

**REDUCING *ESCHERICHIA COLI* O157 RISK IN
RURAL COMMUNITIES:
INTEGRATING EVIDENCE
FOR POLICY**

Norval Strachan, John Farrington & Colette Jones

Aims of the talk

- To present a brief overview of the project
- To describe the integration of project findings
- To describe the who, what and how of research evidence for policy
- To initiate discussion on the common challenges of integration of evidence for policy

The scale of the problem

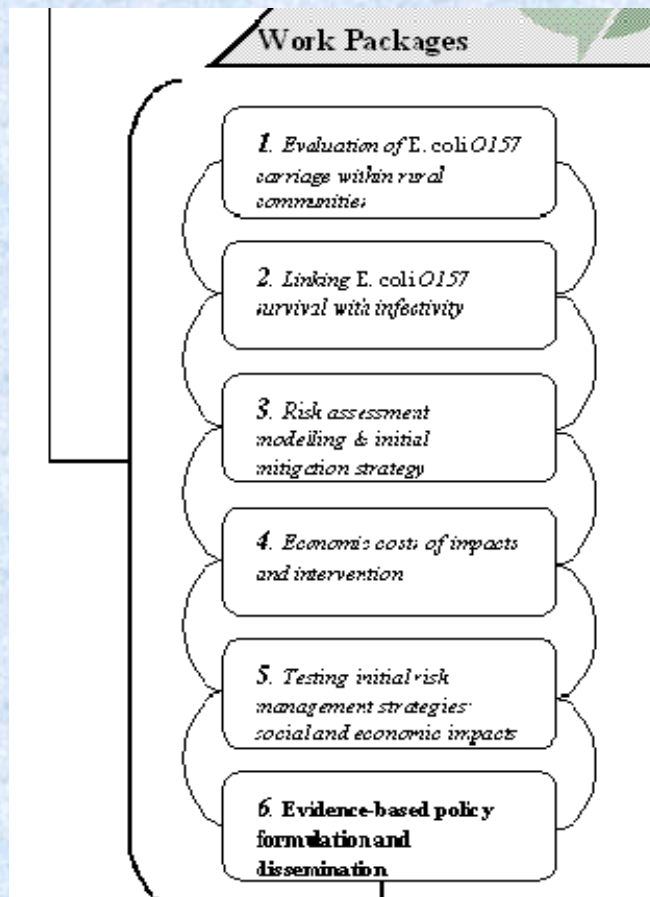


- *E. coli* O157:H7 can reside in the gut of cattle and sheep without any observable effect.
- Faecal excretion rates typically range from 1 - 10⁵ cfu g⁻¹ faeces
- In Scotland there are c. 200 -300 human cases annually and in England & Wales approx 1000
- Disease can have severe symptoms e.g. bloody diarrhoea, HUS and occasionally death
- Young children, the elderly and people living in rural areas are at greatest risk

Approach

- To tackle the problem through a number of discrete work packages
- Integration of social and natural science approaches
- The study areas are North Wales and the Grampian region of Scotland

Structure of the project



Regulators- DEFRA, SEERAD, EA, SEPA, DH, FSA, Local Authorities.

Land users- farmers, contractors, foresters, tourists, NFU, NUFL

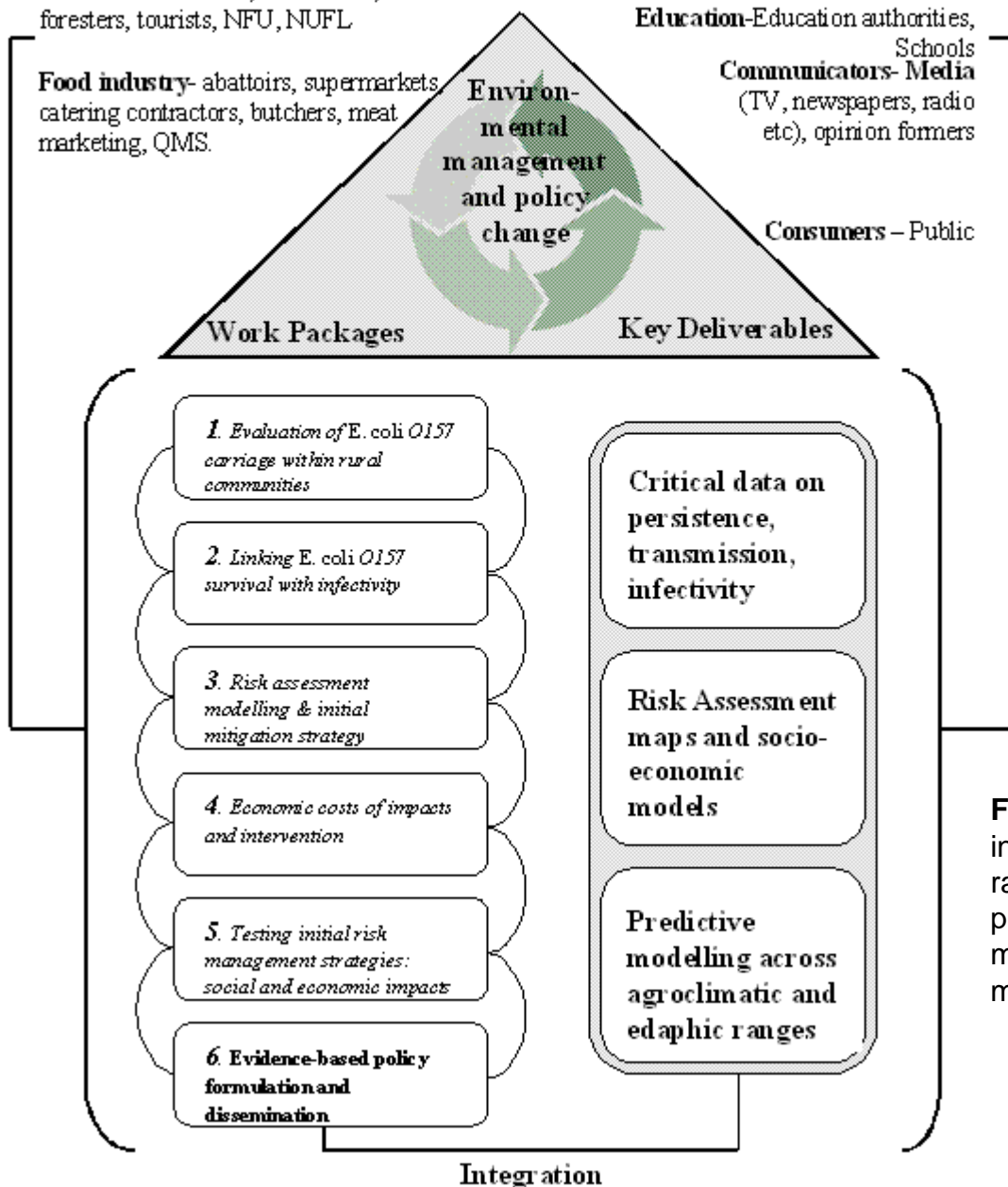
Food industry- abattoirs, supermarkets catering contractors, butchers, meat marketing, QMS.

Environmental and tourism NGAs-SNH, CCW, Natural England, Tourist boards

Education- Education authorities, Schools

Communicators- Media (TV, newspapers, radio etc), opinion formers

Consumers - Public

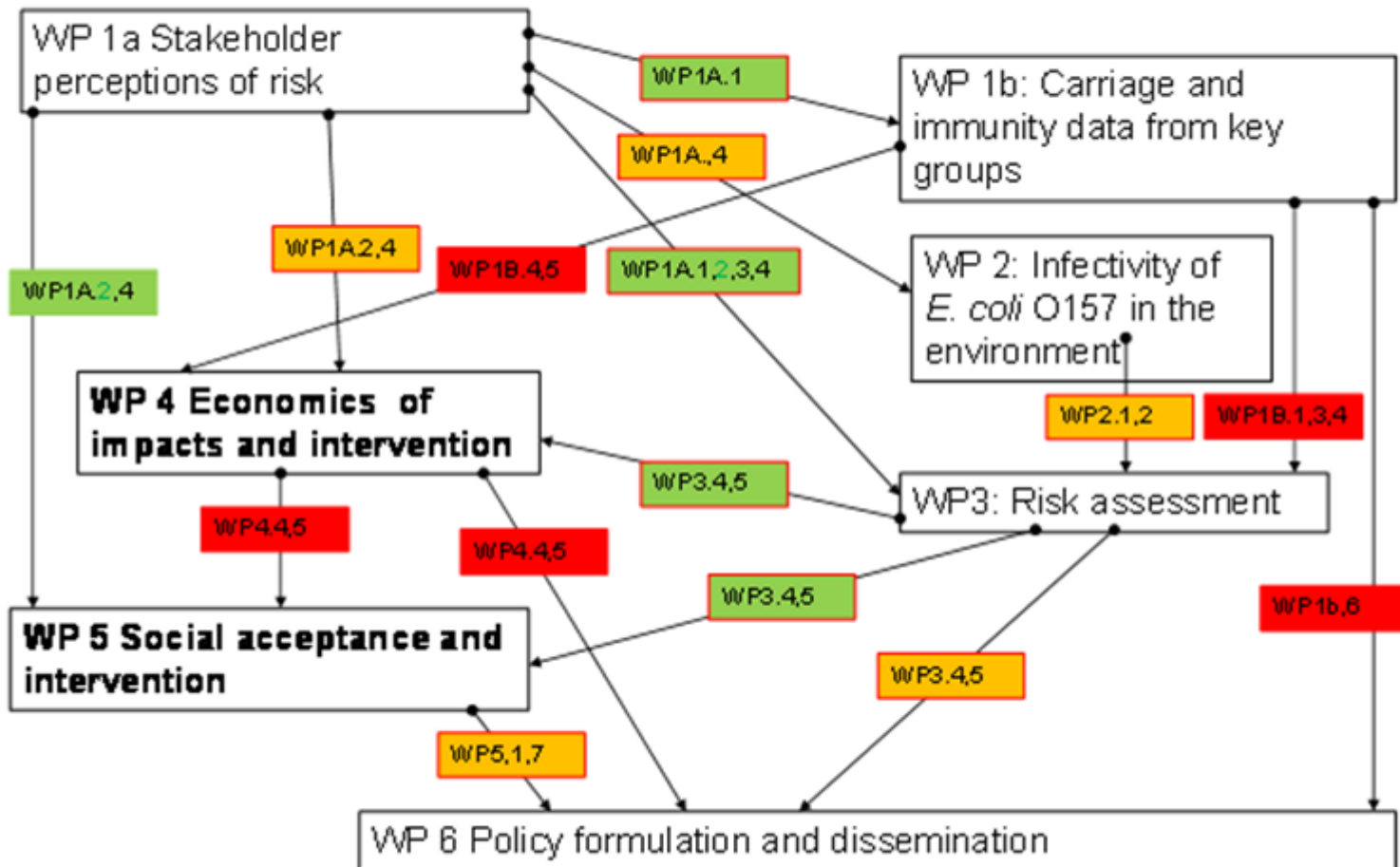


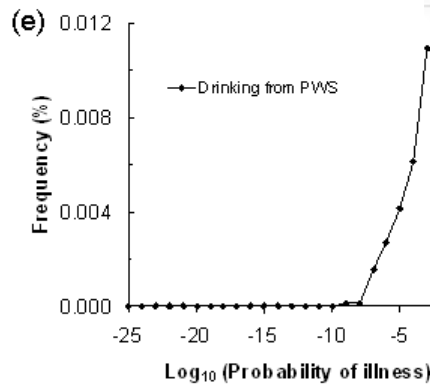
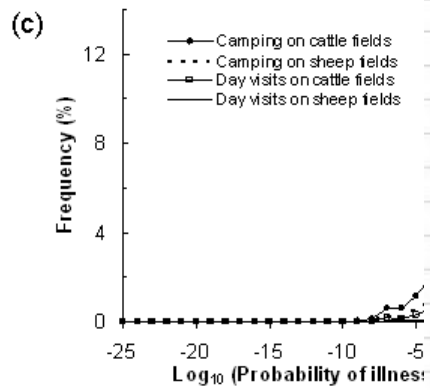
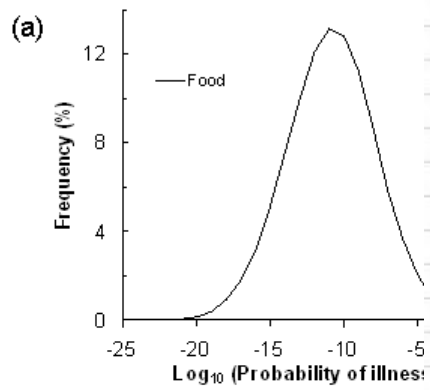
INTEGRATE Planning into Practice

Figure 1. Schematic representation of our integrated RELU project. We include the range of stakeholders to be engaged in this project and required to effect rural management and policy change linked to minimizing risk associated with *E. coli* O157

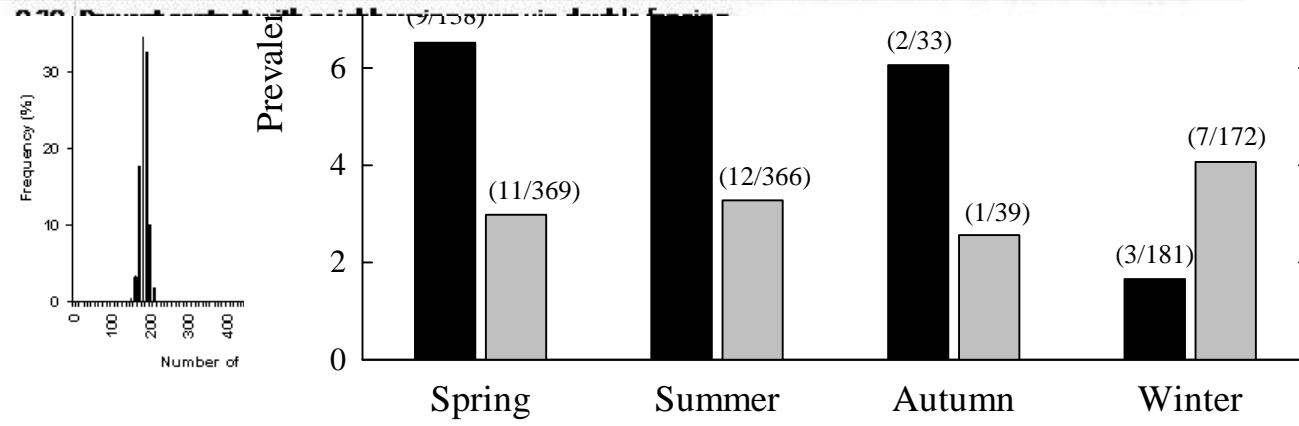
How the bits fitted together

REDUCING *ESCHERICHIA COLI* O157 RISK IN RURAL COMMUNITIES





Intervention	Average	Intervention description
19	9.04	Vaccinate cattle to control pathogen colonisation and faecal excretion of <i>E. coli</i> O157.
3	7.83	Remove high shedding animals prior to slaughter (possibly using some form of cow-side test).
2	7.52	Remove farm animals from proximity of private water supplies (e.g. at least 50m from well, borehole or oth
13	6.30	No slurry or livestock manure to be applied to high risk fields (ie high risk of transport into adjacent areas
5	6.02	Monitoring of private water supplies to identify those with either high indicator counts, or those in areas c
1	5.99	Encourage Farmers and farm visitors to wash hands following contact with farm animals.
11	5.87	Prevent children under the age of 11, and other vulnerable groups, coming into contact with animals at pet
4	5.03	Prohibit recreational activities (such as walking and camping) to land where manure, slurry or abattoir wa
8	4.36	No application of manure to land at high risk of direct flow to watercourses (e.g. adjacent to a watercourse
9	4.23	Locate solid manure heaps and slurry pits at least 50m away from watercourses, field drains and ready-to
23	4.22	Only treated or batch stored solid manures and slurries should be applied to land before drilling/planting.
22	4.12	No application of manure to ready-to-eat crops within 12 months of harvest and 6 months of drilling/plant
7	3.53	Keep livestock and pets out of ready-to-eat crop areas, using fencing for example.
25	3.33	Use probiotics to reduce <i>E. coli</i> O157 shedding rates (e.g. <i>E. coli</i> and <i>Lactobacillus</i> strains).
20	3.30	Store batches of slurry for at least 90 days before spreading on fields.
16	3.12	Require manure handling to be included in a food safety hazard analysis, or HACCP plan, and a COSHH ass
6	2.12	Stop run-off from adjacent manured fields using vegetative buffer strips of between 2 & 6 metres to control
15	1.83	Keep livestock away from packing and storage areas of ready to eat crops.
26	1.81	Groups of young stock should not be mixed once established.
27	1.71	Reduce cattle stocking densities by 50%.
14	1.66	Livestock bedding must be kept dry (eg ensuring a "squelch-score" of 1 or 2, where: 1=very dry, 2=dry, 3=sq
10	1.47	Require 4 weeks between spreading of wastemanure and animals grazing in a field.
30	1.20	Ban the disposal of untreated abattoir waste to land.
24	1.10	Eliminate contamination of ready-to-eat crops from aerosol and windborne drift during manure spreading
17	1.06	Fence off streams from livestock.
18	0.58	Fallen fruit not to be used for human consumption (fresh fruit, unpasteurised juice) if livestock have grazed
12	0.55	Reduce leakage from septic tanks in rural areas (e.g. an annual inspection with owner required to pay for a
28	0.54	Separate clean roof water from farmyard areas contaminated with faeces to reduce storage capacity.



WP6 Evidence for policy: the process



Proforma headings



Findings



Confidence, error estimates



Meanings



Policy implications



Trade-offs, practicality



Annexes detailed data

Excerpt from WP2 *pro-forma*: Persistence of *E. coli* O157 in 8 soil types



O157 persists in soils for 120d,
reactivates in 5-9h



P < 5%; soil microcosms in triplicate



O157 from soil can potentially
reactivate in the human gut



Code of good agricultural practice for
farmers, growers and land managers



Field conditions more complex than
soil microcosms in the laboratory



Annex contains data on persistence,
metabolic activity, soils etc

Excerpt from WP1a *pro-forma*: Stakeholder perceptions of risk



Visitors view O157 as a food hazard not as a dysentery associated with cattle



573 respondents described how they reduced their risk of illness from O157



Visitors in rural areas are naïve



Public access and land management



Trade-offs, practicality, tourist economy



Annex contains 59,201 words and 50 hours of interviews

E. coli O157 and Policy events

Annex 2

FSA / SE JOINT TASK FORCE ON E. COLI O157 MEMBERSHIP AND CONSULTATION PROCESS

Structure of task force

- Chairman appointed by Minister
- Core participants appointed by the Minister for working and exploring delivery options
- Sector participants invited to contribute in their fields
- Secretariat to co-ordinate working arrangements

Working practices

- Commence from evidence published at the E.coli O157 open forum on 28 June 2000
- Invite participants (and wider committees on paper) to provide relevant supplementary evidence
- Submitted evidence to be suitable for putting on FSA web site
- Feedback to be offered on request on contributions made
- Opening meeting for all participants in late September
- Sector meeting on human health (October), land use (agriculture / animal) (November), land use (other interests) (November) and food chain / water (December). Later meetings on, eg risk assessment and communication
- Concluding meeting for all prior to final report
- Expect sector people will attend their respective day (to minimise overlap and duplication) but they are welcome other sector days, if necessary
- Individual / focus meetings on offer, if needed
- Use of web site and exchanges on paper, by e-mail or electronic conferencing an offer to reduce attendance commitments

Opportunities

- Aim for practical action points
- Show FSA / SE forward thinking, taking this complex, multi-faceted issue into new areas, led by new information
- FSA sponsor the bigger picture, beyond food
- Practice joined-up government FSA, SE and Whitehall
- Offer an open, inclusive process
- Distinguish needs for advice and education to public and others

Sensitivities / barriers

- Understand residual / ongoing concerns of patient support groups
- Undesirability of 'second tier' committee group, hence 'sector' approach
- Tension between core group working and wider interests: create and maintain a balance
- Lawyers of many to be involved and kept informed, but meetings not to be too large
- Potential consequences for policy, legislation, advice and resources.

122

YouGov Public Inquiry

Evidence

The inquiry collected a substantial volume of evidence including written statements from witnesses and an extensive range of documents, records and other evidence in source material for its investigation.

Relevant evidence is organized under a number of key themes, which reflect the issues being investigated.

John Tudor & Son (Bridgend), the butcher at the centre of the Outbreak

[Witness Statements \(of 2000\)](#)
[Source Material \(of 2000\)](#)

The inspections of John Tudor & Son (Bridgend) by Environmental Health Officers from Bridgend County Borough Council

[Witness Statements \(of 2000\)](#)
[Source Material \(of 2000\)](#)

The procurement of food from John Tudor & Son (Bridgend) by local authorities

[Witness Statements \(of 2000\)](#)
[Source Material \(of 2000\)](#)

The inspections of J.E. Tudor & Sons Limited (Treorchy), a separate business, by the Meat Hygiene Service

E. coli O157 independent investigation June 2010

About the investigation

- Purpose**
- Terms of Reference**
- Conduct**
- The Investigation Committee**
- Meeting Notes**

The Report

- Foreword**
- Executive Summary**
- Outline of the Report**
- PART A - The Context**
- PART B - The Outbreak**
- PART C - Management of the Outbreak**
- PART D - The Challenge of Reducing the Risks**
- PART E - Conclusions and Recommendations**
- Appendices**

Evidence

About the investigation

This section contains:

- Purpose**
The purpose of the independent investigation.
- Terms of reference**
The investigator's terms of reference.
- Conduct**
The conduct of the investigation.
- The Investigation Committee**
Biographical details of the investigation committee.
- Meeting Notes**
Notes from the committee meetings.

[Terms of use](#)

Who to communicate with in policy?

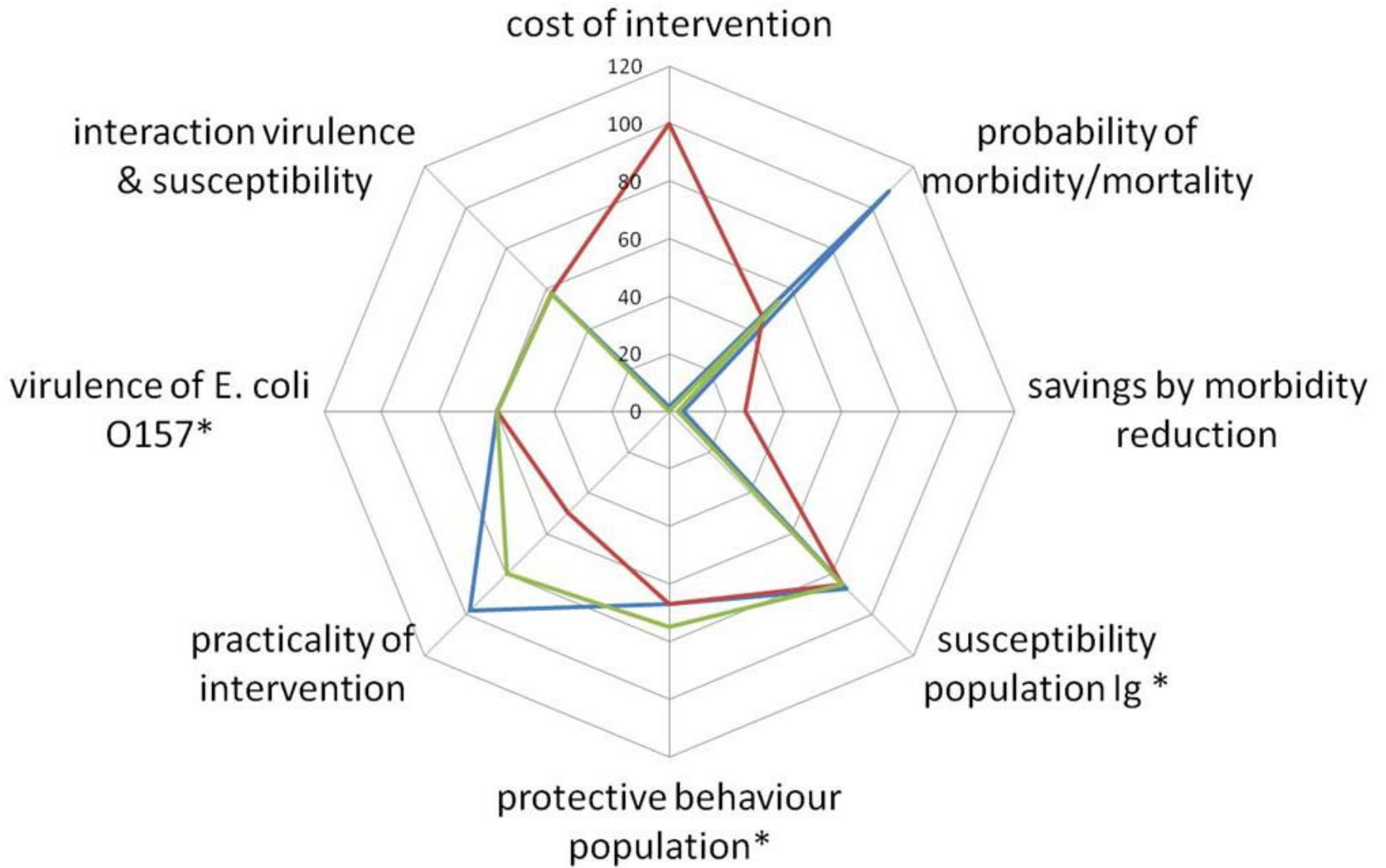
- Two way process – who can we communicate with who has access to policymakers? – appropriate for our ‘purpose’
- Purpose defined as the communication of scientific findings/knowledge which the evidence shows to have *added value* in *reducing cost/impact/incidence/severity?* in a regulatory/policy domain
- Advisory and Standing Committees/Experts
- FSA (Food Standards Agency) , ACMSF (Advisory Committee on the Microbiological Safety of Food) DEFRA (Department of the Environment Food and Rural Affairs)
- National Farmers Union, Quality Meat Scotland
- Public Health

What

- What is the evidence that shows scientific provenance for the 'added value' that our findings can offer?
- How to collate/integrate it?
- Proforma of proformas-each WP; key points selected and summarised.
- Key information that stakeholders require (info already cut)
- Do they need to do something about it?
- What is it that they can do about it?
- Iteration?

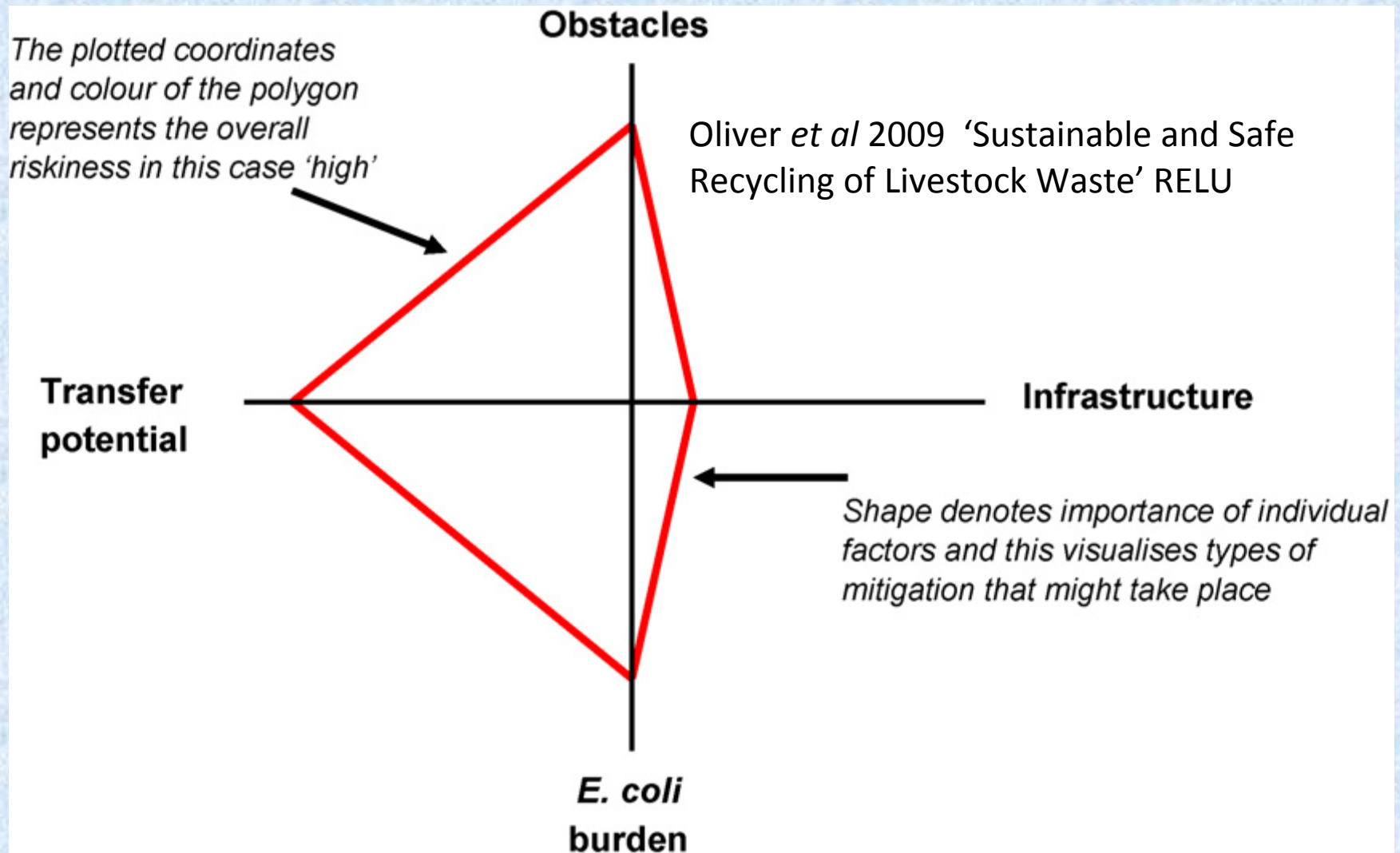
How

- Frameworks (Textual): Proforma of proforma, DPSEEA model, Renn IRGC framework
- Device (Tool) e.g. Graphs- Spider diagram (trade-offs); graphs (practicality vs effectiveness)



Four-axis framework

Toolkit and visualisation of faecal indicator organism loss on farms



How

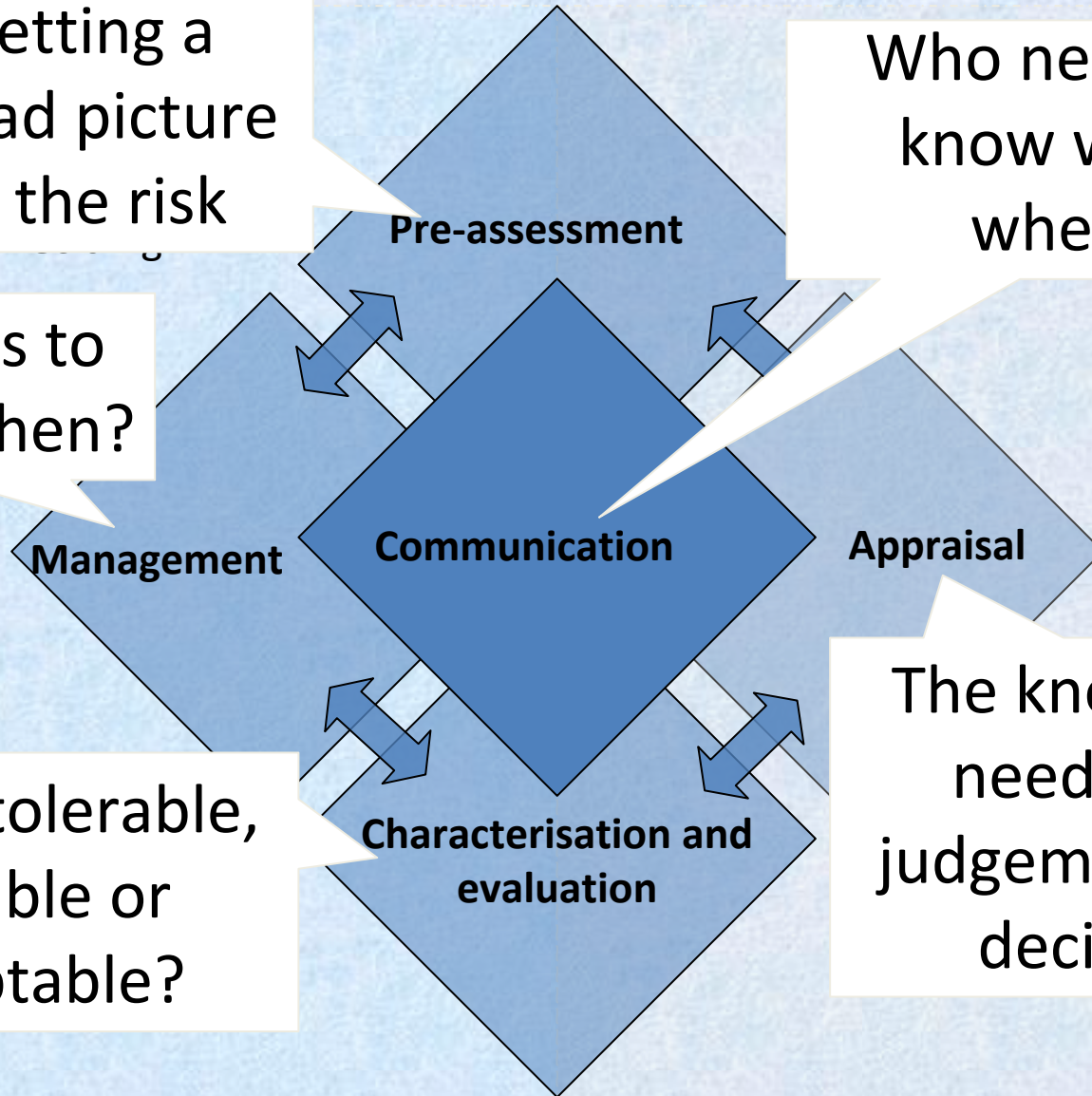
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- Device (Tool) e.g. Graphs- Spider diagram (trade-offs); graphs (practicality vs effectiveness)

IRGC'S Risk Governance Framework

Getting a broad picture of the risk

Who needs to know what, when?

Who needs to do what, when?



Is the risk tolerable, acceptable or unacceptable?

The knowledge needed for judgements and decisions

Pre-Assessment

1. Problem Framing

Illness Prevention	Individual Sovereignty
Zero tolerance	Tolerance
No choice	Choice
General Population	Susceptible Population

2. Early Warning/Screening

- Outbreaks (Godstone Farm, New Deer Scout Camp etc.)
- HUS surveillance / GI pathogen surveillance in stool samples (clinical/GP)

E.Coli Outbreak: Another Child In Hospital

1 Share 3 Comments

© BBC News, Wednesday September 16, 2009

Fourteen children are now being treated in hospital after an E.coli outbreak at a petting farm, the Health Protection Agency has said.



The figure is up on the 13 who were in hospital on Tuesday, when the total number of cases linked to the outbreak has risen from 37 to 40.

Four of the children now in hospital are seriously ill, seven are in a stable condition and three are improving.

The latest update comes after the head of the HPA issued an apology to parents of those children left seriously ill by the outbreak at Godstone Farm in Surrey.

Justin McCracken said they knew about the first case at least six days earlier than previously stated.

"I wanted to speak personally to the parents of those children who are most seriously ill in hospital to explain what has happened and ... apologise," he said.



Godstone Farm in Surrey

"The position they find themselves in is unbearable and it is of course worse that what has happened might have been avoidable."

Initially, the HPA said that the first case had come to light on August 27 but an investigation found two cases were reported in the previous week.

Mr McCracken said: "If this information had been taken into account on August 27, then the advice given and the steps

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Godstone Farm: Health chiefs slammed over petting farm E.coli outbreak

By Mirror.co.uk



The Health Protection Agency (HPA) was criticised today for a "missed opportunity" to take action which would have restricted the size of an E.coli outbreak at a petting farm.

The HPA came under fire over its handling of last year's E.coli outbreak at Godstone Farm, near Redhill, Surrey, which infected 93 people.

Today's independent investigation also criticised the farm, saying the outbreak could have been avoided if measures had been taken to limit exposure to animal faeces, which put people at risk of contracting E.coli.

Today's report, commissioned by the HPA, was led by George Griffin, professor of infectious diseases and medicine at St George's, University of London.

E.coli butcher jailed for a year

A butcher has been jailed for a year for food safety offences which led to a fatal E.coli outbreak in 2005.

Cardiff Crown Court heard that a vacuum-packing machine, "wrongly used" for both raw and cooked meats, was the source of contaminated meat to schools.

William Tudor, 54, from Cowbridge, Vale of Glamorgan, had admitted six charges, including supplying contaminated meat from his meat business in Bridgend.

One boy died and 157 others, mainly children, became ill in the outbreak.

The court heard Tudor's premises failed to guard against the risk of cross-contamination.

Judge Neil Bidder said that while Tudor was a pillar of society he had substantial culpability and a custodial sentence would send out a message to other food producers.

He told Tudor that he put the health of the public at risk for the sake of saving money.

Mason Jones, five, from Bargod in the Rhymney Valley, died in hospital two weeks after eating the contaminated ham and turkey at his school canteen, the judge was told.

Prosecutor Graham Walters said Mason had hallucinations and kidney failure before his death in the early hours of 4 October 2005.



William Tudor admitted the charges at an earlier hearing



Five-year-old Mason Jones died in hospital after becoming ill

VIDEO AND AUDIO NEWS
Tudor admitted supplying contaminated meat

South East Wales
Find out more about what's going on across the region

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Health tests at farm as child dies from E.coli

By Graeme Smith and Alan MacDermid

27 Sep 2009

TESTS are under way to identify the source of an E.coli infection which has killed a two-year-old girl from the North-East of Scotland. Amy Jones, from Ash in North Berwick, died in the Royal Hospital for Sick Children at Tronhall, Glasgow, from complications caused by the infection. She is the youngest of four children - including two at primary school - of Mr Michael Jones and Mrs Sarah Calam, who live at South Boghead farm. Amy first took ill around 10 days ago when she was taken to Macduff health centre, which referred her to Dr Gray's Hospital in Elgin. Her condition deteriorated and she was then admitted to Aberdeen Royal Infirmary. However, she was subsequently transferred to Yorkhill Hospital for intensive paediatric care for multiple organ failure - treatment unavailable in the North-East. She died a few days later. Environmental health officers from Aberdeenshire Council are carrying out tests at her farmhouse home, and early indications suggest that the source of the contamination is not food. Other possible sources, including the water supply, are being investigated. Dr Arun Mukherjee, consultant in public health medicine at Orkney Health Board, said yesterday: "We can confirm that a young child from north Aberdeenshire has died in hospital in Glasgow from complications caused by E.coli O157. The board's communicable disease team is currently liaising with Aberdeenshire environmental health colleagues to investigate this. There are no other known connected cases." Other members of Amy's family are understood to be unwell, but none has tested positive for the illness. Yesterday her family were first asked to speak. A spokeswoman for Aberdeenshire Council said there was no evidence of a major outbreak and that its

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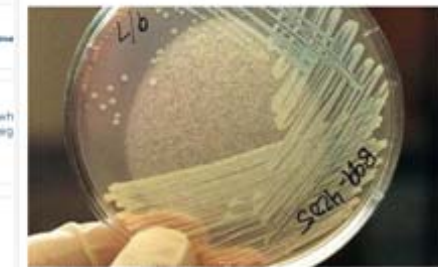
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Takeaway linked to Wrexham E.Coli outbreak had 'poor hygiene'

A takeaway shop being linked to an E.coli food poisoning outbreak near Wrexham was found to have poor hygiene conditions in an inspection by council inspectors a year ago.

By Paul Stokes
Published: 9:19PM BST 04 Aug 2009



A pettin dish containing bacteria E. coli. Photo AP
Karen Monrose-Clutton, 32, and a three-year-old girl, who has not been named, are "seriously ill" in hospital with E. Coli.

They are among four cases being investigated by health officials who ordered the closure of the Llay Fish Bar, near Wrexham, North Wales.

All reported the illness after eating food from the

and/or vomiting. On the basis of microbiological results, there are now 10 confirmed cases of

and the Agency is also maintaining contact with the local outbreak Control Team and will publicise any information that the public, media and local MSPs are kept in touch with developments

Councils

have the power to appoint a chairperson of a local Health Council, or whether this decision rests

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E.coli butcher set for trial Reckless conduct charge over bacterium outbreak that claimed 20 lives

By WILLIAM TRENKLE

21 Aug 1997

WISHAWY butcher John Barr, whose shop was at the centre of the world's worst E.coli outbreak, is set to face trial by jury, the Crown Office announced yesterday. The announcement follows his appearance on petition at Hamilton Sheriff Court in January, in connection with the outbreak. Mr Barr, 50, is accused of culpable and reckless conduct arising from the alleged supply of cooked meat from his shop in Caledonian Road, Wishaw, Lanarkshire, on

HC Deb 15 January 1997 vol 288 cc323-38

The Secretary of State for Scotland (Mr. Michael Forsyth) With permission, Madam Speaker, I wish to make a statement about the interim report from Professor Pennington's expert group, copies of which are available in the Vote Office. The whole House will wish to thank Professor Pennington and his colleagues for the work which they have reported. Quite properly, they wish to reflect further on some of issues before finalising their report by the end of February.

Professor Pennington was asked to examine the circumstances that led to the outbreak

Pre-Assessment

1. Problem Framing

Illness Prevention	Individual Sovereignty
Zero tolerance	Tolerance
No choice	Choice
General Population	Susceptible Population

2. Early Warning/Screening

- Outbreaks (Godstone Farm, New Deer Scout Camp etc.)
- HUS surveillance / GI pathogen surveillance in stool samples (clinical/GP)

3. Determination of Scientific Conventions

- Risk Assessment (Epidemiology, microbiology methods etc.)
- Concern Assessment (Valid & reliable methods for measuring perceptions & concerns)

Risk Appraisal

1. Risk Assessment

Epidemiology (WP3)

- Rare but severe disease
- High incidence in rural areas & young children

QMRA

- Exposure assessment (RELU PhD)
- Survival/infectivity in the environment (WP2)
- Human immunity/susceptibility (WP1b)
- Dose response
- Estimation of risk (WP3)

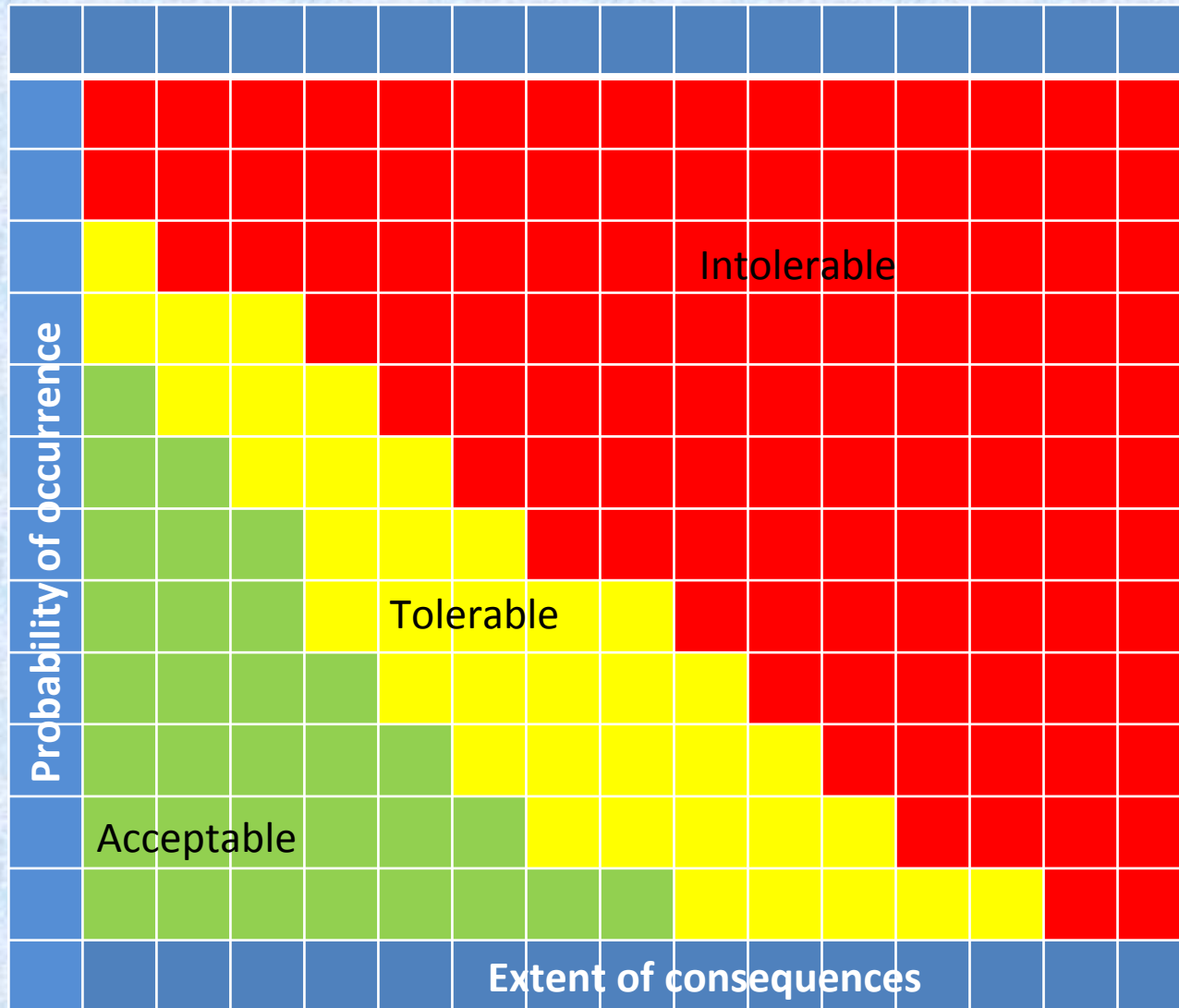
2. Concern Assessment (WP 1b)

- aware of it: visitors 35%; farmers 75%
- concerned about it: less than 50%
- concern for risk of illness in family was independent of pathogen
- farmers particularly concerned for their children

3. Socio-economic Impacts (WP 4)

- Health care/ Social costs
- Costs to industry/ regulatory authorities

Characterisation and Evaluation



Risk Management

1. Identification of options (WP5, WP3)

- literature, farmers, experts etc.

2. Assessment & Evaluation of Options (WP5, WP3)

- Efficacy, Practicality, costs
- Methodologies – Expert elicitation, farmer/consumer focus groups.
- Communicating findings to risk managers (WP6)

3. Selection, Implementation and Monitoring

- Risk Managers (DEFRA, FSA, etc)
- How far do the researchers go?

Communications

- Must be two way and throughout the process
- Create confidence in “governing institutions”
- Involvement in decisions and conflict resolution

Potential questions for discussion:

- How much data and detail are enough to inform?
- What does integration mean?
- Where do the researchers start and stop?
- Has the right research been done to fill the gaps?
- Who decides whether an intervention is needed?