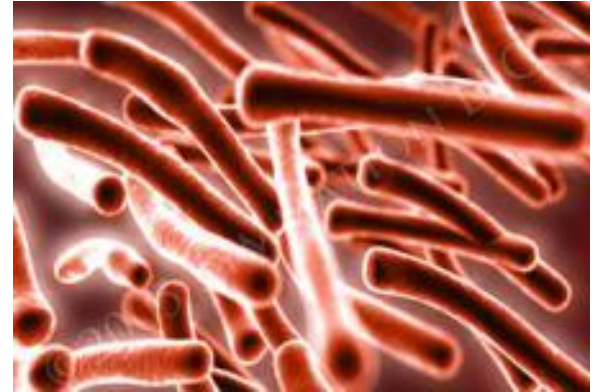




Department  
for Environment  
Food & Rural Affairs

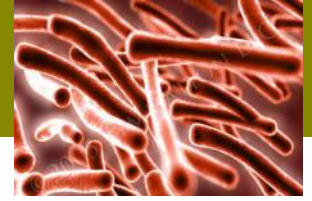


# **Towards Eradication: Science to inform TB Policy**

**Professor Ian Boyd  
Defra Chief Scientific Officer**

**TB Evidence Workshop  
June 5<sup>th</sup> 2013**

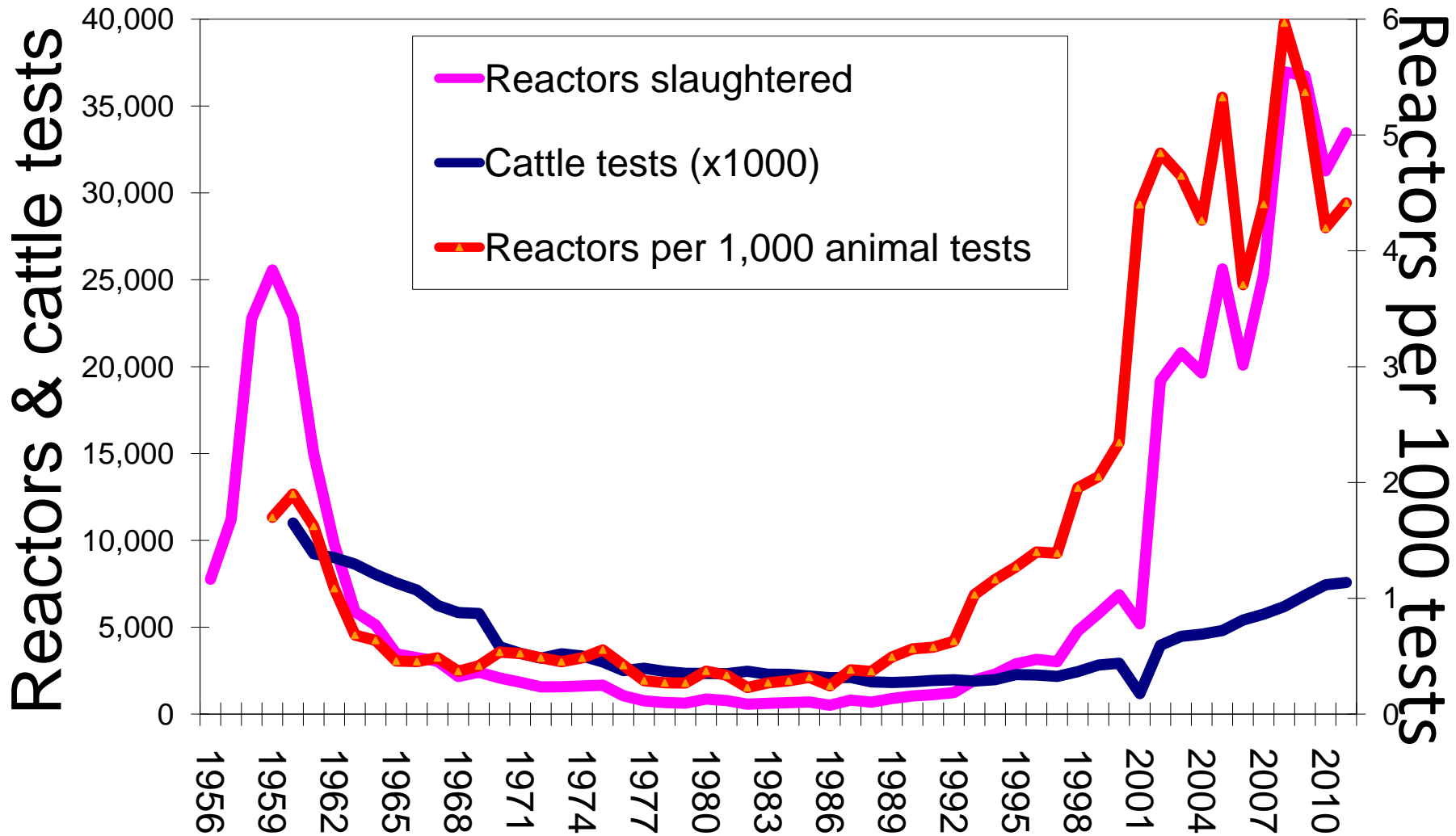
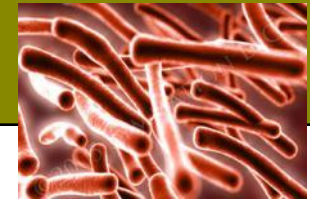
# Take-home messages



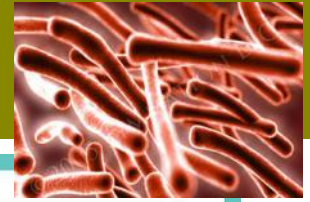
- ❑ bTB is spreading and increasing - out of control
- ❑ Current controls have high impact but are not enough
- ❑ bTB needs to be controlled in BOTH cattle and wildlife
- ❑ Status quo is not sustainable
- ❑ Considerable future financial, economic & health costs
- ❑ Need to implement additional controls
- ❑ Very strong evidence:
  - ❑ badgers are the main wildlife host
  - ❑ reducing badger numbers reduces the disease in cattle
  - ❑ reducing wildlife hosts is an essential component of disease control
- ❑ There are no easy fixes, such as vaccines
- ❑ Control strategy needs to use all available measures
- ❑ Controlling badgers is an essential part of controlling bTB



# The status of bTB: The loss of control



# The status of bTB: Geographical spread



## Bovine TB

### National spread since 1986 Number of cases\*

\*A case is a reactor in a confirmed (now "OTF Withdrawn") incident or a slaughterhouse case.

1986

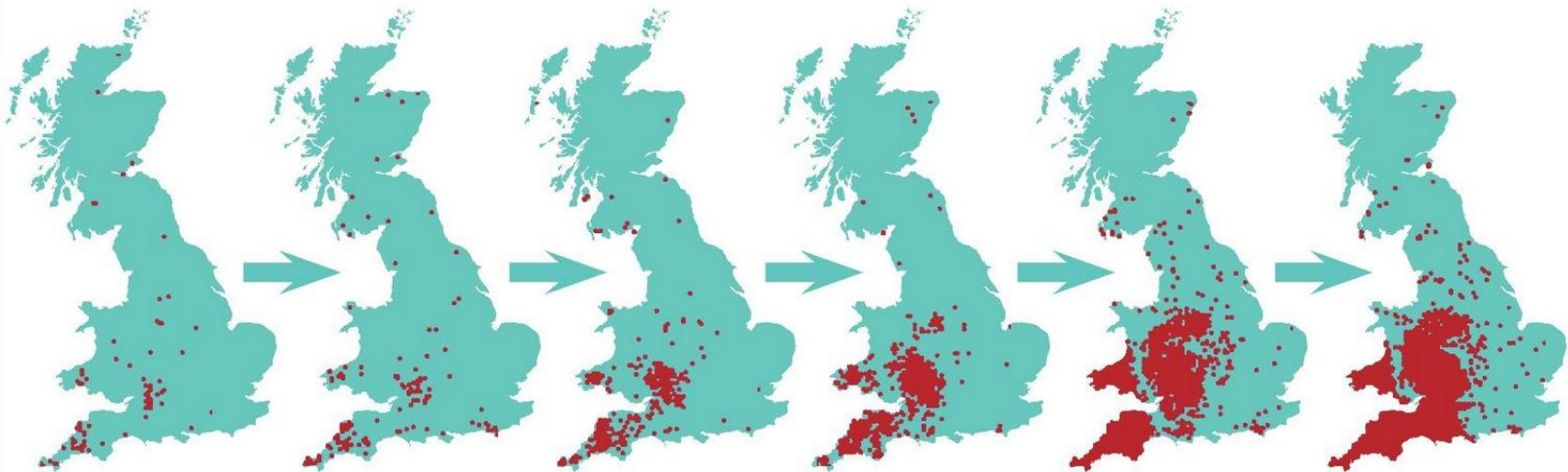
1991

1996

2000

2006

2010



**235 cattle  
tested positive  
for bovine TB**

**655 cattle  
tested positive  
for bovine TB**

**2541 cattle  
tested positive  
for bovine TB**

**6353 cattle  
tested positive  
for bovine TB**

**18342 cattle  
tested positive  
for bovine TB**

**28541 cattle  
tested positive  
for bovine TB**

Defra 2011



# Reasonable worst case



## Status quo

### High certainty:

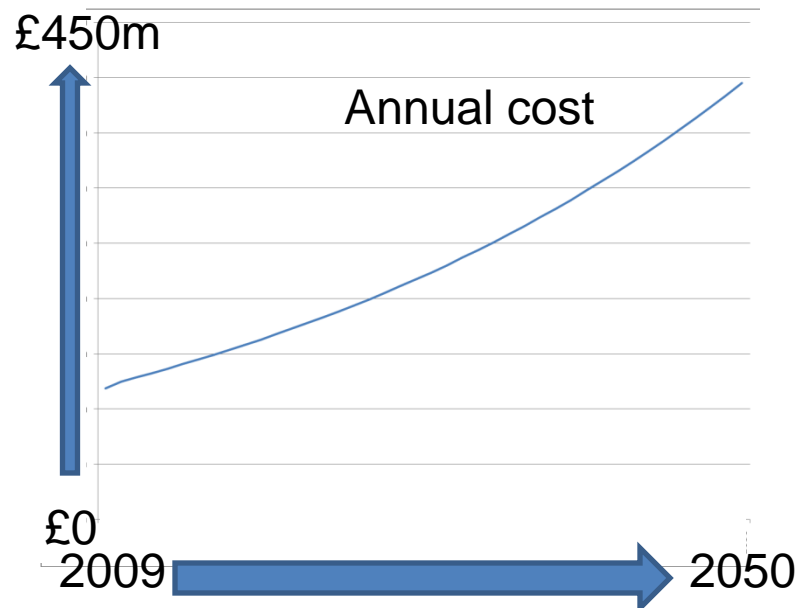
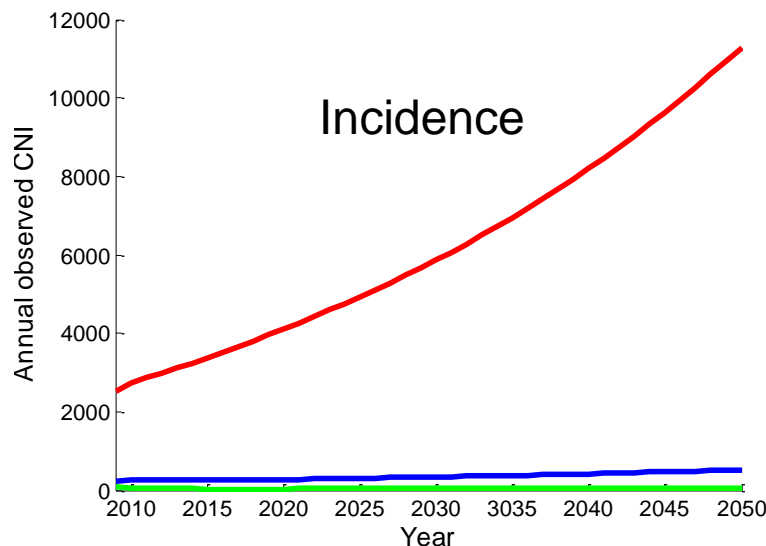
- Increasing incidence
- Increasing cost – unaffordable
- TB endemic and uncontrolled
- Increased pressure from EC

### More speculative:

- Livestock industry decline
- TB in wildlife – e.g. deer, foxes
- TB in other livestock
- TB in domestic pets
- TB in people – human health

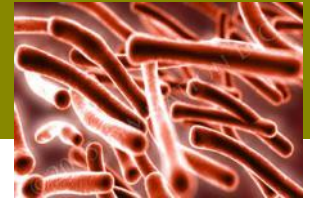
### Conclusion:

- Current direction of travel is not desirable

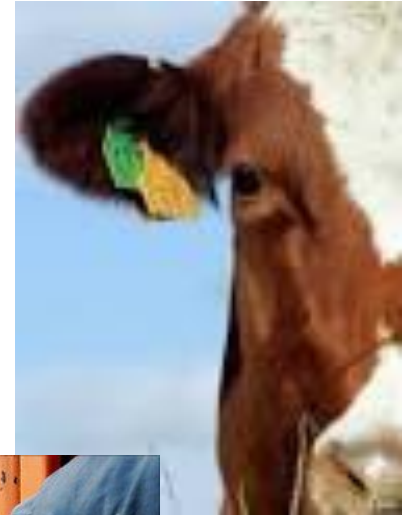




# Response to control the disease



- Containment
- Intensive testing
- Biosecurity
- Vaccination
- Wildlife control

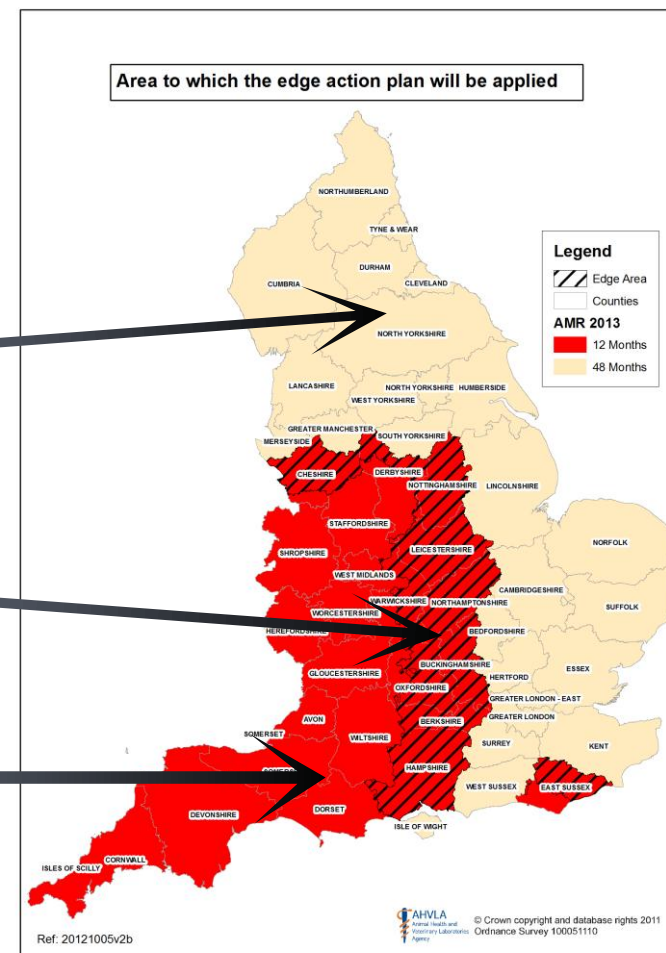


# Response to control the disease



- Containment**
- Intensive testing
- Biosecurity
- Vaccination
- Wildlife control

- **Low risk area**
  - maintain TB-free status
- **Edge area**
  - stop geographical spread
  - maintain low incidence levels
- **High risk area**
  - aggressive intervention
  - use all available tools



# Response to control the disease



Containment

**Intensive testing**

Biosecurity

Vaccination

Wildlife control

5.5 million tests carried out per year

Routine surveillance using tuberculin skin test on annual or 4-yearly basis depending on risk

Herd test followed by targeted use of  $\gamma$ -interferon

Slaughterhouse surveillance

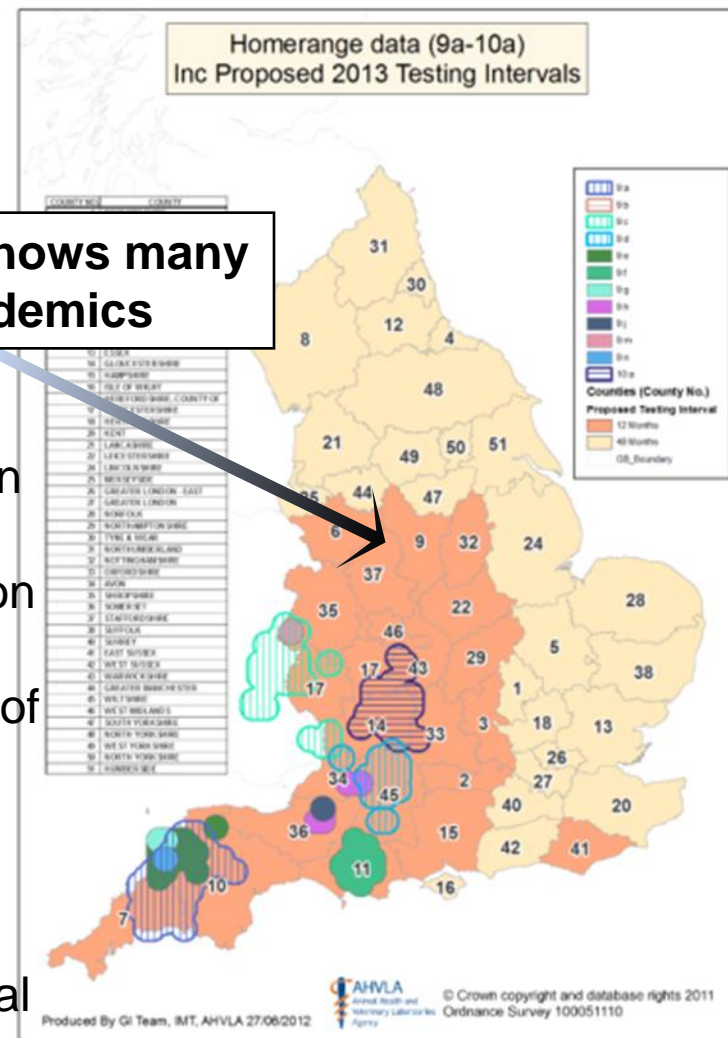
Pre-movement testing for all animals >42 days of age moving out of high risk area

Contiguous and radial surveillance around breakdown herds

Repeat testing until clear of infection

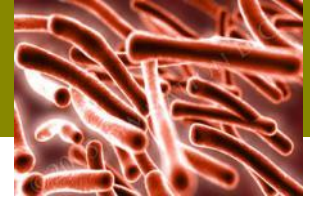
Tracings for source and forward, epidemiological investigation

**Genetics shows many of mini-epidemics**





# Response to control the disease

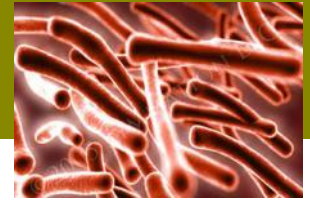


- Containment
- Intensive testing
- Biosecurity**
- Vaccination
- Wildlife control



- Removal of infected cattle and strict movement controls
- 28,000 TB-positive cattle slaughtered/year and rising
- Whole-herd slaughter under certain circumstances
- Measures to separate badgers and cattle

# Response to control the disease



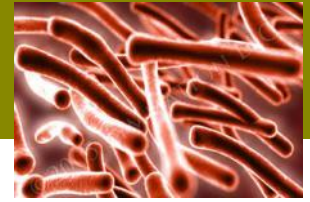
- Containment
- Intensive testing
- Biosecurity
- Vaccination**
- Wildlife control

- BCG is currently only vaccine (only partial protection provided)
- ~10 years until BCG available for use in cattle without trade restrictions
- Work to identify new candidates ongoing
- Vaccination of badgers needs oral vaccine (more than 5 years off)

## **Injectable badger vaccine :**

- Licensed & available for use
- Disproportionately large investment (2-3 times more expensive than culling)
- Need to vaccinate every year for 4-5 years, thus further reducing cost-benefit
- Does not eliminate infection from infected badgers
- Will take longer to have effects on TB in cattle
- Has not been demonstrated to have effects (although would be expected to)

# Response to control the disease



- Containment
- Intensive testing
- Biosecurity
- Vaccination
- Wildlife control**



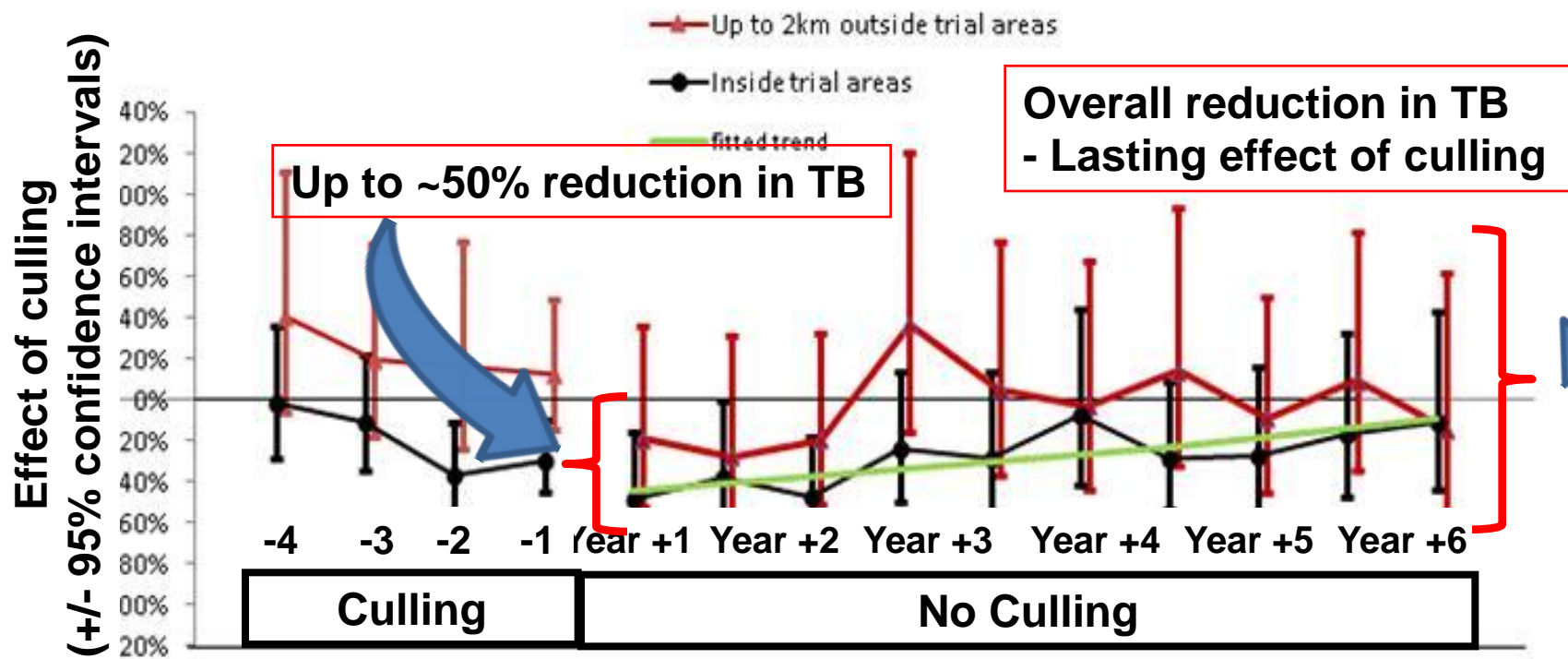
- Badgers may cause an average of 50% of cattle infections in the high risk area
- Control of wildlife reservoirs in US, NZ and Australia
- Dynamic cycle of infection between badgers and cattle
- Mode of transmission to/from cattle uncertain
- Removal of badgers if done on a sufficient scale, in a widespread, coordinated & efficient way, over a sustained time period shown to reduce bTB incidence in cattle



# Evidence: RBCT led to sustained benefit



**Culling badgers has a lasting, significant benefit**



1st to 2nd cull, 2nd to 3rd cull, 3rd to 4th cull, After 4th cull, 1-6, 7-12, 13-18, 19-24, 25-30, 31-36, 37-42, 43-48, 49-54, 55-60

**Time period (months)**

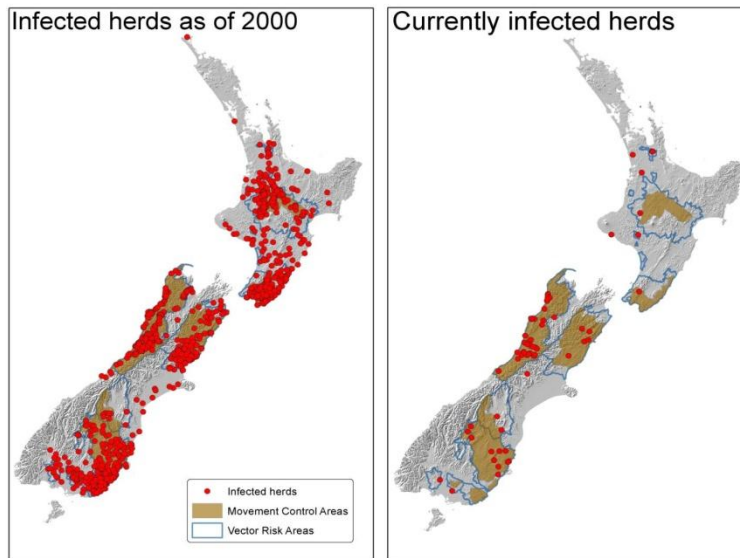
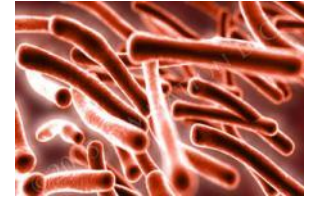
Time period

Graph courtesy of Christl Donnelly (see Jenkins et al, 2010)

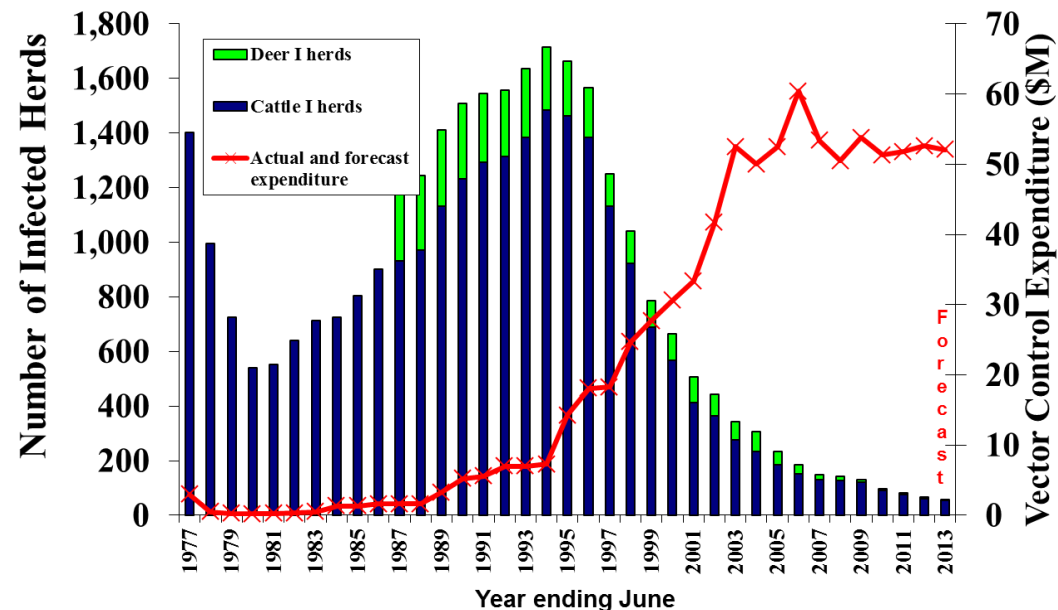


# Evidence: Controlling wildlife reservoir controls TB

- ❑ New Zealand – nearly reached TB-free status
- ❑ Australia – TB eradicated
- ❑ Ireland – TB coming under control



**New Zealand**  
Number of infected cattle and deer herds and expenditure on vector control 1977 - 2012

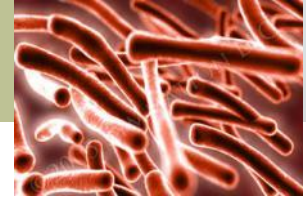


## Lessons

- Transfer responsibility to industry
- Control the wildlife reservoir



# What is the pay-off?



- ❑ Protect the health and wellbeing of the public;
- ❑ Maintain public confidence in food safety and the countryside;
- ❑ Meet international (in particular EU) legal commitments;
- ❑ Maintain the UK's reputation for safe and high quality food
- ❑ Protect and promote the health and welfare of animals;
- ❑ Maintain productive and sustainable farming industry; &
- ❑ Reduce the cost of TB to farmers and taxpayers (from £1billion over next 10 years)

## EU Directives:

- 64/432/EEC – intra-community trade of cattle
- 77/391/EEC – Member States must draw up plans for accelerated bTB eradication
- 78/52/EEC – specific TB controls in EU-approved plans (compensation, movement restrictions, C&D, prohibition to vaccinate, etc.)

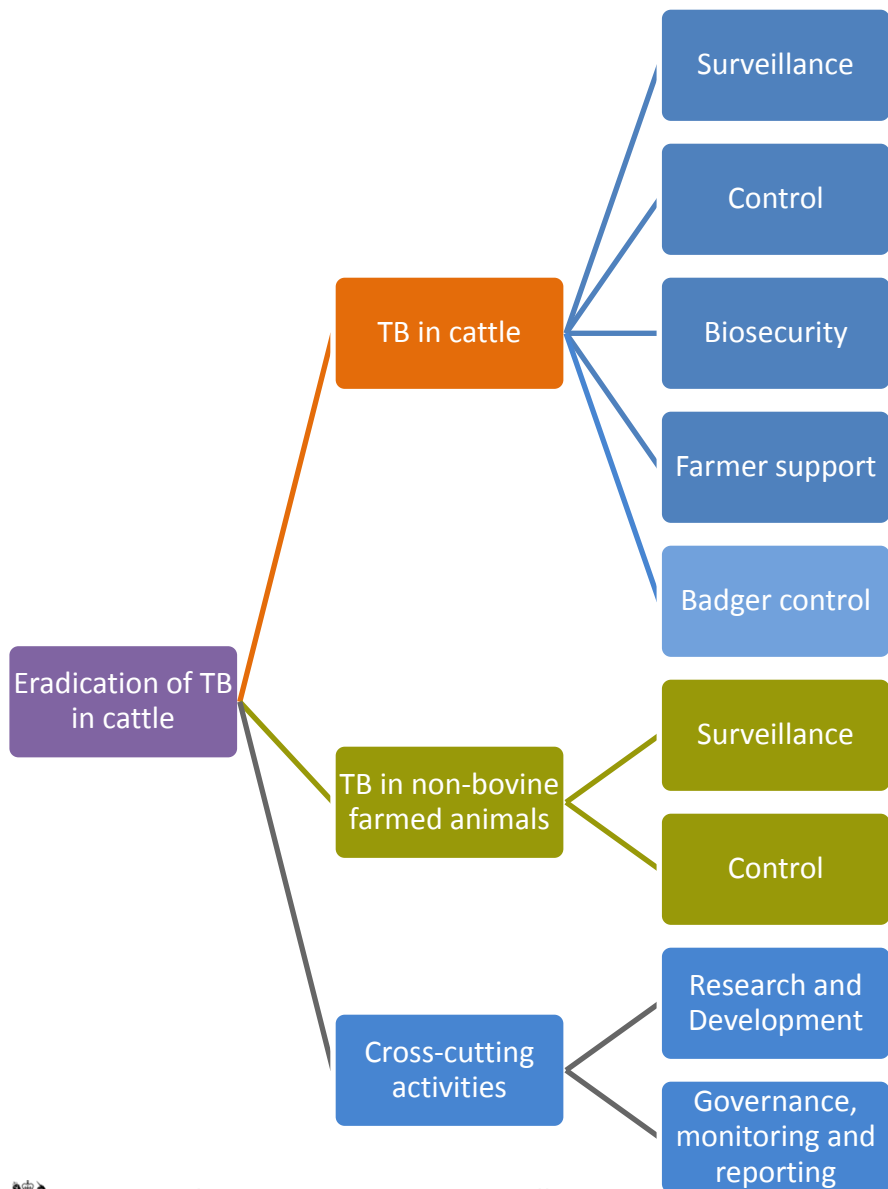
## Implementing Domestic Legislation:

- TB Orders (England, Scotland, Wales) under AHA 1981

## Maintain value of beef & dairy sector to UK economy:

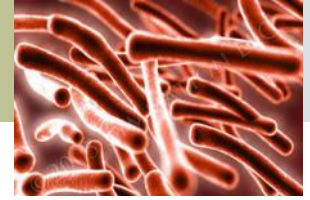
- Worth approx. £15bn a year to the UK economy.
- Dairy & beef cattle sectors employ around 115,000 people directly on farms.
- Beef & dairy export industries are worth about £2bn a year to the UK economy, and this is a growth sector with emerging markets in Russia and China.

# Eradication strategy – using all the tools available



- ❑ Objective is to achieve TB-free status (<0.1% prevalence)
- ❑ Uses all available “tools”:
  - ❑ Containment
  - ❑ Surveillance
  - ❑ Testing and removal of cattle
  - ❑ Risk-based controls on cattle movements
  - ❑ Strengthened biosecurity
  - ❑ Wildlife control (incl.vaccination)
- ❑ Tools applied differently depending upon circumstances

# Why a badger cull pilot?

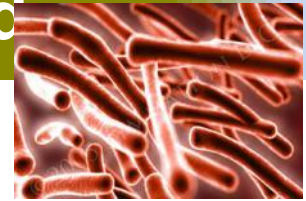


- ❑ Culling is effective based upon evidence from
  - ❑ Randomised Badger Culling Trial
  - ❑ Comparison with other countries with similar problems
- ❑ Turn science experiments in to an operational management tool
- ❑ Use as one of many different tools to control bTB

**Badger culling alone will not eradicate bTB  
BUT  
Without controlling the wildlife reservoir we  
cannot control bTB**



# How the cull will be carried out and monitored



- ❑ Must be seen as part of a wider strategy involving:
  - ❑ Testing cattle
  - ❑ Biosecurity
  - ❑ Vaccination (eventually)
- ❑ Natural England issues licences to cull companies (only during 'open season' when no dependent cubs in setts)
- ❑ Licence criteria – based on evidence from RBCT e.g. minimum size of area (150km<sup>2</sup>), average land access (70%)
- ❑ Requirement to remove at least 70% badgers
- ❑ Precautionary: **pilot** in 2 areas first to test assumptions about effectiveness, humaneness and safety of controlled shooting
- ❑ Results assessed by an independent expert panel
- ❑ Risk mitigation: Best Practice Guidance, training, professional oversight
- ❑ Decision on wider roll-out by February 2014

