell your doctor if you work in agriculture or come into contact with farm livestock. Consider carrying the HSE *Agriculture - your health carry card*² which gives useful information for you and your doctor.

Brucellosis, anthrax, bovine tuberculosis and BSE are notifiable or reportable diseases and subject to animal health legislation. Suspected cases must be reported to the Divisional Veterinary Manager at the Animal Health Divisional Office (AHDO).

Legal requirements

Zoonoses are caused by micro-organisms, which are subject to the Control of Substances Hazardous to

Health Regulations (COSHH) 2002 (as amended). COSHH requires employers and self-employed people to:

- assess the risks to health from work activities which involve a hazardous substance (eg a micro-organism);
- prevent or, where this is not reasonably practicable, adequately control exposure to the hazardous substances;
- introduce and maintain control measures;
- inform, instruct and train employees about the risks and precautions to be taken;
- regularly review risk assessments and the effectiveness of control measures.

Involve employees, especially safety representatives, in making the assessment - they often have personal experience of the work and the risk and may be able to offer common-sense ways of controlling it.

If you are an employer, you should ask employees, and people you are considering employing, about any existing health or other conditions they have which may worsen the effects of contracting a zoonosis, or which may mean that they are more likely to contract one. For example:

- people without a spleen are very vulnerable to infection, and employers should consider carefully whether they allow such people to work with animals;
- people with transplanted organs may be more at risk from all zoonoses;
- pregnant women risk abortion if they are infected with *Chlamydia*, the organism causing enzootic abortion of ewes.

Precautions

This section advises on general precautions to reduce the risk of contracting zoonoses. The sections dealing with individual zoonoses advise on extra, specific steps where necessary.

Remember that, if you bring stock in from outside the farm, you can reduce the risk of zoonotic infections by thoroughly checking them for disease, with help from your veterinary advisor. As well as taking these steps, if

you are an employer, make sure that staff understand the importance of taking the precautions and check that they do so.

Control the disease in the animal

In some cases it is possible to reduce the risk of contracting a zoonosis by controlling the disease in the animal, for example, vaccinating cattle against *Leptospira hardjo* or using salmonella-free feed for pigs and poultry. Consult your vet and:

- find out whether there are such controls available. There are widely available controls for *Leptospira hardjo* and enzootic abortion of ewes;
- consider the benefits to human health of controlling the disease in the animal, remembering that there are also economic benefits from improved animal health;
- take action where human health benefits can be achieved at reasonable cost. Remember that not all medicines will prevent the animal passing the disease on to humans. Check with your vet whether, after treating the animal, there are remaining risks to humans.

Some of the diseases described in this information sheet are passed to humans through contact with animal dung or urine. In some cases the risks to humans can be controlled if you follow good husbandry practices to help prevent animals carrying or excreting large numbers of the disease-causing organisms. These practices include the following:

- ensure good standards of hygiene in young-stock housing;
- avoid contaminating animal drinking water with dung;
- keep animals, especially young, as stress-free as possible - particularly important on farms that open to the public;
- have regular stock health checks by a vet.

It is unlikely that you will completely eliminate the risk of contracting a zoonosis. You must also follow the principles of good occupational hygiene to protect against the remaining risk. These fall into three categories - safe working practices, using personal protective equipment and good personal hygiene.

Safe working practices

Consider the following:

- avoid or minimise the use of equipment or tools likely to cause cuts, abrasions or puncture wounds, and use safe working practices and PPE where appropriate;

- when taking blood samples, use vacuum tubes rather than syringes and put all used needles into a sharps box to BS 7320: 1990. Label and dispose of the box safely, but not in your domestic waste;
- do not use mouth-to-mouth resuscitation on new-born animals - use traditional husbandry methods of resuscitation such as massaging or clearing nostrils with straw;
- avoid handling birth fluids or afterbirths with bare hands and bury or burn them;
- control or eliminate rats, and use a fork or shovel, or wear gloves, to move dead rats.

Personal protective equipment (PPE)

Your COSHH assessment will help you decide whether PPE is needed. Remember that you should only consider using PPE after you have considered other steps such as not doing the task or avoiding contact with infected animals. However, the nature of your work with animals may mean that PPE is your only practicable option. Consider whether you need to:

- wear PPE when helping animals to give birth, handling afterbirths, working with obviously infected stock (eg with orf or ringworm), examining mouths or during rectal examinations. Suitable PPE will include a waterproof apron or parturition gown, obstetric gauntlets for calving/lambing etc and plastic or synthetic rubber gloves for oral or rectal examinations;
- use face protection (for eyes and mouth) if there is a risk of splashing from urine or placental fluids. Suitable protection will include a faceshield to BS EN 166: 2002.

Make sure that whatever PPE you use is suitable, properly maintained, cleaned after use, stored in a clean area and that new PPE is CE marked.

Personal hygiene

Any work with animals inevitably involves contact with dung and urine, which contain disease-causing organisms. Personal hygiene is therefore vitally important. If you are an employer, provide washing facilities wherever staff or visitors work with animals (at least, clean running water and paper towels). Make sure that you and your staff:

- wash cuts and grazes immediately with soap and running water;
- cover new and existing wounds with a waterproof dressing before beginning work - some organisms enter the body through open wounds. Consider whether you or your staff need first-aid training;

- wash hands and arms before eating, drinking or smoking after contacting animals, or working in areas with animal dung.

Symptoms and specific controls for some common zoonoses

Escherichia coli O157 (*E coli* O157)

E coli O157 is a bacterium that lives in the gut of animals, including cattle, sheep, deer and goats. It is also carried by pets and wild birds. Simply carrying the bacteria will not normally cause an animal any harm or illness. In humans, however, the toxins it produces can cause illness ranging from diarrhoea to kidney failure. In some cases the illness can be fatal.

E coli O157 is unusual in that very few individual organisms are needed to infect humans. Infection can be caused by contacting animal dung, and then putting hands or fingers in the mouth, or eating food without washing hands. It is vital that anyone who works with or touches animals thoroughly washes their hands and arms before eating, drinking or smoking.

Workwear should be left at the workplace for cleaning so that the families of those working on the farm cannot contract the disease by contact with soiled clothing.

Cryptosporidiosis

This disease, which may cause diarrhoea and abdominal pain with 'flu-like symptoms for up to six weeks, especially in the young and the old, is caused by a protozoa called *Cryptosporidium parvum*. It is carried by calves, lambs, deer and goats and may be transmitted to humans by contact with animal dung or drinking water contaminated with dung.

Assume that all your cattle, sheep, deer and goats carry *E coli* O157 and cryptosporidium. Follow the advice in the 'Precautions' section and remember that visitors to farms, eg school parties, may also be exposed to these organisms. Young children may be more affected than other people by the diseases that may result, so follow the advice in Agriculture Information Sheet AIS23 (revised) *Avoiding ill health at open farms - Advice to farmers (with teachers' supplement)*. In particular:

- provide proper washing etc facilities for visitors, including warm running water, soap and clean towels adjacent to all areas where they may contact animals;
- erect signs advising visitors to wash before eating, drinking or smoking, and advising parents to check that their children do not put dirty hands or fingers in their mouths;
- provide separate eating areas, close to washing facilities.

Leptospirosis

There are two main forms of leptospirosis that may affect those working in agriculture: Weil's disease, from the bacterium *Leptospira icterohaemorrhagiae*, and cattle-associated leptospirosis, from the bacterium *Leptospira hardjo*.

Weil's disease is usually contracted from infected rat's urine or watercourses contaminated with it. Most rats probably carry the bacteria at some point in their lives. It is most commonly passed to humans through cuts and grazes, especially on the hands. It may result in fever, headache, vomiting and muscle pain, and can lead to jaundice, meningitis and kidney failure. In rare cases it can be fatal. Follow the advice in the 'Precautions' section.

Cattle-associated leptospirosis (CAL) is usually contracted after cattle urine has splashed into the eyes, nose or mouth, after urine or placental products have entered the body through broken skin, or after inhaling droplets of urine. More than 60% of herds of cattle in the UK are thought to be affected.

In humans the symptoms are 'flu-like with a severe and protracted headache. Without treatment they can persist for up to six weeks and in some cases meningitis, jaundice and kidney failure can occur.

Follow the advice in the 'Precautions' section and:

- avoid being splashed with urine or inhaling its aerosol when you work with cattle. If you are developing a new parlour, consider having a wide pit in a herringbone parlour, which allows a low-splash zone in the centre, or floor grids behind cows in parlours to reduce urine splash;
- reduce the risk of infection in your herd by checking the disease status of shared or hired bulls; allowing a two-month gap before grazing cattle on land last grazed by sheep; providing clean, non-infected, drinking water; not mixing normally separated stock; and avoiding the use of rented keep unless other animals there are disease free;
- consider using PPE - for example, during milking wear a water-resistant garment which covers the body and arms; when assisting in calving wear a parturition gown and obstetric gauntlets; and when handling foetal, placental or other contaminated material wear obstetric gauntlets. Thin gloves that may rip are not suitable.

The risk to human health is greater if a herd has recently been infected - consult your vet for information on this. If this is the case, consider wearing a face shield if your face or eyes are likely to be splashed with urine, or using a powered respirator to reduce the risk of inhaling any aerosol.

Note that vaccinating cattle against CAL does not prevent them shedding the organism and possibly passing the disease on to humans.

Bovine tuberculosis

Bovine TB is most commonly carried by cattle, badgers and deer, and can infect humans by inhalation or hand-to-mouth contact. People handling infected cattle are at risk, especially if they become contaminated with mucus from the respiratory tract (eg by holding the animal's nose) and then do not follow the basic rules of good personal hygiene.

Many people will have been immunised against TB in childhood (the 'BCG' immunisation). This gives substantial but not complete protection. If you are in an area where infection in cattle is common, consider whether you should contact your doctor to check your immunisation status. Do not rely on the BCG immunisation to prevent infection - always follow good practice.

If you suspect your cattle have TB you must report it to Animal Health, a police constable or the local authority. All cattle failing the tuberculin test used by Animal Health will be slaughtered. To control the risk of contracting the disease direct from cattle, follow the advice in the 'Precautions' section, and:

- ensure that your cattle are routinely tuberculin tested by Animal Health and do not delay this routine test;
- monitor your cattle for signs of TB - typical signs include violent coughing, a 'snore' or rattling in the throat during breathing, loss of weight, and lumps in the udder. None of these signs are exclusive to cattle TB, however, and so you should not rely on them for diagnosis, nor the lack of them to indicate that your cattle do not carry TB;
- do not lead cattle by the nose - you will be contaminated with mucus, and it is not good stockmanship.

Salmonella

The salmonella bacterium may be carried by most types of farm animal, and can result in diarrhoea, fever and abdominal pains in humans. Occasionally more serious illness will result from contact with the organism.

Although salmonella is usually thought of as resulting from eating contaminated food, it may frequently result from contact with farm animal dung. Humans may be infected when the salmonella organism gets into the gut - usually when you put your hands contaminated with dung in or close to your mouth, eg during eating, drinking or smoking. Hand-to-hand contact is also an important source of infection.

To control the risk follow the advice in the 'Precautions' section, and:

- control infection in livestock, in consultation with your vet.

***Streptococcus suis* (S suis)**

S suis is a bacterial infection carried by pigs, often without any symptoms in the animal. It can be contracted by humans through cuts and grazes, or possibly by inhalation, and may result in meningitis or death. To control the risk follow the advice in the 'Precautions' section, and:

- use good husbandry to eliminate the disease in stock.

Orf

Orf is caused by a virus carried by sheep and goats - lambs often show most symptoms - and may cause face, hand or arm ulcers if you contact lesions on animals or infected wool, fencing or hedges. Treatment is not usually needed as the lesions heal within six to eight weeks. To control the risk follow the steps in the 'Precautions' section, and:

- consult your vet on how to control the disease in your flock;
- consider using a live vaccine for flocks with an orf problem. This has the added advantage of minimising economic losses from orf infection in lambs, but you need to adopt a safe system of work to avoid self-injection.

Ovine chlamydiosis (enzootic abortion of ewes - EAE)

EAE is caused by the organism *Chlamydia psittaci*, carried by sheep and possibly goats. In humans it may cause abortion or 'flu-like illnesses. It is normally passed to humans during handling or contact with an infected afterbirth, but may also be contracted by contact with soiled workwear that has been contaminated with afterbirths etc.

To control the risk follow the advice in the 'Precautions' section, and:

- avoid contact between pregnant women and pregnant ewes;
- leave soiled workwear at the workplace for cleaning so that wives/partners of those working with sheep cannot contract the disease by contacting it. Provide suitable separate accommodation for clean non-work clothing and contaminated workwear;
- vaccinate breeding sheep if enzootic abortion is confirmed in the flock and seek veterinary advice about treating ewes which have yet to lamb.

Visitors to farms may also be exposed to the disease; ensure they are aware of the risk and, if reasonably practicable, prevent access to risk areas.

Psittacosis (Ornithosis)

This disease is also caused by the organism *Chlamydia psittaci*, often carried by ducks and other poultry (including turkeys) as well as caged, wild and exotic birds. In humans, a 'flu-like illness may lead to pneumonia and in severe cases endocarditis (inflammation of the heart chambers), hepatitis and death. It is usually transmitted to humans by inhaling dust or aerosol from dung or a nasal discharge from infected birds.

To control the risk follow the advice in the 'Precautions' section, and also consider:

- controlling the disease in animals. A high standard of flock husbandry is important - birds under stress will shed more of the organism;
- screening flocks for the organism;
- how to avoid producing dust, eg by not dry sweeping areas where the birds are kept, and maintaining good ventilation;
- for on-farm slaughter of poultry, using local exhaust ventilation in evisceration areas if reasonably practicable; if not, using a respirator that has an assigned protection factor of at least 20.

Q fever

This disease, caused by the *Coxiella burnetii* organism, is carried mainly by sheep and cattle but can also be carried by other mammals, eg deer. It usually leads to acute illness with flu-like symptoms (fever, tiredness, headache and muscle pains). Occasionally pneumonia or other complications may appear. A more serious chronic form can also develop leading to liver and heart-valve damage or death. It is normally transmitted by inhaling dust contaminated with animal birth products, faeces or urine. Under suitable conditions, the Q fever agent can survive for months or even years in a spore-like form. Infection can also occur from drinking unpasteurised milk, tick bites or through skin abrasions. Exposure during pregnancy presents an increased risk of harm to the developing foetus.

To control the risk follow the advice in the 'Precautions' section and also:

- avoid creating dust when moving bedding contaminated with birth products, faeces or urine;
- ensure ventilation systems from livestock sheds do not discharge into areas frequented by people;

- dispose safely of animal waste, in particular afterbirths and bedding soaked in birth products. Wear suitable PPE;
- avoid contact with raw milk from infected animals.

More information can be found on the British Meat Processors Association (BMPA) website (www.bmpa.uk.com).

Ringworm

Ringworm is a fungus which may infect cattle, pigs, sheep, horses and dogs. In humans, inflamed, swollen, crusty skin lesions form on the hands, forearms, head and neck. These are caused by fungal spores entering the skin through cuts and abrasions; spores may be transmitted to the skin from handling infected livestock or equipment such as gates etc that animals, especially cattle, have rubbed against.

To control the risk follow the advice in the 'Precautions' section, and also consider:

- preventing disease in animals by maintaining high standards of cleanliness in buildings, in particular calf pens, cattle crushes etc;
- treating any infected cattle in accordance with veterinary advice.

Bovine spongiform encephalopathy (BSE)/variant Creutzfeldt Jacob Disease (vCJD)

BSE is widely regarded as a food-borne zoonosis. The joint Department of Health/Health and Safety Executive and Department for the Environment, Food and Rural Affairs Advisory Committee on Dangerous Pathogens (ACDP) working group on Transmissible Spongiform Encephalopathy agents (TSE Working Group) acknowledge that there have been no confirmed cases of vCJD (the human form of BSE) linked to occupational exposure. To date there has been no evidence of:

- vCJD being transmitted occupationally, for example to farm workers during contact with live cattle or when handling intact carcasses; or
- scrapie (a disease similar to BSE found in sheep and goats and which has been recognised for over 200 years) being transmitted to humans through direct contact with affected animals (including placental material).

However, the TSE Working Group feels that it is still prudent to take a precautionary approach when considering the risks to people who may be exposed to the BSE agent at work. Where there is a risk of exposure to the BSE agent as a result of work activities (eg slaughtering), then the HSE guidance *BSE: Occupational guidance*³ will help you select the appropriate control measures. These control measures should include the sensible occupational hygiene precautions previously outlined.

References

- 1 *Avoiding ill health at open farms - Advice to farmers (with teachers' supplement)* AIS23(rev1) HSE Books 2000
- 2 *Agriculture - Your health carry card* IACL102 HSE Books 1997
- 3 *BSE: Occupational guidance* HSE 2007
www.hse.gov.uk/pubns/web22.pdf
- 4 *Q fever: Information for farmers* 2008
www.defra.gov.uk/animalh/diseases/vetsurveillance/pdf/qfever-farmers.pdf

Further information

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This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

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APPENDIX 7

Health Risks on Open Farms: Following the Enforcement Management Model (EMM)

Sections in the EMM include the following guidance for inspectors:

35 The guidance in AIS 23 comprises a package of measures some of which are risk based, some of which are not. Failure to comply with a number of the key risk control measures may result in a 'Serious Health Effect' including specifically:

- Where there are no washing facilities or the washing facilities provided fall short of the guidance set out in AIS 23 or the facilities are not properly maintained and members of the public (in particular children) have close contact with *E. coli* O157 secreting animals or are exposed to potentially contaminated animal faeces;
- Where the duty holder has failed to take steps to discourage members of the public from eating in animal contact areas and there is evidence that they are doing so; and
- Where catering facilities and designated eating areas are not properly segregated from those areas where the public are encouraged to have close/ intimate contact with animals or are exposed to potentially contaminated animal faeces.

36 Some control measures such as:

- farm layout and routes
- the provision of information and signage; and
- the provision of training and supervision
- livestock management procedures; and
- the management of manure and compost are essentially risk control systems subject to risk gap analysis and for which the EMM Risk Gap Table for multiple casualties is appropriate.

37 Other measures such as the failure to carry out a risk assessment are not of themselves risk based, but rather are 'administrative failures' for which the level of non-compliance needs to be considered against the authority of the benchmark standard in determining the Initial Enforcement Expectation.

38 These considerations are reflected in Annex 1 which aims to provide guidance to inspectors in exercising their discretion when making enforcement decisions.

It does not seek to direct enforcement in any particular case but rather to:

- promote enforcement consistency;
- promote proportionality and targeting by confirming the risk based criteria against which decisions are made; and
- provide a framework for making decisions on enforcement more transparent and a guide for inspectors in making enforcement decisions.'

An Annex contained a number of scenarios to assist inspectors' decision making.

Reference: OC 130/5, LAC 61/1, available on the HSE website.

APPENDIX 8

Collation of Reports from the Meetings with Parents and from Responses Received by Post

The Terms of Reference approved by the Board of the Health Protection Agency (HPA) included the expectation that the families of those affected by the *E. coli* O157 outbreak would be contacted and invited to put their views to the Investigation. The following is a collation of the notes taken from the face-to-face meetings with parents who met Professor Griffin and those who provided responses by post.

The reports have been anonymised. The letters A-Z represent family names, while number suffixes indicate the identities of children in each family. For example, two children in family A are described as A1 and A2. The hospitals have also been anonymised where appropriate.

A. Reports from the meetings with Professor Griffin

At each meeting, Professor Griffin welcomed the family. He explained that the HPA had asked him to Chair an Independent Investigation into the *E. coli* O157 outbreak at Godstone. He provided a copy of the Terms of Reference for the Investigation which explained what the Investigation Committee would be looking at and gathering evidence about.

He advised that the Committee Members had different areas of expertise and Professor Strachan (for meetings held at Rochester-Chatham), Karen Jones (for the meetings at Croydon) and David Eves (at the Crawley meetings) introduced themselves as members of the Committee. Dr Rosenstein explained that she would be taking notes of the meeting and would email the notes of the meeting to check for factual accuracy. Once agreed they would be put together with all documentation for the Investigation.

Professor Griffin referred to the questions that had been sent to the family with the invitation to attend the meeting. These would form the basis of the discussion but there would be opportunities for the families to add more information. They could also use the responses@griffininvestigation.org.uk email if they wanted to provide further information after the meeting.

I. Family A

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: Mr and Mrs A said the family could not believe what they went through and how sick their son was. It was altogether a painful experience and they would not have gone to the Farm if they had known there was anything there to hurt their son.

Mrs A visited the Farm with her two sons, A1 and A2 and her friend with two children on **Thursday 27 August**. Only A1 became ill. The family had visited Godstone many times before.

On this occasion, they visited the soft play area, had a picnic and then visited the animals in the small animal holding. The children went into the sheep pens and held the guinea pigs.

Sunday 30 August: A1 had a headache and raised temperature. Mrs A gave him Calpol thinking he had a virus/cold.

Monday 31 August (Bank Holiday Monday): A1 developed a stomach ache and by the evening started to have diarrhoea (not bloody at this stage) and vomiting which continued through the night.

Tuesday 1 September: AI had diarrhoea every 30 minutes.

Wednesday 2 September (pm): Phoned GP as AI now had bloody diarrhoea and violent abdominal pain. Saw GP at 5pm and then went straight to A&E at Hospital I, and saw the Paediatric Registrar. Urine and stool samples were taken. AI was kept in overnight with presumptive appendicitis.

Thursday 3 September: AI was cannulated and given IV fluids and further blood tests taken.

Friday 4 September: Paediatric consultant confirmed AI had *E. coli* O157.

Mrs A called her friend who had visited Godstone with her to alert her and also contacted other friends who might have visited the Farm.

Completed form from HPA and noted that the family had visited Godstone. The family understood why it was important to trace the infection, although found it intrusive receiving calls from the HPA to test other son while AI was so ill.

Saturday 5 September: The bloody diarrhoea subsided. The family were made aware of the possibility of HUS developing.

A nurse advised the family to phone the Farm. Mr A telephoned the Farm. The Farm answerphone advised of an *E. coli* outbreak 'in the area'. Husband was shocked to hear this and eventually spoke to the Farm Manager, who did not ask how AI was or say he hoped he got better soon but asked out of curiosity whether AI went into sandpit. Mr A didn't know because he had not been there. The Manager advised Mr A to contact the LA. The impression Mr A got from the automatic message was that it was in the Surrey area, not at Godstone.

Sunday 6 September-Thursday 10 September: AI was producing bloody urine and HUS was suspected. Blood tests were carried out every six hours. The serum urea was increasing and the family were advised that AI was going into renal failure and might need dialysis. AI was vomiting and could not eat. He was given anti-emetics and a blood transfusion. Regular blood tests were taken and a naso-gastric tube was inserted although AI vomited overnight and the tube came out. AI was also seen by a Dietician.

AI was petrified by having blood taken and had a cannula inserted for blood sampling.

On **Friday 11 September**, AI's haemoglobin had dropped again and there was a possibility that he might need another blood transfusion. However by the weekend he had picked up, and on

Monday 14 September, he was discharged. AI was by then clear of *E. coli* O157.

AI continues to have tests for urine blood and protein which are still positive.

He has follow-up appointments at Hospital I, still gets tired and is not back to normal.

He has folic acid daily and the family have been advised that his kidneys remain 'leaky'. AI went back to school two weeks ago, but is attending only for a couple of hours/day. The school had been very understanding. AI cannot eat much at one time but needs to intake 1,800 calories/day and also keep hydrated. He has a bottle of water with him and drinks while he is in class. His brother is OK but missed his parents while they spent time with AI in hospital.

Mr and Mrs A commended the medical team at Hospital I, both while AI was an inpatient and his subsequent follow-up. The parents have been warned about the possibility that AI may have kidney problems in the future.

AI will have a follow-up appointment at the Evelina Children's Hospital next year for an assessment of his kidney function.

AI knows where he got the infection. He was so sick, thought he was going to die and is still having nightmares about it. He has asked lots of questions about dying.

Mrs A noted that the other three children who visited the Farm were unaffected.

Q: Was there anything that AI did that was different from the other children and did you notice anything about the Farm facilities?

A: All three older children (including AI) got in with sheep and fed animals at same time. They washed hands at same time with soap, although it was difficult for the children to push the taps down themselves to keep water running. It was noted that the water was cold, not hot. Mrs A noted that in order to dispose of the paper towels you had to lift the bin lid to put paper in. Mrs A also noted that it was an extremely busy day at Godstone. In the barn, near the picnic area, there were no members of staff supervising the animal contact.

Mrs A noted that the family visited the Farm three times/year and had previously thought that Godstone is a good day out for children. Had there been a notice at the front gate about the outbreak, they would not have visited.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Mrs A had known about the dangers of *E. coli* infection if pregnant and so had not gone into animal enclosures when visiting the Farm when pregnant. She had not appreciated that *E. coli* could have been on floor, etc, but knew they had to wash hands before eating. She did not have prior knowledge of how serious an infection with *E. coli* could be. She had thought *E. coli* was a tummy bug for 24 hours with bit of diarrhoea.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: Don't let children go in to the pens with animals, picking up straw, etc. Mrs A remarked that her mother had been brought up on a farm and that it would be a shame to remove this type of amenity for children altogether. Perhaps there should be an age restriction for children getting into the pens with the animals because you cannot stop younger children touching their faces after animal contact. There should be hot water available to wash.

Mrs A also commented there should be two members of staff supervising, one in the barn with the animal contact and one near the washing facilities.

She also wondered if the animals should be fed by the children in the future noting that in the barn, there was a lot of straw lying around that the children were picking up and giving to the animals. Now knowing that the animals carry *E. coli*, she feels that this should not be allowed.

Q: Do you have any other comments that you feel would be useful to the Investigation?

A: Mr and Mrs A wondered why the Farm was not shut as soon as the *E. coli* was found, noting that the Farm kept some parts open and as an incentive let parents in for free with accompanying children.

2. Family B

Q:What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: Mrs B visited the Farm on **Tuesday 1 September** with her two children, B1 and B2.They had visited Godstone many times previously.

The family arrived at 11am by the main entrance. There were no notices or signs about *E. coli* specifically and no signs about the current outbreak.

The family walked along the main path and looked at the goats. They went into the shop and purchased two bags of animal feed. Mrs B noted that this was the first time they had fed the animals during a visit. They walked round courtyard, but didn't go into the pens. Visited the spinning room where both B1 and B2 spun wool, then the ferrets and then went to the cowshed and stable. The children didn't go into the animal pens but did touch the fence. They then visited the small play barn. Following the woodland walk, the children saw the pigs and goats then washed hands outside large animal barns.

After a picnic in the picnic barn opposite Chipmunks, they went into the craft area and then walked to rabbit section, climbed in and stroked the rabbits. Mrs B noted there was a lot of straw and food on the floor. Mrs B remarked that it was not hard to climb into the pens with the rabbits. They then went into the large animal barn. The children did not climb in with animals, but fed the goats and sheep and their young through the fencing.

Washed hands again outside large animal barn. Mrs B noted that she had taken antibacterial gel with her for use in addition to the handwashing. The children went into the large indoor play barn and then visited the toilet situated in the café area of play barn. Mrs B noted that the basins were located on the outside wall of the toilet area on the café side.

The children had a bit more of their picnic, then played in the indoor play area.

They then followed the path around passing pigs, poultry and donkeys, stroked the donkey and then went into the top animal barn where they fed the goats and cows then washed hands near top barn. Went into adventure playground, played on everything except aerial slides and went in sandpit. Mrs B noted that there was taping around one of sandpits but it had come down.

The children then fed the goats by the goat bridge. Went to the toilet nearest gift shop, washed hands and left via main entrance around 5.45pm.

All the water taps were cold, apart from in the play barn where the water was a bit warmer.

The children were able to wash hands themselves. Mrs B observed a sign which said 'wash hands after handling animals'. However, there were no signs to say wash after touching fencing.

The Farm was busy but there were no queues to wash hands.

Monday 7 September: Children went to school. B1 had stomach ache, Mrs B thought it was nerves due to 11+ exam.

After school, B1 still felt unwell with severe stomach pains and diarrhoea, up all night.

Tuesday 8 September: B1 attended school to sit 11+ practice papers but came home early. Symptoms continued through the night.

Wednesday 9 September: B1 had severe stomach pain. Mrs B gave B1 Calpol, but she vomited it up. B1 then had bloody diarrhoea.

Thursday 10 September: B1 felt better; still had a little diarrhoea, but no stomach pains so returned to school. B2 then had the same symptoms. He had a raised temperature and felt nauseous and severe stomach pains. Had Calpol, but vomited it up. Then had diarrhoea, up all night.

Friday 11 September: Symptoms continued until late afternoon, B2 seemed to improve. B2 managed to eat, and went to football practice. He then became very ill in night.

Saturday 12 September: B1 now fine. But B2 had diarrhoea all day with very severe stomach pains. It started to become bloody. Mrs B then wondered whether to call GP. She saw news about Godstone Farm on TV, then looked on internet and saw that symptoms that her children had indicated they might have *E. coli* O157.

She visited NHS Website and realised they had to go to A&E.

Went to A&E at Hospital 2, were put into an isolation room and closed toilet that B2 had used. By now B2 was very ill. He had a blood test, his temperature was taken and his blood pressure.

B2 was admitted late Saturday, early Sunday when a stool sample was taken and his temperature and blood pressure were checked at regular intervals throughout the night. No antibiotics given.

Saw Paediatrician, explained what had happened. B2 was dehydrated but was very tired and distressed and he refused a drip.

Sunday 13 September: B2 was confirmed as having *E. coli* O157. B2 had four glasses of Dioralyte and 1500ml of water. By the evening, B2 started to get better.

Monday 14 September: B2 discharged, his stools were still loose but bloody diarrhoea had stopped.

Monday 14 September: Mrs B was contacted by the HPA and completed a questionnaire over the phone. Someone subsequently came to the house to take stool samples and the family was given a leaflet about *E. coli*.

Thursday 17 September: B2 returned to hospital as outpatient, blood pressure checked and urine test taken by Paediatrician to ensure kidneys functioning normally. Mrs B was advised to have a urine test done for B1 by the family GP.

Friday 18 September: B1 had urine test and kidneys OK.

Monday 21 September: B2 returned to school.

The children are now back to normal but they are more tired than usual, and have had more coughs and colds than usual.

B2 is now able to tell his friends about his illness and doesn't cry about it now.

Q:What did you know about *E. coli* O157 before the outbreak occurred?

A: Mrs B had previously thought that *E. coli* O157 was foodborne.

Q:Was there anything that you did that was different from previous visits and did you notice anything about the Farm facilities?

A: There were no handouts and no advice, although there are hand-drawn 'wash hands' signs. The only difference about this visit was the new goat bridge and that her children had fed the animals which they had never done before. The Farm was not overly busy. Mrs B doesn't really understand

how the children got the infection. Her children can wash their hands themselves and understand the importance of handwashing. The children did eat in the picnic barn and large play barn but not elsewhere. Mrs B assumes the bug is everywhere.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: Mrs B said she was a parent helper at her children's school and the school does annual trips to Godstone with the Reception Class. It would be a shame if this were stopped as the children enjoy the Farms. However when visiting 'Kent Life' with the school, the children had stayed away from the animal areas. Teaching staff decided this because nobody was sure what the risks were. The teachers were surprised how serious the Godstone outbreak had been.

Practical solutions for school trips such as disposable shoe covers would mean teachers needed to help. Walking through tray of disinfectant might work, and for the children to wear Wellingtons whatever the weather.

Mrs B considered the taps and soap dispenser to be unsuitable as germs can easily be passed on when using them. Need automatic tap and automatic paper towel dispenser. Some thought needs to be given on how to stop children touching the fences.

Q: Do you have any other comments that you feel would be useful to the Investigation

A: The Farm already knew about *E. coli* when Mrs B visited on 1 September but there were no notices about the *E. coli* at the Farm.

Mrs B was unsure about visiting Open Farms in future and was concerned because she had sent her children into school before realising her children's condition.

3. Family C

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: Ms C visited the Farm with son C1 and daughter C2 and some family friends on **Friday 4 September**. The family had been to Godstone several times but noticed differences this time. They thought the Farm was dirty. There were no handwashing facilities by the top barn and they had to go to the toilet to wash hands (100 to 200 metres away). Mother washed C1's hands, picking him up to wash. The water was cold and did not flow very fast – you had to push down on the tap to keep the water flowing.

Ms C noticed that there were hay bales stacked up in large main barn and there was a lot of straw on the floor.

The family did not stay very long in the top barn with the cows as it smelt.

The children didn't go in the rabbit pen but did handle the rabbits and chicks by the main barn. This was supervised but there were no other members of staff around. C2 fed the sheep and then washed her hands. C1 didn't feed the animals.

A staff member was present in the play area.

It was noted that the children had to take their shoes off before being allowed in the inside play area.

Monday 7 September: C1 had diarrhoea. Ms C took C1 to GP because she was aware of the Godstone Farm outbreak from reports on TV. GP gave specimen pot.

Tuesday 8 September (am): C1 had bloody diarrhoea, stomach pains and was very unwell. Ms C took him to A&E at Hospital 3.

C1 produced a stool sample while in A&E which was bloody.

Ms C noted that her son was very distressed because he had been unwell since 25 June. Had been on ventilator (from choking) then had swine 'flu. He remembered these previous experiences and was very frightened.

C1 was admitted. C1 suffered a prolapsed bowel twice while in hospital but the prolapse resolved without the need for surgery.

He was in a lot of pain and was given pain relief. He was vomiting, and not eating and was put on a drip and then on a nebuliser.

Saturday 12 September (Day 5 in hospital), C1 started to drink and kept fluids down and was discharged on eighth day (**Tuesday 15 September**).

Daughter was in hospital for the second half of son's stay at hospital.

Thursday 10 September: Daughter C2 started stomach cramps.

Friday 11 September (am): Went to A&E but was sent home as she did not have bloody diarrhoea.

Friday night, C2 developed bloody diarrhoea and although Hospital 3 A&E is usually shut overnight she was seen because brother was in hospital. Hospital care was very good.

Thursday 17 September: C2 discharged.

Follow-up appointments with the Paediatrician have been arranged for both children.

Fortunately, the kidneys have not been affected and C1 has had no further problem with the prolapse.

C1 had only just returned to play group and the stools are now clear.

Both children have lost weight and are very pale.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Had heard of *E. coli* – getting it from unwashed vegetables but had not heard of *E. coli* O157. The parents had known the children had to wash hands after contact with animals but not of any specific risks.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: The family felt there should be more staff supervising and also improve the washing facilities, allowing faster water flow. There are not enough washing facilities – there were a lot of people waiting to use the sinks.

The family wouldn't visit Godstone again and probably not other Open Farms either. They do not understand why the Farm is still open – given that there was an indication of a problem why wasn't the whole site shut down?

They had not seen any notice when queuing to go in. They had seen a notice by the sinks about handwashing but nothing specifically about *E. coli* O157.

The family would have liked more guidance from the HPA and feel that the Farm should have more regular checks. They feel the issue is how well the Farm maintains hygiene standards. There is a balance between entertainment and health and hygiene.

It might be acceptable for the Farm to run with no contact with animals, although there is a point to having animal 'petting' as well.

4. Family D

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your child?

A: Mrs D visited the Farm with daughter DI on **Tuesday 25 August**. They had visited Godstone twice before and DI especially enjoyed going in with the rabbits.

They arrived at 10am through the main entrance.

Went to the toilet. Then held the chicks and rabbits. Fed the animals and then went in with the sheep and goats. After handling all the animals, went back to wash hands.

Then went in the play barn and used the play equipment.

DI didn't touch the horses, llamas or pigs.

When DI went into the sandpit, she took off her shoes and socks.

Mrs D noted that they had visited a lot of other places during the week, including Longleat and when DI became ill, hadn't immediately linked it with Godstone.

Sunday 30 August: DI started being sick while staying with grandmother.

Monday 1 September: DI was sick and had diarrhoea with violent stomach pains in the early hours of the morning. Phoned NHS Direct and was advised to take DI to A&E.

Family took DI to Hospital 4. The staff were very supportive. Initially diagnosed as a virus, and DI was given antibiotics (amoxicillin). DI couldn't tolerate the antibiotics and vomited them up.

The family returned to hospital at 9pm. DI had bad stomach cramps. She was seen by the Paediatrician. Pots were given for stool and urine samples. Once DI had drunk some water, she was sent home. Mr D returned the stool and urine samples to Hospital 4 later that evening.

Tuesday 2 September: DI had bloody diarrhoea. At this stage, didn't connect this with the visit to the Farm – thought it might be food poisoning. Linked it to the Farm when saw it on news.

DI's stool sample was positive for *E. coli*.

Wednesday 3 September: DI returned to the Hospital for blood samples and checks for kidney function. At this stage, DI was still unwell with stomach pains and still had diarrhoea (bloody). However there was no suggestion that DI was to be admitted.

The family were advised that the blood tests were fine as was DI's kidney function.

DI has had a slow recovery. Her first clear stool sample was mid November.

At a much later date (after 1 October 2009) the HPA contacted the family with a questionnaire which was completed on the telephone. There was a lengthy discussion and it was explained to the family why it was being done.

Q: Did you notice anything about the Farm facilities? Was there anything different about this visit?

A: Facilities at Godstone were basic. The water was cold and the taps hard for DI to use by herself, although there were signs for washing hands. Mrs D noticed paper towels on floor. Noted that by the time they left the Farm at 2pm, it was very busy.

DI had gone into the sheep pen for the first time.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Mr D works for the NHS – knew a bit about *E. coli* from reading. He was concerned about the lack of contact between Trust (Hospital 4) and HPA. Mrs D didn't know anything about *E. coli*.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: Mrs D was concerned about the children's ability to use the handwashing troughs outside main barn. She felt there should be staff supervision. Although there were two members of staff supervising the chicks, Mrs D noted that she would have expected to see staff coming around doing some checks. She also observed children as young as two and three getting in with the rabbits.

In comparison, another Farm the family had visited seemed cleaner and there was a clear use of disinfectant.

The family noted that in the main barn at Godstone, there was hay everywhere, pellets, bits of food, and hay had spread from the pens to the central area where the public walked through.

Although recognising the need for a balance, Mr D felt that getting into the pens and feeding the animals was not a good idea. He did wonder however whether DI might have got her feet contaminated when in sandpit.

5. Family E

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: Ms E visited the Farm with her three children E1, E2 and E3 on **Monday 31 August** (Bank Holiday Monday). The family had not visited Godstone before.

The family arrived at 10am. It was not very busy.

They went past the goats to the main petting area. One of the children stroked a guinea pig. E1 had a guinea pig on her lap. One of the children touched the chicken.

The family then visited the big barn. E1 touched the sheep and the goats. E2 and E3 didn't touch any of the animals in the big barn.

The children then washed their hands. Ms E did not need to lift the children up to wash their hands as they were able to reach the sink themselves. E1 was able to wash her hands by herself under supervision. Ms E thought the water was cold. There were notices in the washing area. Ms E said there were no signs about *E. coli* but there were signs about washing hands.

When they went into the barn, a member of staff was sweeping up hay.

When the children all became ill Ms E tried to understand how this had happened since all the family had washed their hands. When she thought about the day, Ms E realised that she had pushed the buggy through animal faeces and the children had walked through it. However, at the time of their visit it did not occur to her that that would cause a risk of infection.

Thursday 3 September: EI became ill with vomiting and diarrhoea.

Friday 4 September During the day, EI had improved but in the evening, became very unwell. She had stomach cramps every 20 minutes and passed yellow material and blood stained mucus. She was sick several times. However, Ms E took her temperature, and EI did not have a raised temperature.

Saturday 5 September: Phoned NHS Direct – although Mr E reported that EI was passing bloodstained mucus, he was told not to worry and to ensure EI was taking fluids.

Mr E also phoned emergency doctor in the afternoon and took EI to see him at the Hospital 5, and again was told not to worry. The GP did not take EI's temperature. Mr E took a stool sample with him, but the Doctor did not take it as he had no facility to check it. In fact, he did not even look at it.

Mr E phoned the GP and was advised to keep EI hydrated by giving her sugary drinks.

Tuesday 8 September (am): Mr E took EI to doctors and took stool sample to surgery.

Wednesday 9 September: GP advised EI's sample was positive for *E. coli*. GP asked if she had been to Godstone Farm. E2 and E3 now had diarrhoea.

Environmental Health came to the house with a questionnaire to complete.

By the afternoon of 9 September, E2 and E3 were very ill and the family took them to GP surgery, who advised them to take E2 and E3 straight to Hospital 6, where they were admitted straight into the paediatric ward. First E3, then E2 went on a drip.

EI was beginning to feel better.

Thursday 10 September: E3 was transferred to the Evelina Children's Hospital and on the following day, **Friday 11 September**, E2 was also admitted. When E2 was admitted to the Evelina, a neurologist was called quite quickly to see him as they were worried about bleeding on the brain and whether E2 needed a CAT scan. They concluded that he was very unresponsive, limp and floppy because he had been given morphine just before he was transferred from Hospital 6.

E3 went on dialysis (five weeks in total). He subsequently had an infection in the peritoneal dialysis tube and then had haemodialysis. E3 had a temporary catheter for one week, followed by a permanent catheter. He also had two blood transfusions. E3 also had severe water retention.

E2 was on peritoneal dialysis for one week and had been given morphine at Hospital 6 because he was in so much pain. E2 had two blood transfusions.

E2 and E3 have had several follow-up appointments including to the chronic renal failure clinic once a week.

E3 is doing better than expected considering the length of time he was on dialysis. At the moment he has estimated 33% kidney function. He is currently not eating and drinking much at all and is being tube fed and is taking medication for anaemia, high blood pressure and sodium bicarbonate.

E2 has estimated 80% kidney function and is taking medication for anaemia.

E2 and E3 will have full renal function tests in 18 months' time.

EI is OK but has missed a lot of school. She is still feeling tired. Blood tests show that her kidney function is normal.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Ms E had heard of *E. coli* and thought it was just an 'upset tummy'. She had not heard of *E. coli* O157 specifically.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: The family feel that under-fives should not pet animals, especially as from what they have read the under-fives is a high risk group.

The family noted that some of the washing facilities were not close to toilets and this should be rectified.

They also realised that some children had been walking through the barns and then going in the sandpit with their shoes on. Ms E removes her children's footwear before going into sandpits. There were no signs to say take shoes off in sandpit and it might have been possible that the sandpit had become contaminated if some children had gone straight into the sandpit after walking through the barn. They also realised that the same could happen with other play equipment through shoe-to-hand contamination.

Although the family would not have visited if they had not been allowed to take their buggy, perhaps it would be better not to take buggies into the petting areas.

As far as supervision was concerned, the family noted there were two members of staff with the guinea pigs. The water slide was supervised. The main barn and outside sinks were unsupervised.

The family feel that there wasn't enough information as to what the problem was and noted that the Godstone web pages referred to *E. coli* 'in the area' and not the Farm itself. The family read about the *E. coli* in the area after their children had become ill.

In response to Ms E's question 'will you investigate why the farm was not closed earlier?' Professor Griffin confirmed this would form part of the Investigation along with a number of other issues that are being considered.

6. Family F

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: Mrs F visited the Farm on **Monday 24 August** with children F1, F2 and F3 and some friends and their children. They went through the entrance by the goat bridge. Mrs F noticed the signs about washing hands and using gel. Gel was provided. She noted that the goats were next to the picnic area and there were no washing facilities. The family had lunch and then went into the petting area in the big barn. You can walk through this barn and out to the other side.

In the big barn, children can climb into pens with the animals. A sign says two children maximum per time,

but no members of staff were present to supervise. Children climb on to bench and then into pen.

In the petting area, the children handled the chickens and stroked the guinea pigs. After the children came out of the barn, there were sinks. The children then saw the horses and the rabbits.

They then went into the Indoor play area with play slides, balls, etc.

They had tea and then went home.

The family visited the Farm again on **Monday 31 August** (Bank Holiday Monday)

Mrs F noted that her youngest son (F3) could get his fingers into the pen.

Water taps were available so you could fill your own water bottles.

There were handwritten signs by the petting area, but not specifically about *E. coli*.

The area where the animals were housed was changed around between first and second visit. The second visit (on 31 August) was very busy and children weren't allowed to climb in with sheep in the main barn.

However, the children could still touch the animals.

Saturday 6/Sunday 7 September: Mrs F had stomach cramps and bloody diarrhoea. She took Diocalm.

Monday 7 September: F3 had diarrhoea, Mrs F thought he was teething (she only heard about the Godstone outbreak a week later). The diarrhoea was not bloody and Mrs F was not concerned because her older son had also had loose stools at the same age.

Mrs F telephoned the GP and all the family were checked. GP informed HPA – family got a visit and completed questionnaires for all five members of the family.

Mrs F's stool sample was negative for *E. coli* O157. Mr F had loose stools but nothing more.

However, both her sons' samples were positive. Neither was that unwell, although they were not allowed to attend nursery.

It took eight weeks for the stool samples to clear, and the children had to miss many activities and had to settle into nursery again. It was noted that the family were not prescribed antibiotics.

Mrs F was concerned about the possibility that the children are still *E. coli* O157 positive despite having two clear stools. Professor Griffin reassured her that this would be unlikely.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Mr and Mrs F didn't know anything about *E. coli* before this outbreak.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: Mrs F likes the idea of Open Farms. The family had also visited 'Farming World' and felt there was nothing at Godstone to put off visiting for second time. She feels that taking the children to Open Farms is good in principle, but might feel differently if the children had been terribly unwell.

Mrs F felt that when there was the Foot and Mouth outbreak, there were areas where you had to run the buggy through disinfectant. She hadn't thought about washing shoes or the buggy after the visit to

Godstone. It would be good if there were facilities to do this at the Farm.

She thinks her older son (F2) might have got it and given it to F3. She does remember F3 being in buggy and giving him something to eat while the family was in the Barn.

Godstone is a good place to go with a lot of facilities. But the family will be cautious in future.

7. Family G

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: Ms G visited the Farm with her children, a friend and her friend's children on **Tuesday 1 September**. Ms G had visited the Farm many times over the last eight years and never had problems before.

On this visit, the children played in the children's play area and then ate their picnic. They bought feed from the shop and fed the animals. They visited the toilet and went into the barn, but didn't touch the animals.

They walked around the path and along the nature trail.

They then went into the main barn and the children got in with the rabbits. There were no members of staff supervising. However a staff member did come in and asked visitors to move out so they could clean.

The children washed their hands after handling the rabbits and then went into the big barn and fed the animals: goats, Shetland ponies, cow, lambs (some you weren't allowed to feed as they were too young).

Ms G noticed that there was a lot of feed on the floor and children were picking the feed from the floor to feed the animals.

After feeding the animals, the children washed their hands.

The older child (G1) washed her hands and Ms G washed the younger child's hands, putting soap on her own hands then washing her child's hands. She noted that it was difficult for the younger child to push down the taps.

Saturday 5 September: The younger child (G2) had loose stools in evening.

Sunday 6 September: While at football G2 had loose motion.

Monday 7 September: Early hours G2 had diarrhoea which continued through most of Monday and through the night.

Tuesday 8 September: Early hours of the morning G2 had bloody diarrhoea and stomach pain. Ms G took G2 to the GP who took stool sample. At this stage the family didn't know anything about Godstone outbreak.

Wednesday 9 September: G2 still had bloody diarrhoea but was able to pass urine.

Thursday 10 September: Ms G heard about the Godstone outbreak from another parent at her daughter's school.

Friday 11 September: G2's stool sample was positive for *E. coli* O157. Ms G was advised to ensure that her G2 remained hydrated and to call GP if there were signs he was deteriorating.

Monday 14 September: Ms G called GP as her son was very pale and sick. GP suggested taking him to Hospital 7 for a blood test. Saw GP in surgery and was advised to keep an eye on him. G2 slept all day and at 6:30pm got him up. GP telephoned, had spoken to Hospital 7 and advised Ms G to take G2 to the hospital straight away for a blood test in the Children's Unit.

By this time, G2 was vomiting and very dehydrated. He was put on a saline drip. His haemoglobin and platelets were very low and he was looking very yellow, although he didn't have a blood transfusion. Urine samples were taken regularly.

Tuesday 15 September (am): G2 had improved.

Was in hospital for three days and discharged on **Thursday 17 September**.

Ms G feels G2 is still not completely recovered. He is pale and is always getting colds.

Went to back to hospital one week after discharge for blood tests. The results were sent to GP. The family were advised that if there were any problems they would be contacted.

G2 has another check-up in December.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Ms G had heard of *E. coli* but didn't really know about it and didn't realise what it caused.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: The family like Godstone and feel it would be a shame to take away the experience. They don't want the Farm to shut. They do however feel there should be supervision in the feeding area. Ms G had told her children not to pick the food off the floor.

There should be better washing facilities as there is only one main washing area plus the ones by the toilets, and in the top barn there should be a soap dispenser as you go out the door. There should also be a notice advising that if you touch the railings there could be a problem with contamination.

8. Family H

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: Mrs H visited the Farm on **Friday 11 September** with her daughters and her sister and nieces. This was the first time Mrs H had visited the Farm, her sister had been before.

Walked around Farm and went to the barn where sheep, etc, were and Mrs H's nieces fed the animals and H1 touched sheep. The children then washed their hands. They then went to the play area and had a picnic.

Mrs H noted a sign which said wash hands. Her sister had also brought gel with her.

The children played in the indoor play area. It was very busy in the play area, and although the children were supposed to take their shoes off, Mrs H noticed that some children had left their shoes on. H1 went into sandpit and had tried to eat the sand.

The children enjoyed the day.

One week later **Friday 18 September**, Mrs H saw a news article on GMTV about the Godstone Farm outbreak with *E. coli*.

Friday 2 October: Three weeks after visiting the Farm, HI had diarrhoea six times. Mrs H took a stool sample to GP. The sample was runny but not bloody and HI was not unwell. She was not in pain and didn't have a raised temperature.

That evening, Mrs H took HI to an out-of-hours clinic. She was advised to take HI in again if there were any changes.

Saturday 3 October: HI did not eat. The HPA called to confirm that HI had *E. coli* O157.

Sunday 4 October: HI was very ill. She was doubled over in pain.

The family took her to Hospital 8 by which time she had bloody diarrhoea.

HI was able to drink Dioralyte and so she didn't need a drip. She did not vomit.

Blood samples were taken which confirmed that her kidneys had not been affected.

HI was discharged after three days (**Tuesday 6 October**)

She has fully recovered. Mrs H noted that none of the other children got infected.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Mrs H was vaguely aware of *E. coli* and association with farms, particularly being a potential problem for pregnant women.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: Mrs H would not go back to Godstone with the baby or if she did she would keep her in her pushchair. Perhaps it is better not to visit until the children are old enough to understand not to put hands in their mouths.

Mr H would not visit the Farm again and feels the outbreak could have been prevented – in particular, there were not enough signs.

The family thought they should close the Farm, eradicate the *E. coli* and sort out the problems.

Mr H advised that he worked for a meat company. Feels that if there is a single case of *E. coli*, ie, one person getting ill, then the Farm should close until it can be contained.

However the family do feel that it is a shame not to have Open Farms to visit. It is important for the public to be informed and to be provided with advice to keep the family well.

They also noted that when the health protection staff came to the house with the questionnaire, it would have been helpful if they had brought some written advice/leaflets with them. Mr H noted that the visit was made by a non-medically qualified member of staff.

9. Family J

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: Mrs J visited the Farm twice with her children, J1 and J2 in the space of a week (25 August – 1 September).

The children really enjoy visits to Godstone Farm and go regularly. The first visit was with a friend and her child.

The family entered the Farm at the entrance by the main car park, saw the goats, walked to the main area under the goat bridge. The children stopped at the outside play area, situated opposite the main animal barn with wooden slides, etc, in a sheltered area. They then went into the indoor play barn.

Mrs J noted that you can visit the activities in any order.

The children then went into the pens and climbed in with the rabbits. Mrs J noticed a lot of hay and straw in the animal barn.

The second visit was with a friend and her two children. There was a notice advising not to feed the animals. J1 picked up food pellets off floor but was told not to feed the animals.

Washing facilities – trough with taps and soap. The water was cold and J1 could not hold the tap down for the water to run. J2 could press tap down but found it hard to reach.

There was a big wheely bin to put the paper towels with a lid that you had to lift up.

Mrs J also had gel with her and was aware and encouraged children to wash hands, especially after feeding the animals. There was signage around the washing area, but not in the play barn area.

The signs did not indicate how long to wash hands for. The toilet facilities in the indoor play barn were grim – the washing facilities were outside the toilets by the café area.

The toilet floor was wet and Mrs J felt the toilet facilities were not adequate.

She noted another toilet block near the sandpits with washing facilities outside.

Friday 4 September: During day, J2 had loose stools.

Friday 4 September (pm): J2 woke up with stomach cramps every 20 minutes throughout the night; crying on bathroom floor. Had a rash around buttocks and was hot and feeling sick.

Saturday 5 September (early hours): Called local out-of-hours Doctors Surgery. Spoke to nurse, who suggested it might be food poisoning. Family were unaware about the outbreak at Godstone at the time. Family were advised to keep him hydrated.

By 5am, J2 was sick and bleeding from the rectum. This got worse during the day.

Saw out-of-hours Doctor, who prescribed a syrup to relieve the cramps. Examined rectum – suggested putting cream on rash. Sent home to rest.

J2 was pale and listless all day.

By 4pm, J2 had passed so much blood. The family went back to out-of-hours Doctor taking a stool sample with. Diagnosed viral/food poisoning.

Still had stomach cramps and diarrhoea but not as much bleeding.

Monday 7 September: Still not right – went to GP. Took another stool sample to Hospital 9.

Wednesday 9 September: GP called, said he had *E. coli*. Told by GP that it was not contagious and could go to school – advised the family would be getting a call from HPA/LA.

Friday 11 September: Went to school – by this time he had loose stools, not diarrhoea.

Environmental Health called but Mrs J missed the call. Mrs J returned the call at 4pm but there was nobody in the EHD to take the call.

Saturday 12 September: Heard about Godstone Farm on news, then realised the link.

Monday 14 September: Mrs J spoke to the LA. Both children were at school or nursery but after conversation with LA had to quickly take them out.

The family were given sample pots.

J1's sample was positive for *E. coli* O157 but he was asymptomatic. Was off nursery until **25 September** when results showed he has passed two consecutive samples free of *E. coli* O157.

However, J2 was off school until **18 September**, but was allowed to return to school with a positive stool sample. The family were advised by the LA that the older child was deemed to be able to wash hands and have good hygiene and therefore could return to school even though he was still passing *E. coli* O157.

Both children are now OK.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Mrs J didn't know about *E. coli* O157 before visiting Godstone.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: The outbreak seemed very difficult to control. Mrs J wouldn't visit the Farm again because of how distressed her children were. She wouldn't go to another Open Farm but feels it is such a shame because of the positive nature of the interaction between children and animals. It might be better if the children did not touch the animals. She does have reservations about school trips but appreciates there needs to be a balance.

10. Family K

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: The children K1 and K2 were taken to the Farm by their Grandmother on **Tuesday 1 September**. The family have visited the Farm many times.

They visited the animals and the play barn. Their Grandmother did ensure the children washed their hands after animal contact.

She was concerned about how busy the Farm was and had already commented on this to the HPA.

There was also a lack of notices at the Farm about the *E. coli* given there had already been confirmed cases of O157 prior to 1 September.

She remembers seeing one small sign saying there had been *E. coli* at the Farm.

Mrs K noted that in the play area, the children have to take their shoes off. They could have contaminated their hands in doing so and then might have touched their faces. Another source of contamination could be from the fences.

Mrs K last visited the Farm at the beginning of August and doesn't remember much signage. It is also possible to by-pass the handwashing area after the animal contact area. If a lot of children are trying to wash hands at the same time, the water pressure drops and some might give up. The water is cold not warm.

Mrs K noted that at Chessington, there are alcohol dispensers at each pen.

Saturday 5 September: K2 became subdued. Took her to GP as she had vomiting and diarrhoea.

GP diagnosed a viral infection. The diarrhoea continued for a few days, but was not bloody. The diarrhoea then stopped but K2 was terribly sick.

Saw GP second time and took a stool sample.

Saw Godstone on BBC website and realised it was serious.

Saturday 11 September: Took K2 to Hospital 10 A&E. The family said they thought it was Godstone linked but the Doctor was doubtful. K2's urine sample showed large amounts of blood and protein and she was referred to a Paediatrician. K2 drank Dioralyte while they were waiting.

The family noted that the local A&E Departments had not been alerted to the problem and there seemed to have been no communication from HPA about the outbreak to the local hospitals.

The family felt they were 'doing the HPA's job' by advising the Doctors about the possible link with Godstone. It is unclear whether the HPA had informed but their advice was not being acted on.

[At this stage in the meeting, Mr and Mrs K were advised that the HPA does not have the legal authority to ensure that their advice is taken; they can only inform.]

The blood test showed that K2 had renal failure. A bed was available at a specialist hospital and she was taken by 'blue light' to Great Ormond Street Hospital.

She was vomiting so much and in so much pain and couldn't take in fluids orally. However, Doctors didn't think she was dehydrated.

At Great Ormond Street, K2 had a blood transfusion as her haemoglobin was so low.

Monday 14 September: Peritoneal dialysis was started and continued for three days. On the fourth day she was taken off continual dialysis, but had another session of dialysis in the evening. K2 was in terrible pain during the dialysis and was given morphine. However, she responded well and quickly to the dialysis. K2 had constipation following dialysis and a sore tummy.

K2's sister K1 had diarrhoea for one day and was positive for *E. coli* O157, but was not unwell.

K2 had started school (am only), then went well full time but is now off as unwell again with a throat infection. The family have been warned that she might be vulnerable to infection as her immune system is depressed.

She is scarred (Keloid) where the dialysis tube went in and still gets tummy pains.

K2 is having follow-up at Great Ormond Street and would have a full kidney function test in March 2010.

She also has appointments at Hospital 11 at the Paediatric outpatient centre and goes regularly for follow-up blood tests.

Q:What did you know about *E. coli* O157 before the outbreak occurred?

A: The family had not heard about *E. coli* cases at farms and thought it was caused by food poisoning.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: The family feel that you can't mix play areas with animal contact.They also feel that parents need more information – people don't know how serious *E. coli* O157 can be.

Although the family now believe that taking their children to an Open Farm might be an unnecessary risk, it is important to have the right information so the people can make an informed decision.

You can read up on information yourself but you can get conflicting information.

There needs to be a procedure for strict handwashing.The family gave as an example the petting area at Chessington Zoo – visitors are strictly directed one way through the area and then have to go straight to a washing area.

However Mr and Mrs K would not go back to an Open Farm and not even Chessington because the experience their daughter had was so awful.

If people realised the risk they may not take their younger children (under-fives) to Farms. But it is difficult to know where to draw the line.

The Farms need more staff supervising and should not combine farm associated activities with other play activities.

They also feel that for the Farm, it was all about making money – commercial exploits outweigh anything else – the Farm knew there had been previous cases of *E. coli*, so surely something should have been done earlier.

11. Family L

Q:What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: Mrs L visited the Farm with her children L1, L2 and L3 on **Tuesday 1 September**, accompanied by her sister and her three children and some other friends.

They had visited the Farm many times, had parties there and the children had always enjoyed previous visits.

The Farm was quite busy and the family was directed to the top car park.They entered the Farm through the adventure playground.There was a big queue and had to wait about 10 or 15 minutes to go in.

Mrs L queried whether the Farm regulated numbers. Some of facilities were very crowded, the indoor play area especially. It was the busiest she had seen it.

The children went on the outside adventure playground first.All Mrs L's children like this and this is the principal reason for the family going to the Farm.There was no staff supervision in this area, parental supervision only.

Mrs L noted that one sandpit was cordoned off, but there was no notice to say why. Lots of children were trying to get in under the cordon and some children did get in and had to be pulled out.

Mrs L's children used the other sandpit.

They washed hands and then had picnic. The water was cold and there were paper towels all over the floor. Mrs L noted that you had to open the lid of the bins and there was no staff supervision at the sinks.

After lunch, the family went into the large barn with the cattle. The children wanted to see the chickens, but they didn't touch them. Then saw the pigs and piglets. The piglets get out of their pen and run around and the children chase them.

They then went into the main barn with the goats, pony, sheep, cows.

They bought feed from the shop (they hadn't done this before on previous visits). The children fed the goats. Some animals you couldn't feed including pony. The paper feed bags split and the children scooped up the feed from the floor. A lot of children were climbing on the troughs and railings to get to the feed.

Mrs L's children didn't go into the pens. There was a strong smell of manure and lots of straw all over the public area. They didn't stay in this barn long and then had to queue to wash hands. A lot of the soap dispensers had run out.

Next door to the large barn there is a smaller barn to hold animals, chicks and rabbits. The children waited on wooden benches and were handed the animals to stroke.

There was a pony outside to groom and an assistant gave a brush to the children.

The children then washed their hands and went to sandpit outside café. L3 took his shoes and socks off. The older children didn't go in the sandpit.

The children then went to the toilet, washed their hands then went into the indoor play barn, where there were enormous queues.

A basket was given to each family to keep shoes and socks.

The children had bottles of water.

Indoor toilets there was one for small boys and girl and one for older children. Sinks were outside.

L3 fell and grazed his hands. Mrs L used wipes to clean his hands. L3 was very muddy and kicked his boots off in the car.

L3 had just started Reception classes and attended in the afternoon of **Monday 7 September** and **Tuesday 8 September**.

Tuesday 8 September: L3 got up in the night with a stomach upset and needed the toilet.

Wednesday 9 September: L3 had diarrhoea every two to three hours. He was not in pain. He didn't go to school but was eating and drinking (the other children were fine).

Thursday 10 September: The diarrhoea got worse and in the evening, L3 was upset and in pain. Mrs L gave him Calpol, but this didn't work. No blood in diarrhoea but L3 was going every hour and was up most of the night. By 3am L3 had bloody diarrhoea every 20 to 30 minutes and was in pain with the cramping.

Mrs L rang NHS Direct and was told to go to A&E.

Mr L took L3 to Hospital 12 where he was told it was a virus and was sent home.

L3 was not dehydrated, although there was still blood in the stools. Came home 5:30/6am.

Friday 11 September: Mrs L took L3 to GP. L3 was in a lot of pain; and by now was just passing blood. At this point the family were unaware about the Godstone outbreak.

Mrs L gave him Nurofen and Calpol. Took stool sample back to GP, who advised that L3 should rest.

Saturday 12 September, 1pm/2pm: L3 was still in pain. A family member phoned to advise them of the outbreak at Godstone.

They then went back to Hospital 12 – and said they were aware of the outbreak. Didn't have result of stool sample.

Saw Paediatrician who checked him.

L3 was discharged. The family were advised this was not related to Godstone and L3 just 'had a bug'.

Sunday 13 September early am: The family took L3 back to A&E. He was very dehydrated and very floppy. L3 was then admitted although there were no beds at Hospital 12 and so he was transferred by ambulance to Hospital 13. At this stage a diagnosis had still not been made.

L3 was put in isolation and put on IV fluids, although he didn't receive any pain relief.

He had diarrhoea every 20 minutes all through the night.

Monday 14 September (early hours): The family were informed L3 had HUS and kidney failure.

No results were available that day. The Doctors at Hospital 13 were in contact with Great Ormond Street Hospital and Evelina Children's Hospital and later that day, L3 was transferred to Evelina.

He had peritoneal tube line and dialysis straight away.

The other children went to Grandparents.

L3 was on dialysis for four weeks but the catheter was kept in for another two weeks.

L3's potassium levels were too high and he was given sodium bicarbonate to reduce them. After dialysis, L3 was in pain from stitches and remained in hospital for six weeks.

L3 is currently being followed up. He is still lethargic and has lost one stone in weight.

His kidney function is currently 39% (28% when he left hospital).

He is getting better but can't walk much. He has lost confidence, has nightmares and is preoccupied with hospital. He has gone back to school for a couple of afternoons but does get very tired.

He is going back for follow-up at Evelina Chronic Renal Failure Clinic at the beginning of December 2009.

He has his blood pressure measured every week and is still on medication for his blood pressure.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Mrs L wasn't aware that *E. coli* could cause so much pain. She knew you could get it from uncooked meat, but was unaware of the association with Open Farms and the problems associated with *E. coli* O157 infection, particularly in children under five.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

There is signage at the Farm for washing hands but there are not enough sinks and some of the sinks are distant from the facilities.

Mrs L thinks petting animals for young children is an unnecessary risk. She also thinks that the Farm was overcrowded on the day she visited so thought is needed about the maximum number of people being allowed in at any one time.

The play areas also need supervision.

Mrs L feels very strongly that what happened was completely out of her control. Mrs L feels L3 suffered terrible pain, discomfort and fear; something such a young child shouldn't have to cope with. The Farm shouldn't have been open to the public when they were fully aware that *E. coli* O157 had been detected at the Farm. She feels her children were put at unnecessary risk and is angry that her youngest son L3 has been permanently damaged.

12. Family M

Before Professor Griffin asked Mrs M about the experience of her family, Mrs M provided Professor Griffin with a list of questions and requested a response to these. Professor Griffin provided Mrs M with a response to these questions and advised her that the Terms of Reference for the Investigation were very broad such that the Report should satisfy Mrs M with regard to the areas covered by her questions. Mrs M was advised that no notes were taken by the Secretariat during this conversation. However, notes were made by Mrs M and on behalf of Mrs M by her solicitor. (Mrs M's record of the questions and Professor Griffin's responses are included after the notes from the meeting – they have been amended by the Secretariat for scientific accuracy). During the course of this discussion Mrs M questioned Professor Griffin's independence, given that in 2004 Professor Griffin chaired a Scientific Advisory Committee on behalf of the HPA, Medical Research Council and BBSRC. Professor Griffin said that he was there to advise but was not employed by the HPA. He went on to say he was not beholden to any of the organisations above. He is a completely independent person and this would be demonstrated in the report. Professor Griffin then proceeded to the part of the meeting on which these notes are based.

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: Mrs M visited the Farm on **Thursday 13 August** with two daughters, M1 and M2, together with the son and daughter of her neighbours. The Family had visited Godstone twice before. Mrs M noted that all were vigilant about washing hands and also used gels. At the Farm there were huge spaces for children to play in and small areas for the animals. Mrs M also noted that piglets were running free around the children and were not contained in penned areas.

Saturday 15 August: M1 had a raised temperature which resolved.

Monday 17 August: M1 developed cramps during the night. M1 was up all night either vomiting or with diarrhoea and in a bad way and Mrs M called her GP.

Tuesday 18 August: M1 saw her GP who arranged for her to be immediately admitted to the Hospital I4, where she was given IV fluids. Stool samples were taken and M1 was also given Calpol and something to relax her stomach, but this didn't work. They tested for five bacteria including *E. coli*. The diarrhoea and vomiting continued and blood samples were taken. The C Reactive Protein (CRP) was 90. (CRP is an acute phase protein in plasma and is a non-specific systemic marker of inflammatory process in the body). Intussusception was ruled out. This continued all throughout the week. Mrs M had never seen a child in such pain.

Friday 21 August: M1 had a raised heart rate of 170 during the night – Mrs M thought that HUS must have kicked in then.

Saturday 22 August: M1 was in a lot of pain. She was pale and very lethargic.

Sunday 23 August: The Family were informed that M1 had kidney failure. She was then moved to the Evelina Hospital, where she was given two blood transfusions. For dialysis she had an operation for putting in the peritoneal dialysis tube and she was dialysed for 10 days. The catheter was left in for another two nights and then removed.

M1 is still not 100% and has suffered emotional trauma. Mrs M noted that all the children behaved identically; there was no particular time or activity that M1 did differently, but her younger sister M2 did not get *E. coli* O157. M1 is due to have a Glomerular Filtration Test to see if there has been any lasting damage to the kidneys. She is still weak and finds it difficult to sustain a full week at school.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: Mrs M feels that the enjoyment of the day does not outweigh the risk of exposure to *E. coli* O157.

She had not been aware of the risk before going to the Farm and feels that parents need to make informed decisions before choosing to visit Open Farms. Mrs M understood that trying to get farms *E. coli* O157 free is impossible. Advertising is needed to inform people about the risks. Information needs to go to parents and schools as the majority of people who visit Open Farms are completely unaware of the risks. Professor Griffin confirmed that the Committee is looking at risk assessment.

Mrs M expressed concerns that the piglets were allowed to escape from their pens and their mother. The children were running around after them. Mrs M thought that if you have piglets running around they could possibly cross-contaminate the whole farm. There was then a discussion about whether *E. coli* O157 is on the railings. Professor Griffin confirmed many creatures can carry it, particularly ruminants. Professor Griffin noted that *E. coli* O157 is the most serious type of *E. coli* as it produces a toxin that goes around the body and affects cells. If infected, about 15% of cases progress to HUS.

We all have other types of *E. coli* in our gut.

Mrs M thinks that children should wear gloves when handling the animals or alternatively that this type of farm should be closed and Godstone should be a play and activity amenity only – this is more appealing than the animal contact areas.

She noted that you didn't get infections from zoos – but they do have petting areas, so what is the difference.

Mrs M said that petting farms could be allowed if *E. coli*-free. If they have outbreaks then move the animals to different parts of the farm. One of the huge problems is that M1 was one of the earlier cases. Mrs M spoke at length to the HPA. The Family had been on holiday and they asked about ice

creams. Mrs M spoke to them over the telephone and she cannot understand why it took them so long to close the Farm down and so many people to be affected. Mrs M had heard of cases in March and April. Professor Griffin confirmed that one of the things the Committee is looking at when addressing this question very seriously is the sanctions which responsible authorities have when these sort of things happen; the Committee wants to make sure the responses are proportionate.

Mrs M commented that when a child has *E. coli* the response is huge (barrier nursing, tests before they can return to school, etc.) but when there is an outbreak at a farm in terms of protection there is a contradiction between what is done with the child in terms of not letting them back to school and what happens on a farm which is not closed down. The point is that we allow a child to become infected with this disease through poor controls at petting farms but when the child contracts the disease then we isolate them from society, ie, they are not allowed to go back to school until *E. coli*-free, and put into isolation at hospital.

Professor Griffin confirmed there is no human vaccine at the moment.

Mrs M said that the responses from the HPA seem to be slow despite Mrs M speaking to them over closure given the incidents of HUS in March and May. Professor Griffin confirmed the Committee was looking at the timescale to get an idea what is involved.

Mrs M commented that the Dialysis Sister at Evelina told her that when she visited an Open Farm she never let children touch animals. This is after 20 years of dealing with children with HUS. Professor Griffin said that the risk is almost certainly not just from touching animals. There are other means by which it can be contracted. There are practices we would like to see in general that may reduce risk.

Mrs M is shocked that Godstone is open now and asked who would be liable had someone died in the outbreak.

Mrs M had spoken to the HPA and was disappointed that she hadn't received a call from Justin McCracken despite him saying on TV that he would contact all the families affected. Mrs M said that no-one voluntarily contacted her – she did, however, contact the HPA and spoke with someone within the Department.

Addendum

Mrs M asked Professor Griffin the following questions. The answers have been written by Mrs M after meeting Professor Griffin and corrected by the Secretariat (for scientific accuracy only).

1. What is Professor's Griffin's relationship with the HPA? And has he carried out any other investigations for the HPA before?

Answer: Professor Griffin confirmed he is independent from the HPA as will be seen in his report.

2. Is Professor Griffin a special advisor to the Government?

Answer: Professor Griffin confirmed that he is independent although he does advise the Government on occasion as an independent expert. For example, he gave evidence to a select committee on laboratory microbial containment.

3. Are animals routinely tested for *E. coli* O157 at Petting Farms? And what percentage of animals carry the bug?

Answer: No. In terms of percentage of animals excreting the organism in faeces, this varies considerably from time to time in the same animal. That percentage will be in the report.

4. Are animals vaccinated against *E. coli* O157?

Answer: Vaccination is used in some centres in the USA but there is no vaccine registered for animal or human use in the UK. The Investigation Committee will be reporting on this. The Committee will be looking at how the HSE, local authority and HPA worked together; what happened when outbreak reported.

5. When MI was admitted to the Evelina Hospital they quarantined her and implemented barrier nursing – this is where they use disposable gloves and disposable aprons? The conclusion you have to make is that they didn't think that handwashing alone was sufficient against contracting the *E. coli* O157.

Answer: Barrier nursing is used in the clinical setting to ensure that the risk of spread of the organism is reduced to a minimum and is commonly used in these and similar circumstances. It is a method to prevent contamination between patients and the spread of the infection through a ward. *E. coli* is only one type of gastrointestinal pathogen. There is no statutory requirement for stool testing but it would be inappropriate practice not to do so in this clinical situation. When an individual gets an enteric pathogen there is an incubation period, then the clinical patho-physiology ensues (illness including diarrhoea, etc). However someone may carry the organism without having any symptoms (asymptomatic carriage) and they may be potentially infectious. It was noted that farmers do not use disposable gloves and aprons.

6. What water temperature is needed to kill the *E. coli* bug and have you tested the temperature of the water at Godstone Farm?

Answer: Professor Griffin commented that he did not know. However the temperature of the water classically used for killing organisms is around 60°C over a period of about 30 minutes. This temperature and time are clearly not suitable for handwashing. At the moment HSE says use warm water with soap for handwashing. When we use soap it can destroy biological membranes of cell walls. Different concentrations have different effects. Professor Griffin noted that the drinking water at Godstone had been tested as part of the outbreak investigation and *E. coli* O157 had not been found.

7. Were the piglets carrying the disease?

Answer: Professor Griffin did not know but confirmed that they had been tested. They can carry *E. coli* O157. One of the things we are looking at is the animal husbandry and the care. We are seeking advice on the best ways to look after animals on farms of this nature.

8. How pervasive was the *E. coli* O157 at Godstone Farm?

Answer: This will be in the report.

9. How much of the bacteria *E. coli* O157 is needed for a person to become infected and how does this differ from other bacteria?

Answer: Professor Griffin confirmed that there were many differences among the enteric pathogens. *E. coli* probably only spread faecal-orally. Compare with salmonella – could be as low as 1,000 or 10,000 organisms. At the other end of the spectrum – only need around 10 viable organisms of shigella to cause clinical symptoms.

10. How many outbreaks have there been in the last 10 years at Godstone Farm?

Answer: Professor Griffin confirmed that this is being looked at in the report.

11. Are Petting Farms the greatest source of *E. coli* O157 infections within children?

Answer: Professor Griffin said no – if you look at occurrence of O157 across the country there are many sporadic outbreaks across the country. Godstone is unique owing to the size of the outbreak. Most cases of *E. coli* O157 are thought to be caused by food poisoning. Reason is that when animals are slaughtered, faecal matter gets on to meat which isn't cooked which is why cold meat should not be in contact with prepared food. With *E. coli* O157, as a whole throughout the year, food is the biggest issue.

12. How do farmers protect themselves and how does this differ from the practices at petting farms for the general public?

Answer: Farmers do not use rubber gloves, etc. In addition, it is possible that they develop immunity through prolonged contact.

13. At Godstone Farm there are large play areas but small enclosed animal areas with lots of different animals. Does the small space encourage cross-contamination and act as a breeding ground for infection?

Answer: We are looking at the animal husbandry aspect.

14. What are the guidelines in other European countries and how do the HPA guidelines differ from, say, the guidelines within France or Germany?

Answer: Professor Griffin explained there are experimental vaccines but none registered in Europe or the USA. The spectrum of disease seen by people we have interviewed goes from carriage with no symptoms through to the terrible problems that you and your family and child had. There is probably a genetic component to susceptibility. We think we know how the VTEC works on the kidneys. One of our recommendations will be that we get rapid diagnosis and also to identify children at risk of getting HUS. One of the things the Committee will recommend is that there is research along those lines as one of the priorities. Research takes a long time and is expensive but we will recommend it as a priority.

13. Family N

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: Mrs N visited the Farm on **Tuesday 25 August** with six children. Of the children, three had serious sickness and bloody diarrhoea and one, NI, was seriously ill. The family had previously visited the Farm regularly.

The family arrived through the top entrance. They had lunch and then went to the playground for about one hour. NI likes the adventure playground and doesn't particularly like the animals. This time however he did go in with rabbits for the first time. When he finished with the rabbits, he washed his hands. He didn't want to pet the other animals (chicks) etc.

The children then went to the inside play area – they didn't stay very long because it was very busy.

The other children went in with the animals. They went to the top barn with the goats/sheep. Mrs N noted that you have to walk over to the toilets in order to wash. It was therefore possible for children who went into the top barn to go straight to the play equipment without washing their hands.

Mrs N also noticed pigs running around; a notice states that the pigs are free to roam.

She noted that prams and shoes contaminated with animal faeces on them might then contaminate equipment that other children then used.

Mrs N noted that at Godstone the 'open' animal contact area was established first, but then the Farm was extended to include the play areas. Some people will only visit the play areas and not be bothered about the animals.

Saturday 29 August: NI had loose nappies but was not poorly. Mrs N thought he was teething.

Sunday 30 August: The family went to a barbecue.

Monday 31 August: NI had a bloody nappy, then several more loose stools, then produced another bloody nappy. He was listless and refused to drink.

Mrs N phoned the out-of-hours Doctor service as this was Bank Holiday Monday. Mrs N was advised to go to the walk-in clinic at Hospital 15. Saw a Doctor who thought NI was dehydrated and considered admitting him. NI went into the assessment centre and was given Dioralyte and had a rectal swab taken. He wasn't vomiting.

Mrs N mentioned the family had visited Godstone and were told that a number of cases had already been seen. The attending Doctor thought that NI might have *E. coli*.

NI then had a urine specimen taken and as he had managed to pass urine, he was sent home.

Tuesday 1 September: There was no improvement. NI wouldn't drink Dioralyte and the diarrhoea was worse. The family took NI to the walk-in clinic again. Blood was taken for kidney function and NI was sent home again as he had passed urine.

Thursday 3 September: The Paediatrician telephoned advising that NI was positive for *E. coli*.

The LA phoned with a questionnaire and Mrs N mentioned that they had visited Godstone.

Friday 4 September: Went back to hospital again, but again, NI was not admitted.

Sunday 6 September: NI's feet were swollen.

Monday 7 September: NI was a little brighter.

Tuesday 8 September: NI vomited in the car on the way back from his Grandparents. His hands and feet were swollen and although the family phoned the GP they couldn't get an appointment until the Thursday.

Wednesday 9 September: The family returned to the Hospital. Took blood straight away. NI was very anaemic and was put on a drip. A decision was taken to transfer him to a specialist hospital. NI was eventually transferred to the Evelina Hospital at midnight. His kidneys weren't working properly and the family were informed that NI would require dialysis.

Both parents very concerned that their local hospital hadn't emphasised the importance of NI needing to urinate. The Consultant at the Evelina explained about the dialysis and only then did the parents understand about the damage caused by *E. coli* O157.

At this stage Mr and Mrs N hadn't heard about the outbreak at Godstone. At the Evelina, they met other parents whose children were also being admitted with *E. coli* O157.

Thursday 10 September: NI was operated on for insertion of the peritoneal tube.

At this stage the Ward started to fill up with cases of *E. coli* O157 from Godstone.

The Consultant on Beech Ward who was the renal specialist was on the telephone all night to HPA and other consultants at other local hospitals.

The Consultant then telephoned on **11 September** requesting the Farm to be closed. The Farm closed completely on 12 September.

Mr and Mrs N could not understand why part of the Farm had been kept open and Mrs N spoke to the press to complain that the Farm had remained open.

The Farm had apparently made a statement about loss of business and Mrs N noted that a lot of people had visited the Farm over the October half-term holiday when the Farm had re-opened.

NI spent three weeks in hospital and had three blood transfusions. He is still anaemic and loses energy quickly. He still has nightmares, but is getting back to his normal self.

Mrs N would not take the children to the Farm again.

Q:What did you know about *E. coli* O157 before the outbreak occurred?

A: Mrs N thought *E. coli* was foodborne. She knew farm animals carried *E. coli* but thought that the only real risk was to pregnant women. She had not realised that the *E. coli* could stay on the ground.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: There is a need for the Farm to carry out proper risk management. The family compared this business with how effectively Disney runs theme parks. There should be a clear risk assessment of the Farm available whenever it is inspected.

The Farm should put up effective signage.

The family think the Farm put their commercial considerations above public health and they are disappointed that the HPA does not have the authority to close Open Farms. The Farm was not proactive and had to be put into a position to close voluntarily after the HPA had spoken to the Farm owners.

Mr and Mrs N do not understand why the HPA does not have the power to enforce closure. For the future, the HPA needs to have the authority to close Open Farms or there needs to be another identified responsible organisation.

Mrs N said that she had heard that there had been previous issues with cleanliness on the Farm. Washing facilities have to be close to animals and there needs to be more of them. The farms should wash down their play equipment regularly to avoid it spreading. Maybe under-fives should not touch the animals.

People need to be more aware of how seriously ill young children can get – although it is very difficult to get the message through – people think it won't affect them. Could consider stopping children petting animals, although Mrs N thinks this would be a shame. Even if this is stopped, it would not stop the buggies getting contaminated.

As a comparison, Mr and Mrs N considered Drusillas Park (in Alfriston, East Sussex) was a very good park, but there is no hands-on contact with the animals.

They feel that there should be a blanket decision made on animal contact – parents should not have to use their own judgment.

Mrs N advised Professor Griffin that she was a teacher. Trips to Godstone have been cancelled by her school.

The parents were upset how long it took for HPA to apologise. When they finally received a telephone call from HPA, they were advised there had been administrative errors.

14. Family P

Q:What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: PI was taken by her Grandparents to the Farm on **Wednesday 26 August**. Mr P and Ms P had visited the Farm with their daughter before.

On this visit, PI touched the animals: guinea pigs, sheep, ponies, rabbits. She also went into the large barn. The Grandparents remembered that there was no hot water and there were few washing facilities, PI's Grandmother being very particular about hygiene.

There was also no visible signage about *E. coli*, although there was a sign about washing hands.

It was very busy – PI had a tractor ride and visited all the areas and enjoyed the day.

Thursday 3 September: PI had diarrhoea. She had visited Chessington during the day and was very pale in the evening and sleepy in car travelling back.

Friday 4 September: Early hours of the morning, PI had diarrhoea. Ms P rang NHS Direct and was advised to go to GP asap. Went to GP who diagnosed it as 'dysentery'. GP wrote a note to the A&E Department at Hospital 16.

The family went to the Hospital where PI was kept in for six hours. PI's arm was prepped for blood tests. A stool sample was taken and her fluid intake was monitored for one hour. PI was then sent home. Her parents were advised that the results would be available on **Monday 7 September**.

Saturday 5 September: PI was passing blood only. She then had severe bouts of vomiting. Ms P tried getting Dioralyte into her and took her to the out-of-hours Doctors service.

Monday 7 September: Phoned GP and given the results as presumptive *E. coli* at this stage. The GP suggested that she arranged another GP appointment for the following day. However, Ms P felt that PI should go back to Hospital.

The family returned to Hospital 16 where PI had blood tests. The family were then advised that PI had renal failure and needed to be transferred to the Evelina Children's Hospital.

The family had no idea about *E. coli* and at this stage thought PI had food poisoning.

Tuesday 8 September: Early hours, PI was transferred by ambulance to the Evelina Hospital, where the Consultant explained about *E. coli* O157 and confirmed that PI had HUS and thrombocytopaenia.

Wednesday 9 September: PI had peritoneal dialysis, a blood transfusion and packed cells. She also had sodium bicarbonate because she was acidotic (showing increased acidity in the blood).

PI was on dialysis for 10 days and had blood tests every morning. She was vomiting continuously and so had a naso-gastric tube.

PI has regular blood tests which will continue up to early adulthood.

She has been back at school full time from mid-October, but tires quickly. She used to be very energetic. She lost weight but is now gaining pounds and has just finished daily folic acid. She continues to be susceptible to infections. She is needle phobic and reluctant to eat next to people.

She used to be very gregarious. Her parents have explained to her about the *E. coli* O157 and how she was infected.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: For future, need better inspections by animal welfare and health and safety. From their own personal experience, PI's parents would want these Farms shut, but do appreciate this could be an enjoyable experience for children. Better practices are needed rather than closure.

To reduce risks, there needs to be more public awareness of *E. coli* O157 and what it can do, particularly that *E. coli* O157 is not particularly susceptible to gels – it is better to use soap and handwashing.

The parents felt that not enough attention at the Farm was given to health and safety – there was an

element of complacency. There is a need to exclude any animals with *E. coli* O157 and areas where the public go through thoroughly cleaned and disinfected.

PI's parents felt it is an important experience for children, but correct procedures should be in place and information available. Inspection reports should be available or the dates when the inspection took place. Perhaps Open Farms should have a licence or certificate, but then this needs to be monitored.

They did not feel that issuing disposable gloves was an answer.

15. Family Q

Note: Mr Q reported on his experiences with his daughter's *E. coli* O157 infection acquired as a result of a visit to Godstone Farm earlier in the year (March 2009) and separate from the August 2009 outbreak.

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: Mr and Mrs Q visited the Farm with their two daughters Q1 and Q2 on **Sunday 8 March** for a friend's daughter's fifth birthday party. They had not visited the Farm before, but knew about it from friends.

It was a cold dry day. They arrived at 10:30am and set up the party in the lower barn.

The food was set up in the L-shaped barn.

Q1 and Q2 played in the large barn area on swings, etc.

They then went into the lower barn to feed and stroke the animals. Q2 dropped food on the floor but Mr Q didn't let her pick it up. However, she did touch the metal railings. The barn did smell but one would expect that. Q2 fed the lambs, sheep and the cow. Mr Q didn't notice anything wrong with the animals.

Q2 didn't like the sheep licking her hands. There was no cleaning area in the barn and so she wiped her hands on the back of her Father's trousers.

Q2 enjoyed the Farm – it was only the second time she had fed animals. They were in the barn for about 20 minutes. They then washed their hands with soap. The water was cold and there was no air dryer. Mr Q couldn't remember if there were paper towels available. There were signs for washing hands, but no warning signs about *E. coli* O157.

There are two ways in and out of the barn – at the exit there was handwashing but not at the other end.

Mr Q noticed that some children didn't wash their hands after they left the barn (although not with their party). No members of staff were present to supervise handwashing.

The family then went to the L-shaped barn for the party lunch. After the party, the Q family stayed with host family to continue to play on the equipment.

Looking back, Mr Q noted that there was nowhere to wash hands in the area where they had food.

Also at the top part of the Farm where there is the adventure playground with slides etc, they also had something to eat and there was nowhere to wash.

Mr Q noted that his older daughter Q1 didn't become infected.

Wednesday 11 March: Q2 was sent home from school with diarrhoea. Didn't link this with the Farm at the time and didn't think it was associated with food poisoning as Q2 eats very little meat. (Mr Q noted that his father-in-law is a LA inspector.)

Friday 13 March: Mr Q phoned GP and took a stool sample to the local hospital.

Saturday 14 March: Q2 couldn't urinate properly.

Sunday 15 March: Took urine sample.

Tuesday 17 March: GP telephoned with result. By this stage Q2 couldn't pass any urine and had

diarrhoea with blood and mucus. Saw GP who referred Q2 to the A&E at Hospital 17. Tests were carried out and Q2 was admitted.

Wednesday 18 March: Q2 was taken by ambulance to Great Ormond Street where she was diagnosed with acute renal failure.

Thursday 19 March: Q2 had surgery for catheter.

This was taken out and put back in again on Saturday.

Wednesday 25 March: Came off dialysis.

Saturday 28 March: Q2 was discharged but returned to hospital for the dialysis tube to be taken out. In total, Q2 had 12 to 14 days of dialysis and two blood transfusions. The staff at Great Ormond Street were excellent.

Q2 went back to school on 20 April, part time at first, then full time. Q2 is fine now but has two abdominal scars. Mr Q is a little concerned about the colour but the scars are not inflamed.

Q2 is returning annually to Great Ormond Street for follow-up and Mr Q understands this is for the rest of her life.

Blood tests show a return of renal function. The family don't know what the long-term effects are for Q2 and have considerable concern for her.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: The family hadn't been to many Open Farms before. They didn't know the implications of *E. coli* O157 and trusted that the layout was fine. They didn't question that at the time.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: After this experience, Mr Q thinks certain things could have been done better, in particular:

The handwashing facilities were poor; there was a lack of supervision, the play area and animal contact areas in the farm are adjacent and some animals are wandering around.

Mr Q noted that at another Open Farm (Woodside Farm), some animals also wander around and there are no signs to say wash hands.

Mr Q questioned why the outbreak happened at Godstone Farm in the first place. The requirement for adequate washing clearly didn't work. Mr Q wondered if the Farm had not been cleaned properly - there was muck on the floor and lot of children were picking up pellets from the floor to feed the animals.

Perhaps there should be a stop on feeding the animals. Although it is nice for the children to do, the risks are awful.

Professor Griffin explained that the cleaning in the animal barns comprised of a hose down every three months or so. Mr Q said he would have expected it to have been done daily or at least once a week. In Mr Q's view the cleaning practices were bordering on almost recklessness. Professor Griffin commented that the farm was self-audited, ie, it arranged its own cleaning programme and working practices.

Mr Q works on financial risk assessment and therefore appreciates that one might say acquiring *E. coli* O157 infection is low risk because of the numbers globally. There is a need to look at mechanisms for risk assessment and also who does the risk assessment.

(In the financial sector, an independent administrator looks at the financial health of the company –

perhaps this could be parallel for risk assessment on Farms). There is a need for regulations externally and for the Farm itself.

Mr Q feels on balance, Open Farms should continue as it is a good day out, but without animal contact or feeding. He feels that it is counterproductive for children to exist in a 'sterile' environment. He cited Whipsnade Zoo as a good example. Mr Q wouldn't take his children to a petting farm again even if there was a 'no touch' policy in place.

Should farm practice be different for Open Farms compared with commercial farms?

There should be warning signs – if you don't wash, this is a risk.

Mr Q spoke to Surrey County Council at the end of April to ask what action was taken regarding the Farm. He was passed from pillar to post – because Q2 appeared to be a single case nothing was going to happen.

Mr Q advised Professor Griffin that he had given an interview to the BBC in September and found out from the BBC there were two cases at Godstone in May prior to the outbreak in August. It appears that the HPA didn't know about these previous cases.

Mr Q was told by the Consultants at Great Ormond Street that they believed Q2 acquired the infection from the Farm and that as *E. coli* O157 is a 'notifiable disease' they would take appropriate action.

Mr Q asked the Consultants at Great Ormond Street about the process for notification. He understands that HUS is not currently notifiable. However, there is a list of notifiable diseases and procedures to follow if a particular infection is defined as 'notifiable'.

Mr Q noted that it wasn't clear that information went back from Great Ormond Street to Hospital 17 and also to the HPA.

There was also an issue about when there is an 'outbreak' because this is currently defined as two linked cases. At the time Q2 was one case. However with a further two cases in May, Mr Q would have expected flags of concern. But with many links in the chain, there is a chance of one of the links being broken.

Mr Q noted that the press announcements from the HPA referred to the outbreak in August being the first time at the Farm, but Mr Q knew that this wasn't the case.

When to re-open the Farm? Mr Q realises you can't have a sterile environment. Feeding animals therefore is one of the highest risks and education for parents is thus important.

Mr Q concluded by saying that he had conflicting information about *E. coli* being notifiable, there was a lack of communication on information about the earlier cases and later ones, the County Council was not bothered when Mr Q queried what action was being taken, and there were no checks nor an action plan to correct the original infection at the Farm.

16. Family R

Q: What was your experience during the outbreak of *E. coli* O157 infection that involved your children?

A: Mrs R visited the Farm with her son R1 and her friend and her two daughters on **Sunday 30 August**. They had visited Godstone twice before.

R1 doesn't like touching animals so he didn't go into the pens and didn't feed the animals. He enjoys the play area more than the animals.

The family walked through the barns, washed their hands (R1 can do this himself) and had lunch near the covered area. In the afternoon, the children played in the big play area and in the sandpit. They had ice creams and chocolate (which R1 might have eaten without washing his hands). They then went into the play barn before going home. Mrs R noted that her friend's two daughters did not become unwell.

She didn't remember seeing a lot of signs about handwashing or *E. coli*. The washing facilities were in the correct place near the animal contact areas but there was no staff supervision in this area.

Friday 4 September: RI had diarrhoea on return from school with flecks of blood. He wasn't that unwell.

Sunday 6 September: RI was a bit better.

Monday 7 September: RI off school.

Tuesday 8 September: RI went back to school. He had a bit of tummy pain, but no diarrhoea.

Saturday 12 September: Mrs R heard about Godstone on the news and telephoned NHS Direct to ask what to do. She was advised to take RI to the GP and have a stool sample taken.

Tuesday 15 or Wednesday 16 September: Mrs R took RI's sample into the GP.

Monday 21 September: GP telephoned to confirm RI had *E. coli* O157.

The GP had informed the HPA. The LA EHO then telephoned the family to go through the questionnaire and said that RI couldn't go to school until two consecutive stool samples were free of *E. coli* O157.

RI returned to school on **1 October**.

Mrs R thinks there could have been other children who had visited the Farm who might have *E. coli* O157 and attended school with it. Professor Griffin felt that this was unlikely because the children would have had diarrhoea if they were infected.

She was also concerned about the long-term clinical outlook for RI. Professor Griffin explained that it was unlikely that RI would have long-term renal complications as in his case the infection resolved without renal involvement. Mrs R noted that she had received very good advice from a member of staff at the HPA.

Mrs R said that RI wouldn't want to go to Godstone again and was very confused because he was off school when feeling fine. The rest of the family was fine as were the other two children who had handled the rabbits.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Mrs R was not aware of *E. coli* O157 before visiting the Farm but had heard about *E. coli*.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: Mrs R had visited Open Farms before with her family and was aware of washing hands as good practice after touching animals. She feels on balance it is important for children to see animals, but Open Farms should be more closely inspected. Professor Griffin advised Mrs R about the current guidance which was used by Open Farms and by inspectors. Mrs R particularly noted that the sandpits should be inspected. Mrs R is not that keen on farms personally, and felt that the play area must have been contaminated from the children's shoes. It is not the animals' 'fault' but is because the animals are in a position to contaminate other areas.

Mrs R noted that the Farm covers a large area, was busy and there were not that many staff.

There were no members of staff in the play barn to supervise children taking their shoes off and leaving them in the baskets.

Mrs R is so much more aware now of the risks of infection. Signs just weren't enough, there should have been supervision at the wash area. But the washing hands area was by the animals. Mrs R's son was infected from the play area it seems which you wouldn't expect. It was exceptional circumstances and the *E. coli* O157 appears to have been widespread at the farm.

Parents 'kid' themselves that seeing animals is educational for the children, but this combination of animal and play has turned out to be dangerous. If similar farms want to continue with the 'see the animals and play' style, new ways of doing it need to be arranged and more regulations put in place. Staff could talk about the animals and give demonstrations. The animals could be handled but in the talk it could be reinforced that handwashing is very important. Safety talks are given for other activities and this should be the same. But in Mrs R's opinion, Godstone Farm, and others like it, let you walk through the pens and through the animals' excrement so that however good you are at washing your hands after touching animals, your boots or shoes are trudging the excrement and any germs all around the farm. Mrs R believes that the public should not walk through the animal pens. Staff walking round the farm should walk through a disinfectant after being in the animal pens. Farm owners should be more aware and more responsible. Animals should be tested regularly and also the surrounding areas should be checked for harmful bacteria.

17. Family S

Q: What was your experience during the outbreak of *E. coli* O157 infection that involved your children?

A: Mrs S visited the Farm on **Wednesday 26 August** with SI and her sister; together with another family. The family had been to Godstone many times, including to parties and had really enjoyed it. Mrs S noted that SI likes washing her hands and spent a lot of time doing this during the Farm visit. SI held the chicks and the guinea pigs for a short time but didn't go into the rabbits. They went into the barn with the sheep, goats and ponies and fed the animals. SI picked up food pellets from the ground, but did wash her hands afterwards.

Mrs S noted that the barn was very chaotic; the Farm was the busiest Mrs S had seen it and so many people were going through the animal contact areas. There was a lot of rubbish around and paper towels were strewn over the floor. There were members of staff around but they did not seem to be very motivated. There was no supervision of handwashing. Mrs S mentioned that the Farm employed a lot of temporary staff over the summer.

SI played in the sandpit by the tea shop and by the top barn. Mrs S noted that she went straight into the sandpit after walking through the barn and didn't take her shoes off in the sandpit. The family had their picnic lunch outside the tea shop, and washed hands before and after lunch. They bought soft ice cream in individual tubes.

Wednesday 9 September: SI had diarrhoea in the night every two hours. She was in pain and had a sore bottom. There were streaks of blood in the nappy. SI was not vomiting. As SI had had diarrhoea before and the family were not aware of the outbreak at Godstone at this stage, Mrs S didn't contact the GP straight away.

Saturday 12 September (evening): The family heard about Godstone on BBC news.

Sunday 13 September: SI began vomiting and Mrs S took her to the emergency clinic at Hospital 18. SI still had diarrhoea, but it had started to get better.

Tuesday 15 September: Took sample in which was later confirmed as *E. coli* O157. By now Mrs S was concerned because SI had stopped eating and drinking and hadn't passed urine for 24 hours.

It took two weeks for the stomach cramps and blood in the stools to clear, and a month to get over it completely. The rest of the party who visited with Mrs S and SI were fine.

Professor Griffin wondered whether she had picked the *E. coli* O157 up from contaminated items at home, for example the buggy or shoes, rather than directly from Godstone, given the length of time between visiting the Farm and SI becoming symptomatic.

Mrs S said that someone had visited them at home to complete a questionnaire once the diagnosis was known. The questionnaire was more food-orientated and the investigator commented that they were more used to investigating restaurants, although there were also questions about petting farms. The investigator wasn't able to give the family information at the time but did send a fact sheet on *E. coli* afterwards. The GP also provided information.

All the family gave samples. Mrs S was *E. coli* O157 positive but was asymptomatic. She noted that she also had a ringworm infection after the visit to the Farm.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Mrs S had heard about the Lanarkshire outbreak and knew was caused by a specific strain of *E. coli*. She had heard Hugh Pennington interviewed saying people were not aware of *E. coli* O157 and that under-fives shouldn't go to Open Farms.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: Mrs S wouldn't go again with a small child. There were no particular signs at the Farm; there were notices about washing hands, but nothing specific about *E. coli* O157 even though by 26 August, there were already cases of *E. coli* O157 from the Farm. Mrs S feels that because the bug is on shoes and the buggy, children should go to these farms when they are more capable of washing their hands themselves. Mrs S also feels that the animals are now almost incidental – children like the play areas.

Mrs S noted that she has been to other farms which were less 'hygienic' than Godstone. She feels it is impossible to keep the level of hygiene up with the number of visitors passing through. There were a lot of washing areas but also a lot of people trying to use them. The water was cold, but there was soap.

Mrs S thought that inspection of Open Farms linked with licensing of the premises would be a good idea. She had spoken to her local butcher who said he had to apply for a licence for his premises.

Mrs S thought that using disinfection mats for buggies and shoes as during the Foot and Mouth outbreak would be a good idea, but it is important people understand the reason for doing this.

She had visited the Oxted and Edenbridge Show after Godstone and felt that experience was more risky, ie, there was less cleaning, and portacabins were used for toilet facilities, etc.

Mrs S didn't feel well informed about the risks before visiting Godstone. She thinks there should be more notices explaining how long the incubation period can be for *E. coli* O157 and more notices and guides to information in the local area – it had taken a long time for information about the outbreak to come out.

18. Family T

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: Mrs T visited the Farm towards the **end of August** with children T1 and T2, and cousins and the cousins' Grandparents. The family had visited the Farm before.

The Farm was really busy. The children washed their hands after being in contact with the animals. The children then had a picnic next to the sandpit and ate a biscuit after playing there without washing

their hands. T I had been in contact with someone infected with cryptosporidium, so when T I became unwell, Mrs T thought she had cryptosporidium. T I wasn't too bad for a couple of days then five or six days after visiting Godstone, she had really bad diarrhoea with some blood.

Mr T took her to the GP the following day (**Wednesday**) and a sample was taken. T I was not hungry and quite poorly at this stage. Overnight, she passed further bloody diarrhoea and started vomiting.

Thursday: T I went to the A&E at Hospital 19, where she was seen by the Registrar, who sent her home with antibiotics (amoxicillin) and a tentative diagnosis of scarlet fever because he saw 'bumpy skin'. A stool specimen was taken.

Friday: The GP telephoned to say the stool specimen was positive for *E. coli*.

Mr T had been looking on the internet and read that taking antibiotics was not a good idea for *E. coli* because it might increase the chances of developing HUS. They informed the GP that T I had been prescribed antibiotics by the Registrar at the Hospital. The GP advised that T I did not take the antibiotics anymore.

Mr T telephoned the hospital with his concerns and spoke to the Registrar who'd seen her the previous day. He said that T I should continue to take the antibiotics.

However the family decided to stop T I taking the antibiotics.

T I continued to deteriorate. She was not eating or drinking properly. The diarrhoea was no longer bloody but she was vomiting. The family tried to keep her hydrated.

Saturday: The family returned to the A&E at Hospital 19, where they saw a different Registrar who thought she was a bit dehydrated, but since she was passing a little urine, felt she was getting better and sent her home. He confirmed that T I had *E. coli* O157 and also cryptosporidium.

Mr T asked about the possibility of T I developing HUS and was advised to keep a watch on her.

Sunday: T I was worse still and pm returned to Hospital 19 and saw the same Registrar as the previous day. Blood tests were undertaken and T I was given fluids to rehydrate her. HUS was diagnosed.

The Consultant was called in and she was checked hourly overnight by the nursing staff.

T I was transferred to St Thomas's the following day.

The family were told about the spectrum of HUS; T I didn't need dialysis immediately – we had to watch and wait. Meanwhile the family was aware that a lot of different children had been admitted at the same time.

After six days, T I was transferred back to Hospital 19. She had not needed dialysis in the end.

She was discharged three days later, and was given folic acid to restore her haemoglobin levels.

She had follow-up blood tests at Hospital 19.

The family was pleased with the care T I received at St Thomas's and Mr T wanted the Investigation Report to reflect this. The Consultant spent a lot of time on the telephone some days after T I was admitted to St Thomas's, when the ward was beginning to fill up with other cases of HUS and later advised the family that the Farm had been closed. He didn't however give any opinion on the outbreak.

T I is fine now but Mr T wants to understand whether there may be any long-term problems. Professor Griffin advised Mr T to discuss this with the Specialist at St Thomas's and to ensure that T I has long-term follow-up with blood tests to check her renal function.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Mr T had heard of *E. coli* but not about the complications and was aware of some outbreaks caused by *E. coli*.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: Mrs T and T I like animals and take the view there are risks to everything. Mr T does not feel qualified to say what should or shouldn't have happened. However he was concerned about the proposed intervention with antibiotics by the first Paediatric Registrar to examine T I at Hospital 19 in the light of his research on the internet.

Mr T would probably not go back to the Farm although he recognised this was largely an emotional response.

Perhaps it would be better not to have play areas in an Open Farm. However there will still be railings which might get contaminated.

There needs to be staff supervision to ensure handwashing. However Mr T felt that the animal contact should not be stopped. It is a balance of risk and Mr T feels on balance it is good for children to be exposed to animals. Parents do need to be educated about the risks. They then need to exercise judgement and choose themselves whether to let their children handle the animals. The Farm owners and staff should also be fully aware of *E. coli* and the risks and should be suitably trained. The risk is low, but the price is high and this is the worst form of risk because of the emotive issues. It is thus important not to have a knee-jerk reaction.

Mr T asked whether it would be possible/beneficial for an 'alert' to be circulated to the possibility of *E. coli* O157 when children present with bloody diarrhoea – so that Doctors on call in A&E can be made aware.

19. Family U

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your children?

A: Mrs U had visited the Farm many times with her children and several times each year. On this occasion, **Monday 24 August** Mrs U visited with her children U1 and U2 and a friend and her daughter. U2 pulled at the long grass near the goat enclosures.

They spent a lot of time in the sandpit in front of the café. They visited the toilets near the café and Mrs U noted that the toilets were not in a great condition.

They looked at the rabbits in the maternity pen and went to the play frame just in front of the sandpit and café.

They had a picnic at the front of the building and filled their water bottles up in the café's own sink. They had used alcohol wipes before eating.

After lunch, they visited the animals and the children went into the pen with the rabbits and also went in with the sheep. There were no Farm staff supervising these activities, although a sign did say no more than four children in the pen at any one time. The children picked up food pellets from the floor to feed the animals.

Straw was strewn around in the area where people walked through (although this was no different from previous visits).

The children washed their hands after visiting the animals. Mrs U again commented on the state of the toilets and washing area – there were paper towels lying around, bits in the sink and the water was cold and always was. Mrs U didn't see any signs about the use of alcohol gels. She was aware of the need to wash hands after touching animals.

The children also went into the barn near the adventure playground which housed large cattle.

The children were not terribly interested. They then spent time in the sandpit near the adventure playground. U2 touched some diggers in the playground, the girls didn't. They had a tractor ride – there was a queue and they also waited for the toboggan ride. They had four goes each – there was not such a big queue for this activity.

Generally the children spent more time in the play area than the animal area. If Godstone had just been a farm the family would not have spent nearly as long there.

Mrs U didn't feel there was anything different about this visit other than taking a friend with them and they spent full day this time rather than a shorter visit which they had done previously. The children had also fed the animals with pellets at previous visits.

Mrs U commented that the family had also visited Drusillas Park (in Alfriston, East Sussex), which is more like a zoo but there is also a Farm area. She noted that at Drusillas, the play area is less 'rustic' and the animals are kept more at 'arm's length'. There used to be a petting area at Drusillas which was removed as there had been an outbreak.

Thursday 25 August: U2 was 'off colour'. He had flea bites and had taken Piriton and had loose stools (this was not unusual for U2). He was 'under the weather' for the rest of the week.

Sunday 30 August: U2 was pale, had watery diarrhoea with stomach pain and this continued during the night – every 15 minutes at its worst. Mrs U telephoned the out-of-hours Doctors service and was told to wait 24 hours to see how he was. At this stage, U2 was drinking.

Tuesday 1 September: Mrs U spoke to the Nurse at the GP Surgery and was advised to bring in a stool sample.

Thursday 3 September: Mrs U was advised that the sample result was presumptive *E. coli* O157.

At this stage, U2's sister was at school. She was then told to stay off school (a sample was taken which was clear).

Friday 4 September: An EHO came to the house to do the questionnaire and U2 saw the GP who took a urine sample to test for blood and protein. The HPA advised Mrs U to go to the hospital if U2 had a problem with passing urine. Mrs U was concerned about U2 because he was so pale and pasty. U2 said 'Mummy make it stop'.

Tuesday 8 September: Mrs U took U2 to Hospital 20 where he had blood and kidney function tests. His haemoglobin levels were OK (seven) but he still had blood in his stools.

Test results were OK and the hospital was happy to send him home.

Mrs U couldn't understand how U2 had got the infection. However, the outbreak at Godstone then broke in the press.

U2 didn't clear the *E. coli* O157 from his stools for six weeks. He had one negative sample but this was followed by a positive one and the EHO advised that U2 should not mix with children when he was still positive for *E. coli* O157.

The HPA also advised the family to talk to other families about U2 having *E. coli* O157.

It took a while for U2's colour to come back and to get his energy back but he has picked up since half term.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Mrs U had been aware of *E. coli* before and knew about foodborne transmission. The GP had only referred to foodborne transmission of *E. coli* O157 when Mrs U discussed U2 with him.

The HPA had advised Families to look at their website for information.

Having gone through this, the family do understand the implications a whole lot more – but previously had no idea of the risks.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in the future, particularly among children?

A: The family feel reassured by U2 having blood tests to exclude the possibility of renal failure because the family had previously lost a child with Potters Syndrome. They feel that with a history of renal problems in the family they would have liked to have been aware of the risk of *E. coli* O157 for children under five. They would have liked the risks to have been made clear by the Farm. As far as the family was concerned this visit was no different from any of the many other visits they had made in the past. Mrs U wouldn't go back to Godstone and wouldn't want the children to touch the animals now she understands that the *E. coli* O157 might be in a lot of places around the Farm. She acknowledged that the children do like to see the animals, but the right facilities are needed.

If you go out walking in countryside, you keep shoes separate and don't take them into the house. The questionnaire contained a question about taking shoes off. Mrs U feels that if you have to think about it at that level, it really wasn't worth going to the Farm. It might be an idea however to have baths of disinfectant to walk through or that farms stipulated you had to wear Wellingtons.

Friends and family have also spent time at the Farm and were surprised about the outbreak.

Mrs U would have liked to feel confident that the Farm had control and were aware of the risk.

She also feels there had been unnecessary delays – the family had been told to keep U2 off school to prevent transmission – they couldn't understand therefore why it had taken so long to close the Farm and children were still getting infected.

There needs to be active education of the public and positive engagement (by the Farm) – if all the obvious precautions weren't being adhered to, what about the hazards that are not obvious to the public.

Because there have been other outbreaks of *E. coli* O157 the family would have appreciated more information from the HPA. The suggestion to check their website was unhelpful at that time. Information was required. They feel families were left to ask their own questions and to keep chasing up and following up.

The HPA website wasn't that informative and could be improved.

At a donkey sanctuary where they visited, the handwashing stuff was right on top of where the donkeys were.

When they visited a farm in France they had hand gels at the way in and at the exits and corralled you through to the handwashing.

Professor Griffin advised Mrs U that they were looking at the time sequence of when the Farm should have been shut. It is a judgement call.

20. Family V

Mr V explained that his family had not been directly affected by the outbreak but that a neighbour's child had been seriously ill with *E. coli* O157 and had been in close contact with his own children.

Mr V had been very concerned about the lack of communication by the school with parents during the outbreak and had contacted the HPA with his concerns. He had been invited by the HPA to communicate his concerns to the Independent Investigation Committee chaired by Professor Griffin and had been invited to attend a meeting with Professor Griffin.

MrV had become aware that the son of his neighbours had visited Godstone Farm and subsequently had an infection with *E. coli* O157. The son had not been too badly affected. However, he had passed it on to his sister. MrV and his family were informed by their neighbours what was going on and MrV had visited the neighbours' daughter in hospital.

Thursday 10 September: The neighbours' daughter became ill while at school. She had diarrhoea and had used the toilet at school but was not sent home.

Saturday 12 September: The neighbours contacted NHS Direct and then the out-of-hours GP service after hearing about the Godstone Farm outbreak. A stool sample was taken and sent back.

Monday 14 September: The neighbours received an unexpected visit from the Environmental Health Officer. They visited a GP who suggested it was gastro-enteritis. School asked the parents if the results of the stool sample were back.

The neighbours' daughter was admitted to the local hospital.

Tuesday 15 September: Daughter transferred to St Thomas's hospital for specialist care.

No communication from the school. Because MrV felt there was a very strong circumstantial link to Godstone, he approached the school to ask for advice.

He was told that the school had not received any specific guidance and so were not doing anything.

Wednesday 16 September: MrV contacted the HPA (Chichester HPU), explaining that his children had been in close contact with a child who had been admitted to hospital with *E. coli* O157 after visiting Godstone. There had been no information provided by the school to the parents. MrV said that the person at HPA had been very helpful but advised him there had been no confirmation of diagnosis until that morning. He was also advised that the child had not been unwell at school (but MrV knew this was incorrect from his conversations with the affected family). MrV had looked at the HPA website, but had not been able to find any information or guidance about *E. coli* O157.

The school said that there were confidentiality issues. The identity of the child would be compromised if a letter were sent out to all parents at school. MrV said that bizarrely the school refused to allow the friends of the affected child to sign a communal get well card, presumably for the same reason.

MrV felt that the problem was the HPA had not issued guidance to LAs on how to handle communications about the outbreak, in particular, there was no guidance on how to communicate to schools and to parents about the possibility of secondary transmission and how to minimise this.

MrV asked HPA to advise the school to send out a communication to the parents to alleviate anxiety. He felt the lack of communication created an unnecessary vacuum.

In addition, MrV noted the school would not change its cleaning regime, although the After School Club which was run by one of the school governors decided to give a thorough deep clean of the areas of the school used by the Club.

MrV also noted that a child in the school was immunocompromised, and there was no consideration of the susceptibility of that child to the possibility of secondary transmission of the infection.

Thursday 17 September: A letter was sent out by the school (but MrV felt it was of limited value).

MrV was dismayed by the lack of action taken. It appears that the HPA had not informed the school officially about the outbreak and parents had found out about it from newspapers and the local 'grapevine'. Meanwhile the Farm was still open for visitors.

MrV felt that as well as preventative action, action was also needed on effective communication. There was a way of engaging with the media without being dictated by it.

He felt that the HPA did not have a handle on this as a public issue of concern and there should have been a plan to deal with the wider community. There was a failure to take any form of action to give guidance to LAs on what to do with school communities.

MrV felt that the HPA was not doing job it had been set up to do.

Professor Griffin informed MrV that the HPA has no legislative power, which is held by the Local Authority. HSE have guidelines, but again no legislative power to close Open Farms.

MrV thought that even without legislative power, the HPA could act as an expert organisation to influence the enforcing agencies and persuade them to take action.

MrV also wondered why the Environmental Health Department had not contacted the Education Department to suggest they give advice and guidance to schools (although he did acknowledge the lack of a direct link between the Environmental Health and Education Departments within the Council).

MrV felt that the attitude of the school was 'we need to be told what to do'. The school did not want to take independent action which might create a panic and so preferred to be led by others. There also needs to be thought as to level of information and the way information is disseminated.

Professor Griffin confirmed that the communication of risk to the exposed population would form part of the Report and acknowledged it did need attention.

MrV wondered whether the 'Gold Command' response used to deal with responses to major emergencies could be adapted for use in dealing with an outbreak. There is a generic aspect to this in terms of communication with a community about other infectious diseases such as 'swine flu'.

There should have been a co-ordinated response to the outbreak and cross agency and cross department dialogue with a plan in place which describes this that everyone signs up to. Professor Griffin advised MrV that there is a mechanism and structure already in place to deal with outbreaks.

Professor Griffin noted the millions of visits to Open Farms but the (relatively) few infections associated with these visits. Statistically Open Farm visits are seen as 'low risk'. However the challenge is even though the visits are low risk, the impact of an *E. coli* O157 infection is extremely high. Therefore a robust system is needed to deal with events.

MrV also felt the reaction of the Farm was extraordinary. He felt they were putting their business before the public health. Even though the Farm owners are not experts, they do have a responsibility as duty holder.

MrV would not take his children to Open Farms (although feels this is probably a disproportionate response). In his opinion, there is no need to go to this type of entertainment.

In conclusion, MrV would like to see changes which will increase public confidence and he feels that every public service had failed the families affected by the outbreak.

B. Responses received by Post

Response 1

Q: Please explain to us what made you contact the Health Protection Agency about the *E. coli* O157 outbreak even though your child(ren) was not one of those infected during the outbreak.

A: My son suffered stomach cramps then diarrhoea after visiting Godstone Farm on 4 September. On Sunday 13 September I saw on TV that the Farm had been closed. My son was on the mend by then, but I contacted NHS Direct and the symptoms and visit were too much of a coincidence.

Q:What was your experience during this outbreak of *E. coli* O157 infection?

A: My 10-year-old son complained of stomach cramps four days after visiting the Farm, then six days after visiting had diarrhoea and didn't eat for a number of days. He lost lots of weight and his appetite went for about three weeks. My four-year-old and myself had no illness.

Q:What did you know about *E. coli* O157 before the outbreak occurred?

A: I did not know you could get *E. coli* from animals, I thought it was from food only. I have been a childminder and nursery teacher and I am mother of three, but I still didn't know enough about *E. coli*.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in future, particularly among children?

A: If you think there is a link report it!

If you have been to an animal farm and get stomach upset – go to the Doctors.

More publications – raise awareness about it being carried on shoes, bags, clothing, etc.

Young children are supervised in handwashing but with older ones you leave it to them.

Q: Please add any other comments you would like to make about infections with *E. coli* O157 that you feel will be helpful to the committee.

A: On 4 September at Godstone I saw no signs about possible *E. coli*.

The washing facilities next to the rabbits are good but there should be more around the Farm as I understand it can be carried on shoes and by wild rabbits.

As a family we will think hard about attending petting farms in the future, which is a shame as we love animals.

In my opinion the Farm stayed open too long.

If you think there is a link between a visit to a farm and illness – report it so a picture can be built up and action taken sooner by the authorities.

I believe as my 10-year-old is usually fit and healthy and was older than most sufferers he recovered quickly but it was still very unpleasant and he doesn't want to go back there.

By staying open after suspicion it has caused damage to their business but they went on advice from health professionals. We have been to Godstone at least 10 times previously.

Response 2:

Q: Please explain to us what made you contact the Health Protection Agency about the *E. coli* O157 outbreak even though your child(ren) was not one of those infected during the outbreak.

A: I visited Godstone Farm on 21 August with my kids. When I heard on the news about the *E. coli* outbreak I felt I had to let the HPA know about a couple of things which occurred that day that might have helped them with their enquiry – a copy of my original email is attached.

Q:What was your experience during this outbreak of *E. coli* O157 infection?

A: Luckily my kids were not infected but I could fully understand how this could happen given that the staff were prepared to let children handle a sick animal and that there was no one monitoring the bigger animals that the children were touching.

Q:What did you know about *E. coli* O157 before the outbreak occurred?

A: I thought (mistakenly) that it was something that you got from food if someone who had prepared it had not followed basic hygiene before touching the food. I did not realise you could get it from animals. I think the news coverage has educated parents well recently though!

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in future, particularly among children?

A: I fully believe that although the Farm perhaps did not give enough training to their staff in monitoring the animals and kids' contact with them, there is also some blame on behalf of parents who I have seen are too busy chatting or doing something else to make sure their kids wash their hands properly. At Godstone there is no excuse not to wash your hands because you are directed past the sinks but if parents are too lazy or irresponsible to ensure that kids wash their hands properly after handling animals then the Farm cannot be expected to take all the blame. I am a parent with two young kids and we go to lots of farms. There are always good signs and good washing facilities, but there are a lot of lazy parents out there I'm afraid!

Q: Please add any other comments you would like to make about infections with *E. coli* O157 that you feel will be helpful to the committee.

A: Proper staff training on these farms to make sure the animals are well, properly cared for and if necessary to remind parents who have not used the sink that it is their responsibility for their children's health. I truly hope that farms like these will not suffer because of this problem as my kids and others I know love them, and it's always a good day out for the family.

Email sent to HPA webteam (14 September 2009) from Response 2: Godstone Farm *E. coli* outbreak. Just wanted to tell you that I went there on 21 August with my children and we went to the petting section. There were some small chicks which were being handed out to the kids to hold. While we were there, another animal in a cage a chicken or rabbit (sorry can't remember which) which they said we could pet but which was unwell and had diarrhoea. I decided against letting my son touch it and was surprised they were even suggesting it if it was sick!. Also while I was there the girl who was doing the water for the guinea pigs did not cleanse the bottles she just simply refilled them and put them back in the pens any old how. Having kept guinea pigs I know how important it is to cleanse water bottles properly before refilling and to never swap bottles around so I was very surprised at this practice.

Response 3:

Q:What was your experience during this outbreak of *E. coli* O157 infection?

A: It was an absolutely dreadful experience for my family and me. Our grandchildren W1, W2 and W3 were all infected by *E. coli* O157 and very seriously ill as a result. It has been horrendous and very frightening for their parents, my daughter and her husband, it meant that they were parted from their two sons, my daughter had never been separated from her baby. W2 suffered from acute kidney failure ending up on dialysis, having three blood transfusions, being fed by a nose tube and being constantly sick. At one time we thought we were going to lose her because she was so poorly.

W1 had very severe diarrhoea but improved within a few days. I had to take baby W3 to hospital and had one of the worst experiences of my life, holding him and trying to calm him, while the doctor struggled to take blood samples. He was covered in puncture wounds from the needles, screaming his

head off in pain as well as being absolutely terrified as I was! In addition his bottom was red raw and extremely painful as a result of the constant diarrhoea. I moved into my daughter's house to look after W1 and baby W3 etc, as my daughter did not leave W2's side at the hospital (nor did my son-in-law initially). Then to make matters worse I contracted *E. coli* and was very ill. I am aged 62 and as you can imagine this was exhausting and debilitating and I have been left totally exhausted.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: My husband and I had never heard of *E. coli* O157 and knew nothing about it and we had no idea how serious and potentially life threatening it is. My daughter and her husband and the rest of my family and friends were similarly unaware and I understand there was no information or warning signs anywhere when the children went to Godstone Farm on 25 August.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in future?

A: I am shocked at the complete lack of information or warnings to the members of the public visiting the Farm also lack of information to the public as to just how serious this bacteria is and that it can cause renal failure, brain damage and even death. Of huge concern is that there were cases of *E. coli* O157 at the Farm in March and May 2009, but no one was told and nothing was done even though the Farm and the HPA were aware of the infection they did not close the Farm until 12 September. Surely there should be guidelines in place to not just prevent this from happening in the first place but in the future. There were many thousands of people visiting the Farm during the summer and yet nothing was done. Why?

Q: Please add any other comments you would like to make about your experience of the outbreak that you feel will be helpful to the committee.

A: My daughter and her husband and I received conflicting advice and information from the children's GP, from the environmental health and the HPA. The right did not seem to know what the left was doing, even though I had been tested as 'presumptive positive' I had gone into work as well as looking after children. It was not until several days later that I was told by an HPA nurse that I should not be preparing food, even though the HPA was well aware that I had the infection. It was all too late. Again there was a complete lack of action and information provided by the HPA. This only compounded this dreadful and horrendous experience, particularly for the children, only heightening our concerns and anxiety.

Response 4:

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your child?

A: X1 was very sick but fortunately recovered fairly quickly. X2, although was infected, showed no symptoms but still missed her first four weeks of school.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Knew it was a serious infection but thought it was mainly through food.

Q: Please add any other comments you would like to make about your experience of the outbreak that you feel will be helpful to the committee.

A: As far as X2 was concerned, felt we received no help or advice from anyone – just constant testing and positive results, while missing so much of her first term in full-time school.

Response 5:

Q:What was your experience during this outbreak of *E. coli* O157 infection that involved your child?

A:Y1 became ill first, three days after visiting Farm,Y2, two days after. Both suffered stomach cramps and diarrhoea, lasting six weeks or so.

Q:What did you know about *E. coli* O157 before the outbreak occurred?

A: Nothing.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in future, particularly among children?

A: Handwashing, HPA should have closed Farm immediately they heard of first case – they did not.

Q: Please add any other comments you would like to make about your experience of the outbreak that you feel will be helpful to the committee.

A: I blame the HPA wholly, for failing to shut the Farm once they heard of first case, had they done so, my sons would not have become ill.

Response 6:

Q:What was your experience during this outbreak of *E. coli* O157 infection that involved your child?

A:Totally devastated, my three children all contracted *E. coli* O157 as well as myself and mother-in-law. While my boys seemed to recover after a few days, my six-year-old daughter developed HUS and acute renal failure.

Q:What did you know about *E. coli* O157 before the outbreak occurred?

A: Nothing whatsoever. I believed *E. coli* to be a form of food poisoning and understand from my wife that there were no warning signs relating to the danger of *E. coli* O157 at Godstone Farm.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in future, particularly among children?

A: The Farm provided no information or warning to the public of *E. coli* O157. There seems a total lack of public knowledge of the potentially fatal effect of this bacteria. I am extremely angry to hear of cases in Spring 2009 of *E. coli* O157 and feel that the Farm and HPA have let us down by allowing the Farm to remain open with this prior knowledge.

Q: Please add any other comments you would like to make about your experience of the outbreak that you feel will be helpful to the committee.

A: This has been one of the worst experiences of my life, there appears to have been a total lack of action and information from the HPA and Farm.

Response 7:

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your child?

A: Traumatic. My then 18-month-old became very sick following a visit to Godstone Farm on 30 August. He seemed to be in excruciating pain with spasms, vomiting and diarrhoea which started on Friday 4 September. On the morning of Saturday 5 September I was so concerned that I called NHS Direct who suggested I took him to an out-of-hours doctors service. I did so and was told he had gastroenteritis.

I called NHS Direct again on Sunday 6 September as the cramps were debilitating and he started to have blood in his stools. I was told this was common with gastroenteritis. On Monday (7 September) I took my toddler to the doctor in the evening and they suggested we take a stool sample to rule out any of the nastier bugs. He continued to be very sick and then the news story broke on the following weekend of the Godstone Farm *E. coli* outbreak and I realised that it was quite likely my toddler had been affected. I called for the results on Monday 14 September and they were clear, but apparently it is not routine to test for *E. coli*, so with the new knowledge I asked for the sample to be retested and *E. coli* was confirmed on Thursday 17 September and the environmental health officer came over to see us.

My toddler was due to start nursery on Monday 7 September as I am training to be a teacher, so he was unable to start. The environmental health officer asked plenty of questions regarding our hygiene practices, but was unable to offer any advice other than to say that my toddler would not be able to start nursery until two clear samples had been received. My doctor said that he had never managed a case of *E. coli* before and did not have any advice to give and when I called the HPA they said that they were not in a position to give any medical advice over the phone, so we felt let down by the NHS. Luckily, my sister is a consultant Paediatrician, so I was able to speak to her about his case.

I was extremely angry to discover that the HPA were aware of the presence of *E. coli* at Godstone Farm far in advance of our day trip. We only spent a couple of hours there and although he touched a couple of the animals, I washed his hands in the facilities provided. We have never received any explanation or apology from the HPA. My toddler was unable to attend nursery for six weeks. If I had not been so totally consumed with starting a full-time job and trying to cope with minding a sick child, I would certainly have considered legal action, as I understand that some of the other victims of this negligence have gone down this route. I would never have taken my child anywhere near the Farm had I been aware of the dangers. I had previously visited Godstone Farm with my toddler and as a child myself and I think it is such a shame that this was allowed to escalate to this extent. I would appreciate an explanation as to why the decision was taken to keep the Farm open and an apology would not go amiss. I took part in a telephone survey with the HPA but am yet to hear any feedback from this.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Very little. Thought it was just food poisoning.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in future, particularly among children?

A: Close any site of infection immediately. I did wash my son's hands that day, but it did not help.

Q: Please add any other comments you would like to make about your experience of the outbreak that you feel will be helpful to the committee.

A: I still feel quite traumatised by this whole experience. Luckily our child has made a full recovery, but he suffered terribly, as did we, and it all could have been avoided so easily.

Response 8:

Q: Please explain to us what made you contact the Health Protection Agency about the *E. coli* O157 outbreak even though your child (ren) was not one of those infected during the outbreak.

A: Because we visited the Farm on 4 September; and at that time there had already been known cases of *E. coli* (the Farm knew, not the public) so it should have already been closed to the public. I believe my child and his friends were put at unnecessary risk.

Q: What was your experience during this outbreak of *E. coli* O157 infection

A: Naturally after we heard about the outbreak and that there was a potential incubation period of one month we were worried.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Didn't really know much about it at all. I knew it was spread through uncleanliness. I also didn't know that it was such a serious infection.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in future, particularly among children?

A: Keep children and farm animals totally separate. I don't think that it is that important for children to pet farm animals. Dogs and cats are enough.

Response 9:

Q: What was your experience during this outbreak of *E. coli* O157 infection that involved your child?

A: My grandson ZI developed violent diarrhoea on August bank holiday Monday (31 August) and my daughter took him to the drop-in clinic at Hospital 21. They recommended that she gave him Dioralyte to treat the symptoms. She then went back several times in the following week, as ZI was not improving. His hands and feet became swollen so the last time my daughter took him to Hospital 21 on **Wednesday 9 September** the hospital realised it was serious and arranged for him to be admitted to the children's renal unit at St Thomas's in London. The treatment he received at St Thomas's was exemplary from the consultant to the nursing staff. They were very professional and quickly provided the treatment he needed including kidney dialysis.

My wife had received a telephone call from the Health Protection Agency during the first week of September confirming that ZI was infected with *E. coli* and asking about places he had visited the previous two weeks. When she said that he had been to Godstone Farm the HPA person commented that this appeared to be a common factor in other cases. The HPA came to our house on Friday to collect a stool sample from ZI.

Q: What did you know about *E. coli* O157 before the outbreak occurred?

A: Very little. I was aware that there had been outbreaks involving *E. coli* infected meat products and in restaurants but did not realise contact with animals could also be a cause of infection. Importantly I did not realise that in a minority of cases the secondary phase caused by the toxin resulted in HUS and kidney failure.

Q: Do you have any suggestions about how risks of *E. coli* infection could be reduced in future, particularly in children?

A: I think access to petting farm animals for the under-fives needs to be reassessed. I understand that the under-fives and over-65s are particularly vulnerable in *E. coli* outbreaks. The experience of watching my healthy two-year-old grandson fight an *E. coli* infection followed by a kidney complication that left him wired up to a dialysis machine was frightening. I am very thankful that he was admitted to a wonderful specialist renal unit and received the treatment he needed. I believe that parents and grandparents should be aware of the potential seriousness of an *E. coli* infection so they can make an informed decision on a farm visit.

I believe the regulations need to be strengthened so the sources of such infections can be closed earlier. Incredibly it turned out that of the five or so very sick youngsters in St Thomas's all of them had visited Godstone Farm in the previous two weeks. We were contacted by the local Health Protection Nurse and the Environmental Health Department to help establish the source of the infection and informed there was an apparent pattern around about 3 September, yet I visited the Godstone Farm website several days later and was amazed that there was not a warning to parents not to bring young children to the Farm until the source of this nasty infection was cleared up.

As I understand it the HPA can only recommend closure to the owner and not actively enforce closure, which seems very odd given the health and safety focused culture we live in. In my opinion the responsible thing for the owners to have done was to close the Farm once an apparent pattern was identified, around about 3 September. I strongly believe that commercial considerations played a key role in the decision to stay open and I hope that if the owners had witnessed the suffering in renal units around London they would have reached a different decision and closed a week earlier therefore avoiding unnecessary exposure for more children. I understand that Godstone receives 2,000 visitors a day so the week delay in closing exposed a further 14,000 people to this infection.

Q: Please add any other comments you would like to make about your experience of the outbreak that you will feel will be helpful to the committee?

A: It is worth noting that the response to this outbreak added to the workload of a very important and dedicated NHS team at St Thomas's hospital and potentially resulted in children in need of their expertise to be turned away.

I was very surprised that the Farm opened for half-term week in October before the results of this enquiry were published. Again I can only conclude that the commercial imperative held sway. I wonder if the Farm owners even bothered to check if all of the victims of the outbreak had recovered.

APPENDIX 9

OPEN DOCUMENT

Interim Views of the Committee on the Risks of Animal Contact at Open Farms

- 1.0 While we consider that the achievement of zero risk is not a practical reality or desirable, we do consider that there are reasonable and practicable controls for use by Open Farms.
- 2.0 Although parents/carers have a responsibility to the children they accompany, it is essential that owners/managers of Open Farms recognise they have a duty of care to the public who have an expectation to be in a safe environment. The primary objective is to allow the public to safely enjoy and benefit from the experience.
- 3.0 Points that need to be considered are that visitors may have little appreciation of the hazards and risk prevention; and that the most susceptible ages may not be able to read signs and may often be in pushchairs, or have items such as gloves, sandals, shoes, dummies and toys that become easily contaminated. Children will also often suck fingers.
- 4.0 While we understand the reluctance of some operators to confront customers who ignore advice, we believe that active supervision of visitors by staff is necessary to ensure health and safety and that it is a reasonably practicable thing to do.
- 5.0 While the AIS23 guidance is to be commended, it may be improved and clarified. Although critical control of infection is by handwashing, as much attention should be given to risk avoidance and keeping areas accessible by the public clean and free of faecal material – which we are confident is reasonably practicable.
- 6.0 An assumption should be made that all ruminants are carrying *E. coli* O157. Therefore attention should be given to permitting public access without a necessity to change or clean footwear or buggies. All public walkways throughout the premises must be maintained clean. This will require that the public is kept separate from animal passageways, that animals should not be able to contaminate the walkways by defecation, urination or seepage/runoff and that the public must have no access to contaminated pens, contaminated animal environments or manure heaps.
- 7.0 Visitors should be informed that handwashing is most suitable as it physically removes harmful dirt or contamination. Gels and hand wipes should be discouraged as the primary cleaning agent.
- 8.0 Many Open Farms will have other entertainment activities such as playpens, slides, swings, climbing areas, sandpits or ball pits. To prevent contamination of these areas that may be difficult to clean, they should be sited so that there is no direct access from controlled-contact areas and preferably in a distinctively separate 'clean non-animal' area of the Open Farm.

'This document is provided in response to a request for an interim view from the HPA, prior to the handover of the Independent Investigation Committee's full report in May 2010. As such the views expressed represent those currently held by the Independent Investigation Committee, although the Committee reserves the right to revise, amend and/or change these views within the final report. The final report will set out the context and justification for the Committee's views, conclusions and recommendations.'

APPENDIX 10

List of Abbreviations

AALA	Adventure Activities Licensing Authority
A&E	Accident and Emergency
ACoP	Approved code of practice
AH	Animal Health
AIS	Agricultural Information Sheet
ALARA	As Low As Reasonably Achievable
ALARP	As Low As Reasonably Practicable
BAU	HSE's Biological Agents Unit
CCDC	Consultant in Communicable Disease Control
CDC	Centers for Disease Control and Prevention
CEHO	Chief Environmental Health Officer
CEVAS	Countryside Educational Visits Accreditation Scheme
Cfl	HPA Centre for Infections
CIEH	Chartered Institute of Environmental Health
COSHH	Control of Substances Hazardous to Health
CPH	County Parish Holdings
CT-SMAC	Cefixime-Tellurite Sorbitol MacConkey (Agar)
DC	District Council
DCSF	Department for Children, Schools and Families
Defra	Department for Environment, Food and Rural Affairs
DH	Department of Health
DNA	Deoxyribonucleic Acid
DWP	Department of Work and Pensions
<i>E. coli</i>	<i>Escherichia coli</i>
EFSA	European Food Safety Authority
EHD	Environmental Health Department
EHO	Environmental Health Officer
EMM	Enforcement Management Model
EU	European Union
FACE	Farming and Countryside Education
FSA	Food Standards Agency
FWE	Food Water and Environment
GEZI	Gastrointestinal, Emerging and Zoonotic Infections Department at Cfl
GIRU	Gastrointestinal Infections Reference Unit
GP	General Practitioner
HAIRS	Human Animal Infections and Risk Surveillance Group
HELA	Health and Safety/Local Authority Liaison Committee
HPA	Health Protection Agency
HPS	Health Protection Scotland

HPU	Health Protection Unit
HSE	Health and Safety Executive
HSWA	Health and Safety at Work etc Act 1974
HUS	Haemolytic uraemic syndrome
HUSH	Haemolytic Uraemic Syndrome Help
IID	Infectious Intestinal Diseases
IOSH	Institution of Occupational Safety and Health
LA	Local authority
LAC	Local Authority Circular
LACORS	Local Authorities Co-ordinators of Regulatory Services
LaRS	Local and Regional Services
LEAF	Linking Environment and Farming
LGP	Laboratory for Gastrointestinal Pathogens
LOtC	Learning Outside the Classroom
MLVA	Multiple locus variable analysis
NFAN	National Farm Attractions Network
NFU	National Farmers' Union
NHS	National Health Service
OCT	Outbreak control team
PACAR	Prevention of Accidents to Children in Agriculture Regulations
PCR	Polymerase chain reaction
PCT	Primary Care Trust
PFGE	Pulsed field gel electrophoresis
PT	Phage type
RDA	Rural Development Agency
RDNA	Regulators' Development Needs Analysis
RHET	Royal Highland Education Trust
RNCI	Royal Northern Countryside Initiative
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
SHADs	Safety and Health Awareness Days
SERL	Scottish <i>E. coli</i> Reference Laboratory
SFAIRP	So Far As Is Reasonably Practical
SySxHPU	Surrey and Sussex Health Protection Unit
TSO	Trading Standards Officer
TTP	Thrombotic thrombocytopaenic purpura
VAQAS	Visitor Attraction Quality Assurance Scheme
VLA	Veterinary Laboratories Agency
VNTR	Variable number tandem repeat
VT	Verocytotoxin
VTEC	Verocytotoxin producing <i>Escherichia coli</i>

APPENDIX 11

Glossary of terms

Accreditation - official authorisation and or/ endorsement of the process (in the context of Open Farms assuring that a set of agreed safety and other standards are achieved by the Farm)

Amoxicillin - an antibiotic used to treat many different types of infections caused by bacteria, such as ear infections, bladder infections

Anti-emetic - a drug that is effective against vomiting and nausea

Antigen - any substance that causes the immune system to produce antibodies specifically directed against it

Antibody - a protein formed in direct response to an antigen. Antibodies can combine with their specific antigens eg, to stop the effect of toxins or destroy bacteria

Approved code of practice (ACoP) - regulations made under health and safety legislation are sometimes supplemented by Codes of Practice approved and/or issued by the Health and Safety Executive (HSE). ACoPs give practical guidance on compliance. Failure to comply with an ACoP is not an offence in itself. However, these codes have special legal status. If an employer/individual faces criminal prosecution under health and safety law, and it is proved that the advice of the ACoP has not been followed, a court can regard it as evidence of guilt unless it is satisfied that the employer/individual has complied with the law in some other way. Following ACoPs is therefore regarded as best practice

Asymptomatic infection - an infection caused by a microorganism where the person infected does not suffer any symptoms or disease

Campylobacter - a group of bacteria that cause food poisoning and gastroenteritis transmitted via the oral route

Case-control study - an epidemiological study in which the characteristics of persons with disease (eg, *E. coli* O157 infection) are compared with a matched control group of persons without the disease or infection

Dialysis - medical procedure to remove waste products from the blood in the absence of adequate kidney function. This can be achieved using haemodialysis or peritoneal dialysis

Enforcement - the Health and Safety at Work etc Act 1974 provides for a number of legal sanctions including prosecution for defined offences and the use of enforcement notices by inspectors to require action to improve standards or prevent incidents. There are two types of notice for use in different circumstances: prohibition and improvement. Both are intended to achieve effective control of risk, so far as is reasonably practicable. The former is used when there is one of serious personal injury.

Epidemiology - study of factors affecting health and disease in populations and the application of the knowledge to control and prevent disease

Environmental Health Officer (EHO) - an individual trained in environmental health issues such as housing, sanitation, food, clean air, noise and water supplies. Responsibilities include inspecting certain kinds of premises for health and safety, inspecting restaurants and other food premises and investigating cases of food poisoning

Food safety - the assurance that food will not cause an adverse health effect to the final consumer when it is prepared and eaten

Haemolytic uraemic syndrome (HUS) - condition characterised by acute kidney failure, anaemia due to increase destruction of red blood cells and thrombocytopaenia (a lowered body level of platelets, which are needed for normal blood clotting). *E. coli* O157 is the principal cause of this syndrome in children

Haemorrhagic colitis - inflammation and bleeding from the large intestine, resulting in bloody diarrhoea

Haemodialysis - used in kidney failure to remove waste products from the blood and correct fluid imbalance. The patient's blood is pumped through a dialysis machine, before returning the filtered blood to the patient

Hypertension - (or high blood pressure) – a medical condition in which the arterial blood pressure is elevated

Immunosuppressant medication - immunosuppressive drugs or immunosuppressive agents are drugs that inhibit or prevent activity of the immune system

Improvement notice - under health and safety law, inspectors may issue an improvement notice if they believe a premises they are inspecting is breaking health and safety law. This will usually be where the law is being broken in a relatively serious way, or in a way that poses a risk to people. The improvement notice will specify the breach of law, say what needs to be done and why and give a period of time in which to comply. The inspector will discuss the improvement notice before serving it, and try to resolve any disagreements

Incubation period - time between becoming infected with a microorganism and the symptoms appearing

Infectious dose - the amount of infectious material, eg, number of bacteria, necessary to produce clinical infection

Licensing - to license or grant license means to give permission. In the context of Open Farms, licensing could mean that a premises would have to apply for permission to open their premises to the public

Microbiology - the study of microbes and microorganisms and in the context of an outbreak with an infectious agent, identifying the specific organism (eg, *E. coli* O157 that causes the outbreak)

Monoclonal antibody - monospecific antibodies that are directed against one specific antigen and are the same because they are made by one type of immune cell which are clones of a unique parent cell

Open Farm - those premises that maintain farm animals, actively attract visitors for leisure purposes, have visitor facilities and encourage, permit and allow animal contact, and such premises need not be open on a daily basis nor solely operating as commercial leisure activities

Outbreak - an increase in the number of people with an illness or disease above that normally expected to be seen in the population at a particular time, or two or more linked cases with the same illness

Outbreak Control Team - a team formed to control the spread of disease during an outbreak. Assesses the outbreak, tries to identify the source and implements prevention and control measures

Outbreak Plan - a national or local plan for controlling an outbreak

Pathogen - an infectious microorganism, bacteria, virus or other agent that can cause disease by infection

Peritoneal dialysis - a treatment for patients with severe chronic kidney failure. The process uses the patient's peritoneum in the abdominal cavity as a membrane across which fluids and dissolved substances (electrolytes, urea, glucose and other small molecules) are exchanged from the blood. Fluid is introduced through a percutaneous tube in the abdominal cavity and flushed out via regular exchanges throughout the day. This technique is used as an alternative to haemodialysis

Phage type - a system of sub-classifying certain species of bacteria according to whether they are susceptible to infection by a panel of different phages (which are viruses that infect bacteria)

Polymerase chain reaction - a technique in molecular biology to amplify a single or few copies of a piece of DNA across several orders of magnitude, generating thousands to millions of copies of a particular DNA sequence which can then be specifically detected

Primary case - the first individual within a group or family to get a disease. There may be several primary cases in a group if they are exposed to the same source around the same time

Prohibition notice - under health and safety law, if inspectors believe that the work activities at a premises give rise to a risk of serious personal injury, they may issue a prohibition notice. The prohibition notice normally requires that the activity is stopped immediately. The activity must not be resumed until action has been taken to remove or control the risk. The prohibition notice will explain why the inspector thinks there is a risk of serious personal injury. It may also state whether a law is being breached and what needs to be done to reduce or control that risk. The prohibited activity must be stopped until the required remedial action has been taken, as not doing so could result in prosecution

Proper Officer - appointed by local authorities (LAs) to assist them to comply with their responsibilities. A consultant in communicable disease control (CCDC), employed by the Health Protection Agency (HPA) usually holds the appointment of a Proper Officer for infectious disease control for LAs in their area; legislation requires doctors to notify Proper Officers of certain types of infectious disease

Pulsed field gel electrophoresis - a scientific process based on chopping up with enzymes the DNA material of bacteria such as *E. coli* O157. In the context of an outbreak of *E. coli* O157 such as at Godstone Farm, it enables scientists to determine whether *E. coli* O157 strains taken from different people and from the environment are related to each other

Risk Assessment - a step in a risk management process. Risk assessment is the determination of quantitative or qualitative value of risk related to a concrete situation and a recognised threat (also called hazard). Risk assessment consists of an objective evaluation of risk in which assumptions and uncertainties are clearly considered and presented. It is usually based upon four stages, namely hazard identification, hazard characterisation, exposure assessment and risk characterisation

Risk management - the process of determining the maximum acceptable level of overall risk to and from a proposed activity, using risk assessment techniques to determine the initial level of risk, and if this is excessive, developing a strategy to ameliorate appropriate individual risk until the overall level of risk is reduced to an acceptable level

Ruminant - any even-toed, hoofed mammal of the suborder Ruminantia, comprising cloven-hoofed, cud-chewing quadrupeds, and including domestic cattle, goats and sheep, bison, buffalo, deer, antelopes, giraffes, camels and chevrotains

Salmonella - a group of bacteria that cause typhoid fever and other illnesses including food poisoning, gastroenteritis and enteric fever from contaminated food products

Secondary case - a person who catches a disease from a primary case

Serotypes - a group of microorganisms based on the cell surface antigens. Allows organisms to be classified at the sub-species level, which is important in epidemiology

Shigella - a bacterium causing approximately 165 million cases of severe dysentery and more than 1 million deaths worldwide each year, mostly in children. The causative organism is frequently found in water polluted with human faeces, and is transmitted via the faecal-oral route. The usual mode of transmission is directly person-to-person, hand-to-mouth, in the setting of poor hygiene and sanitation

Sporadic case - a single case of disease (apparently) unrelated to other cases

Stakeholder - a person, group, organisation, or system which affects or can be affected by an organisation's actions

Strain - a population of organism within a species or sub-species distinguished by sub-typing

Super-shedders - animals, usually cattle, that excrete relatively large amounts of *E. coli* O157 bacteria in their faeces

Surveillance - in the context of *E. coli* O157 infection it is the regular monitoring of this organism and infection in the population in order to control this microbiological hazard

Trading Standards Officer - acts on behalf of consumers and businesses to advise on and enforce laws that govern the way goods and services are bought, sold and hired. Areas of work vary but may include animal welfare, agriculture, commercial fraud, counterfeiting, product labelling, weights and measures, safety and pricing, under-age selling, credit and loans

Thrombotic thrombocytopenia purpura (TTP) - a clinical condition resulting from the aggregation of platelets in various organs, usually characterised by fever with skin and central nervous involvement, anaemia and multi-organ involvement

Toxin - a poisonous substance which may be produced by a microorganism

Variable Number Tandem Repeats - a robust typing method for specific strains of bacteria such as *E. coli* O157

Verocytotoxin-producing *Escherichia coli* (VTEC) - *E. coli* that produce powerful toxins that kill a variety of cell types in the body. The toxins were first identified by their activity altering the structure of a cell type (vero cells) in tissue culture.

Virulent - broadly describes the effect of the infectious agent on the host. A highly virulent strain of bacteria, for example, may cause severe symptoms in the host, whereas a less virulent strain would produce relatively less severe symptoms in the same individual

Zoonotic infection - an infection in humans caused by a microorganism carried by or infecting an animal species



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