

*Scottish Centre for Animal Welfare Sciences, Edinburgh, 19 October 2006*

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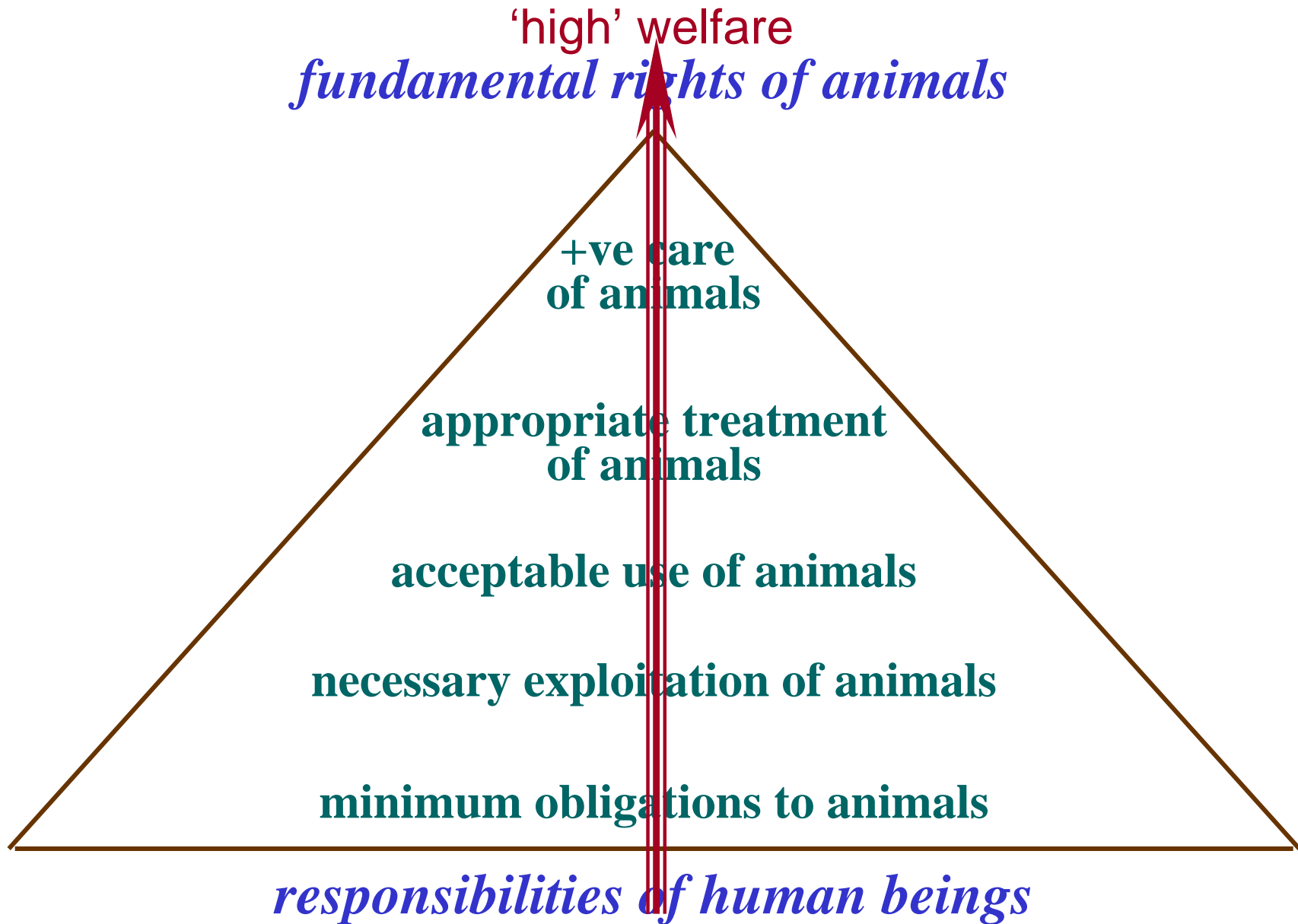
# **TUBERCULOSIS IN CATTLE & BADGERS - disease control, ethics and welfare**

***John McInerney***

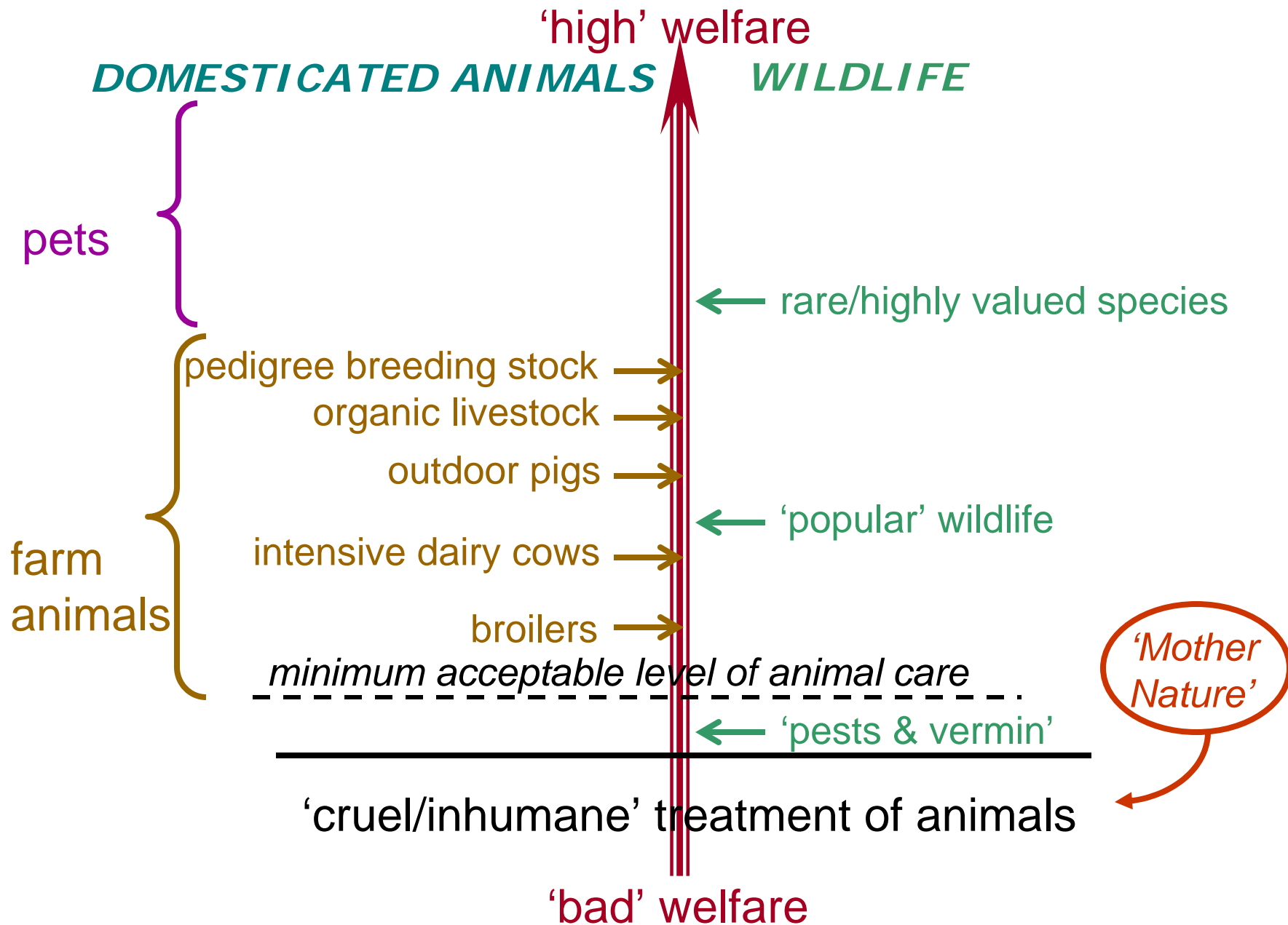
*University of Exeter*

*Independent Scientific Group on Cattle TB*

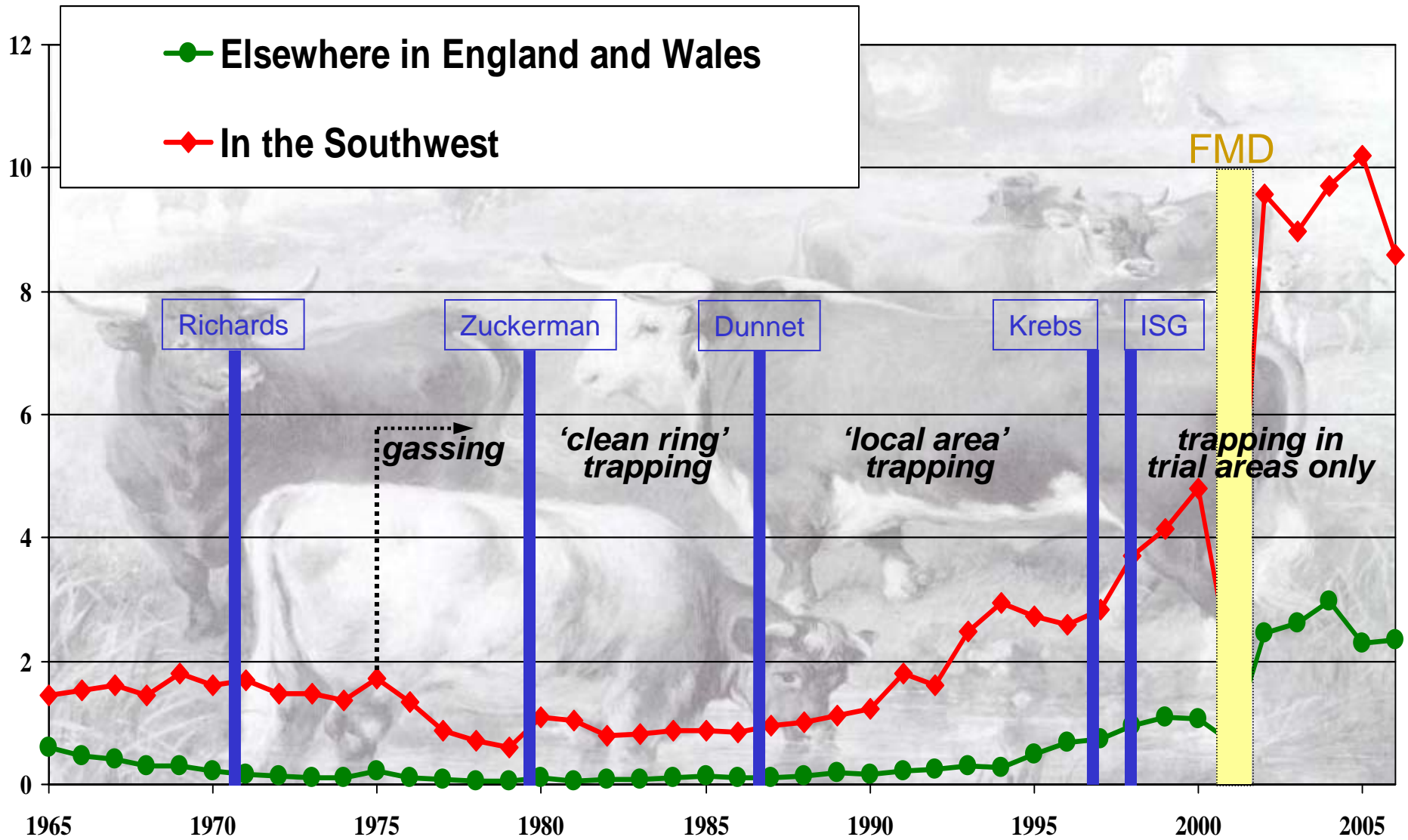
# Defensible Ethical Positions In Society



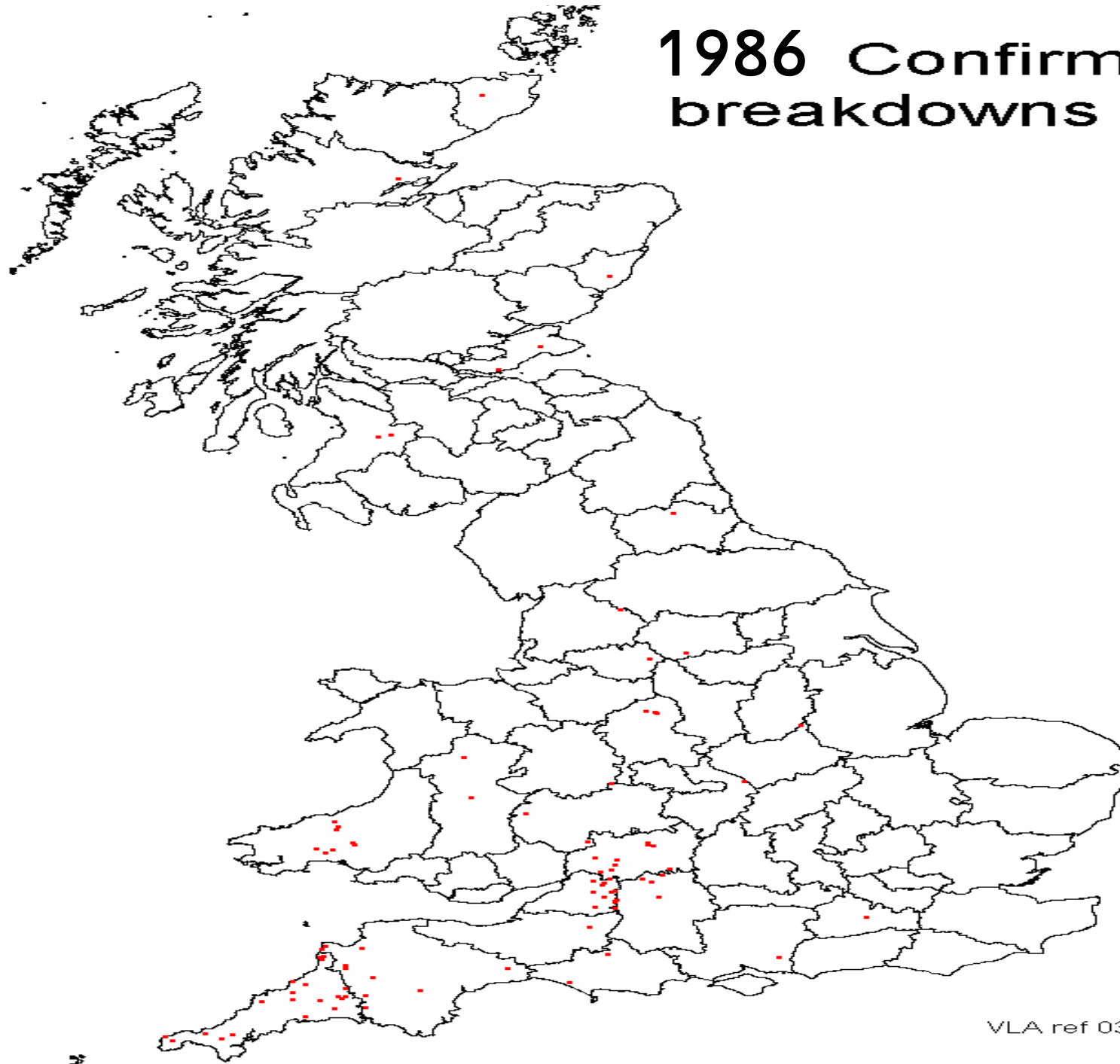
# A conceptual scale of animal welfare levels



# Proportion of herds with TB reactors

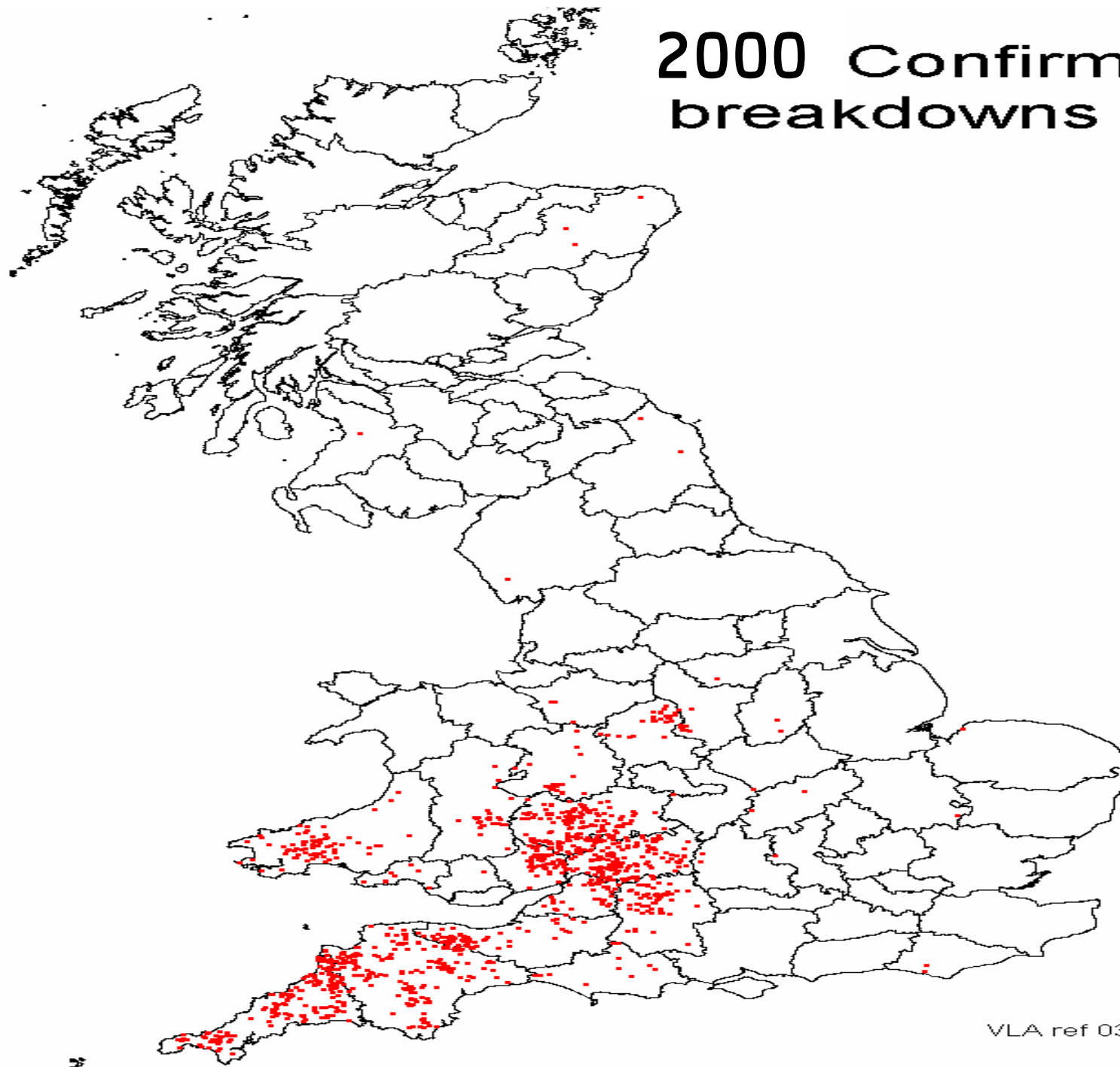


# 1986 Confirmed breakdowns



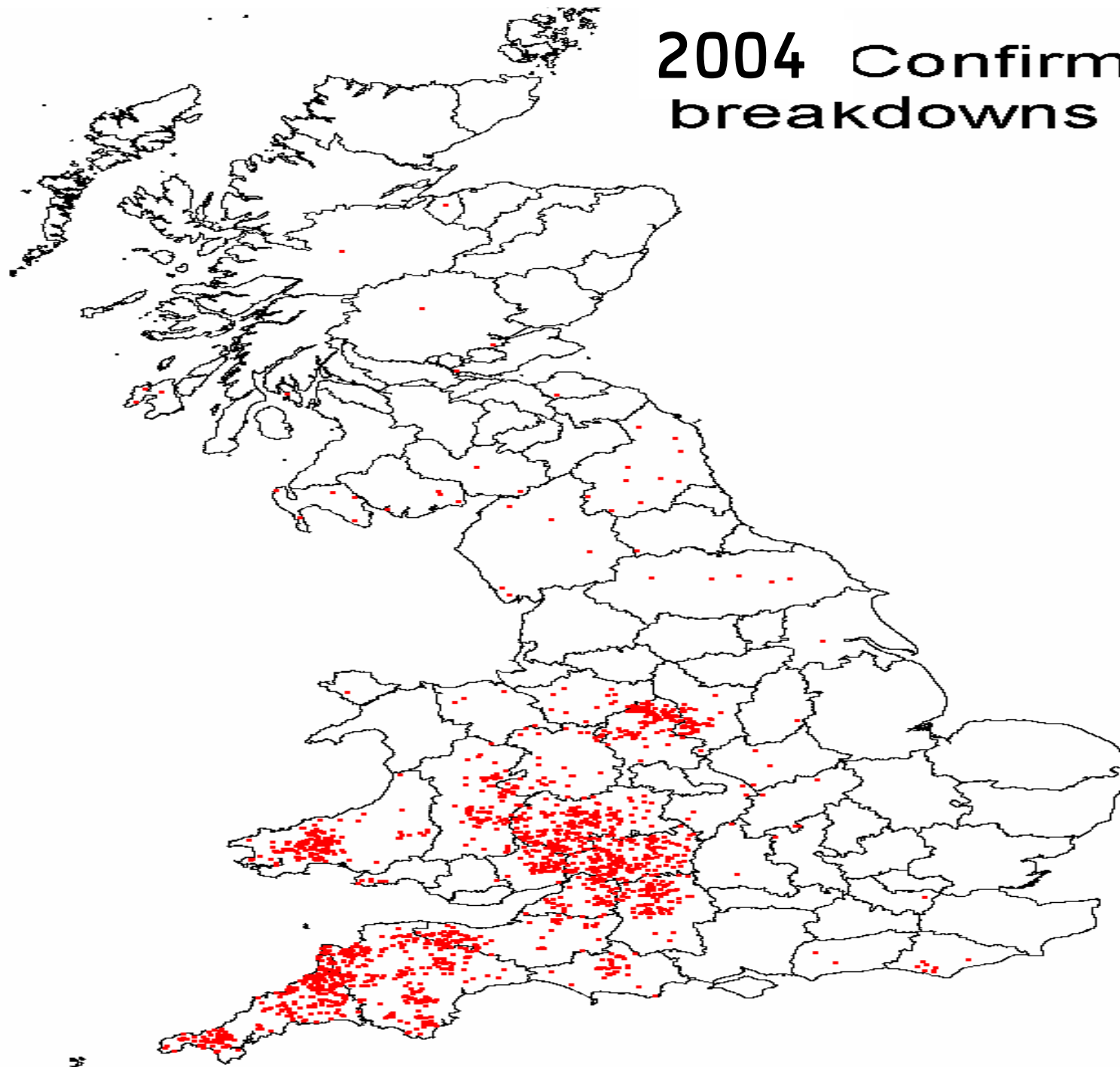
VLA ref 03/01

# 2000 Confirmed breakdowns



VLA ref 03/01

# 2004 Confirmed breakdowns

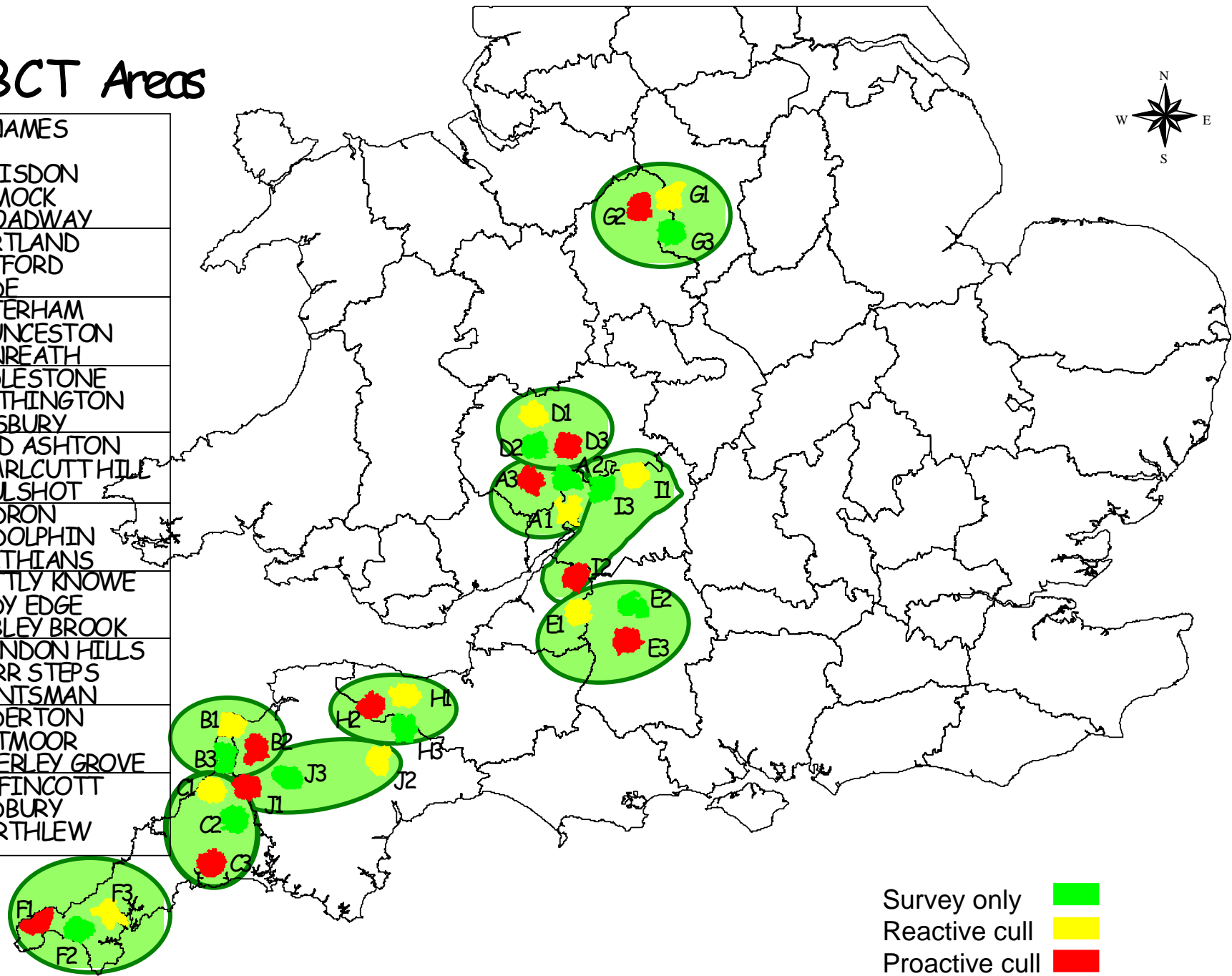


# The Randomised Badger Culling Trial (RBCT) ('Krebs trials')

- Krebs (1997):
  - compelling evidence that badger implicated in cattle TB
  - however, not clear what contribution they make
  - ∴ proposed a culling trial to assess this
- ISG (1998 - ):
  - unfortunately, not possible to assess 'contribution' of badgers
  - implemented as a field trial of potential culling strategies (but that was what was needed in practice anyway)
  - 30 trial areas each of 100km<sup>2</sup>, 3 different 'treatments'
    - (a) **reactive culling**: cull badgers on land associated with a herd breakdown
    - (b) **proactive culling**: cull badgers throughout trial area at the outset and maintain at as low a level as possible
    - (c) **survey only**: no culling, to serve as experimental control
  - trial areas located in TB 'hotspots', grouped into 10 locationally close 'triplets' having each of the 3 treatments
  - each treatment ∴ replicated 10 times

# RBCT Areas

TRIAL NAMES
A1 - BLAISDON
A2 - DYMCK
A3 - BROADWAY
B1 - HARTLAND
B2 - PUTFORD
B3 - BUDE
C1 - OTTERHAM
C2 - LAUNCESTON
C3 - LANREATH
D1 - PUDLESTONE
D2 - WITHINGTON
D3 - BOSBURY
E1 - COLD ASHTON
E2 - CHARLCUTT HILL
E3 - POULSHOT
F1 - MADRON
F2 - GODOLPHIN
F3 - STITHIANS
G1 - NETTLY KNOWE
G2 - LADY EDGE
G3 - CUBLEY BROOK
H1 - BRENDON HILLS
H2 - TARR STEPS
H3 - HUNTSMAN
I1 - ALDERTON
I2 - WETMOOR
I3 - APPERLEY GROVE
J1 - LUFFINCOTT
J2 - CADBURY
J3 - NORTHLEW



Survey only ■  
 Reactive cull ■  
 Proactive cull ■

## Dates of initial proactive culls

	<i>Triplet</i>	<i>Date initial cull commenced</i>
	B	December 1998
	C	October 1999
	A	January 2000
	E	May 2000
	F	July 2000
	G	October 2000
	H	December 2000
FMD	I	September 2002
	J	October 2002
	D	December 2002

# The Randomised Badger Culling Trial (RBCT) ('Krebs trials')

Practical considerations of implementing a badger cull:

- collaboration of landowners
- opposition and interference
- length and timing of culling operations
- effectiveness of capturing the buggers
- appropriate data collection

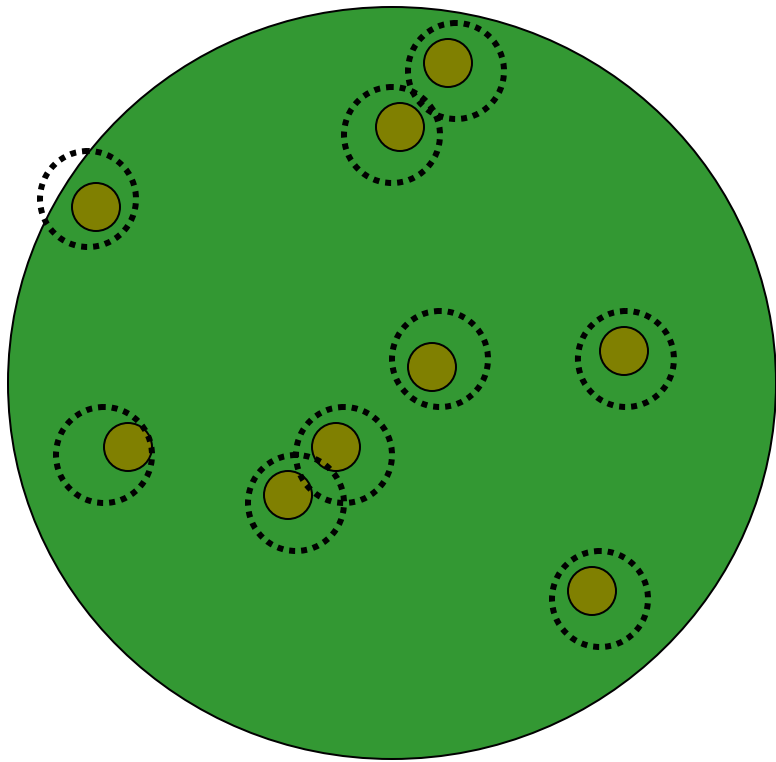
All had to be carefully considered and catered for in trial planning

# Ethical and welfare considerations in the RBCT

- ‘elimination of badgers from large areas of the countryside’ not acceptable
- closed season for culling, 1 February – 30 April
- capture method – gassing? snaring? cage traps?
- size and design of traps
- strict SOP regarding siting and attention to traps
- rigorous training and SOP re shooting
- independent welfare audits (4 reports)
- detailed analysis of trap injuries

[8900 badgers culled in proactive trial, 2069 in reactive]

## (a) Reactive cull treatment



*[average area culled 5.3km<sup>2</sup> in each case]*

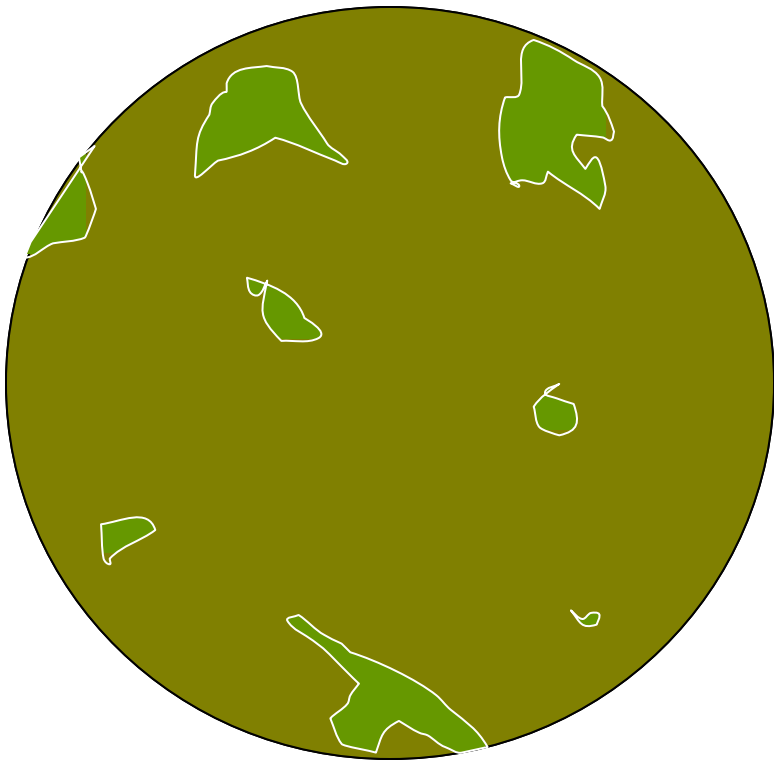
Overall incidence of confirmed herd breakdowns rose by 25%

Treatment suspended by Minister in November 2003

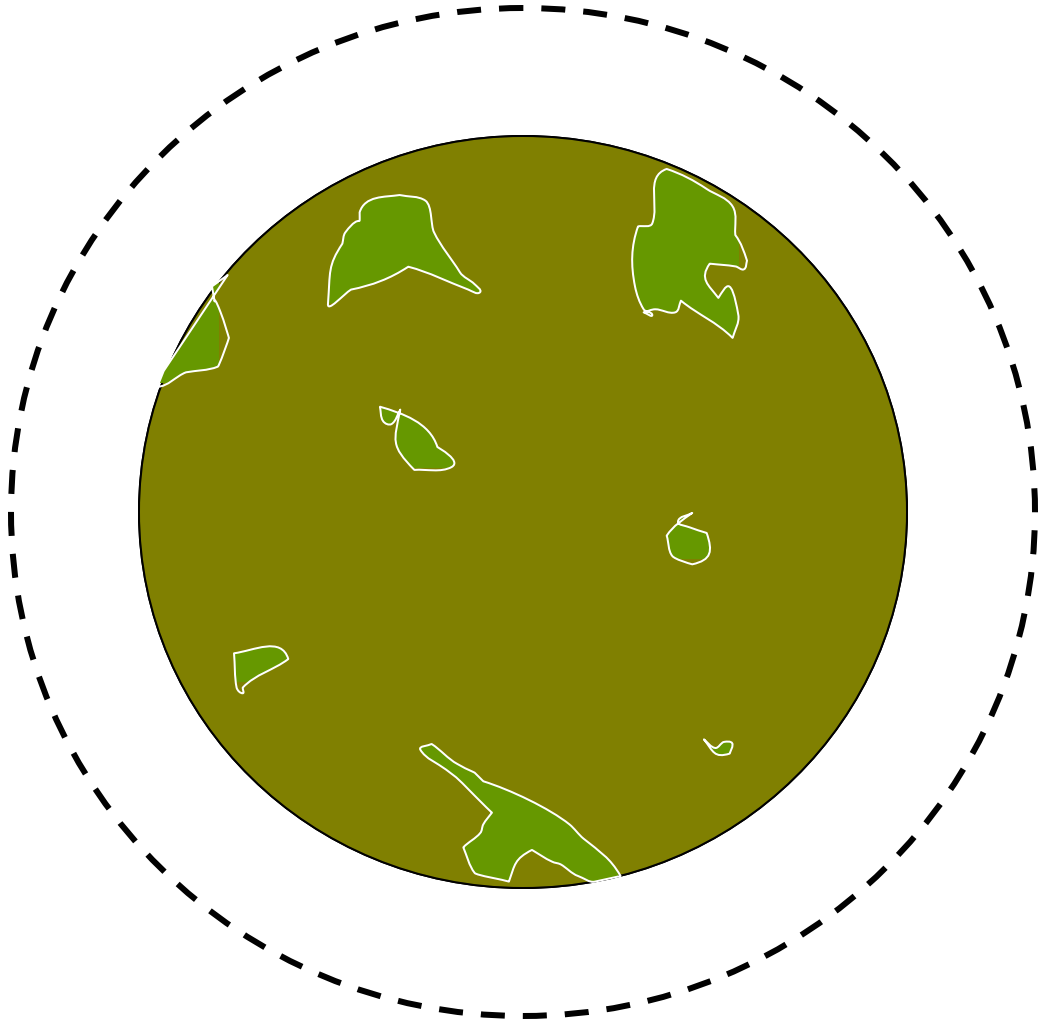
Reactive culling, as a candidate control policy, seen as a non-starter (despite it having been the main MAFF approach since 1975)

(b) Proactive cull treatment

Overall incidence of confirmed herd breakdowns in culled area fell by 20%



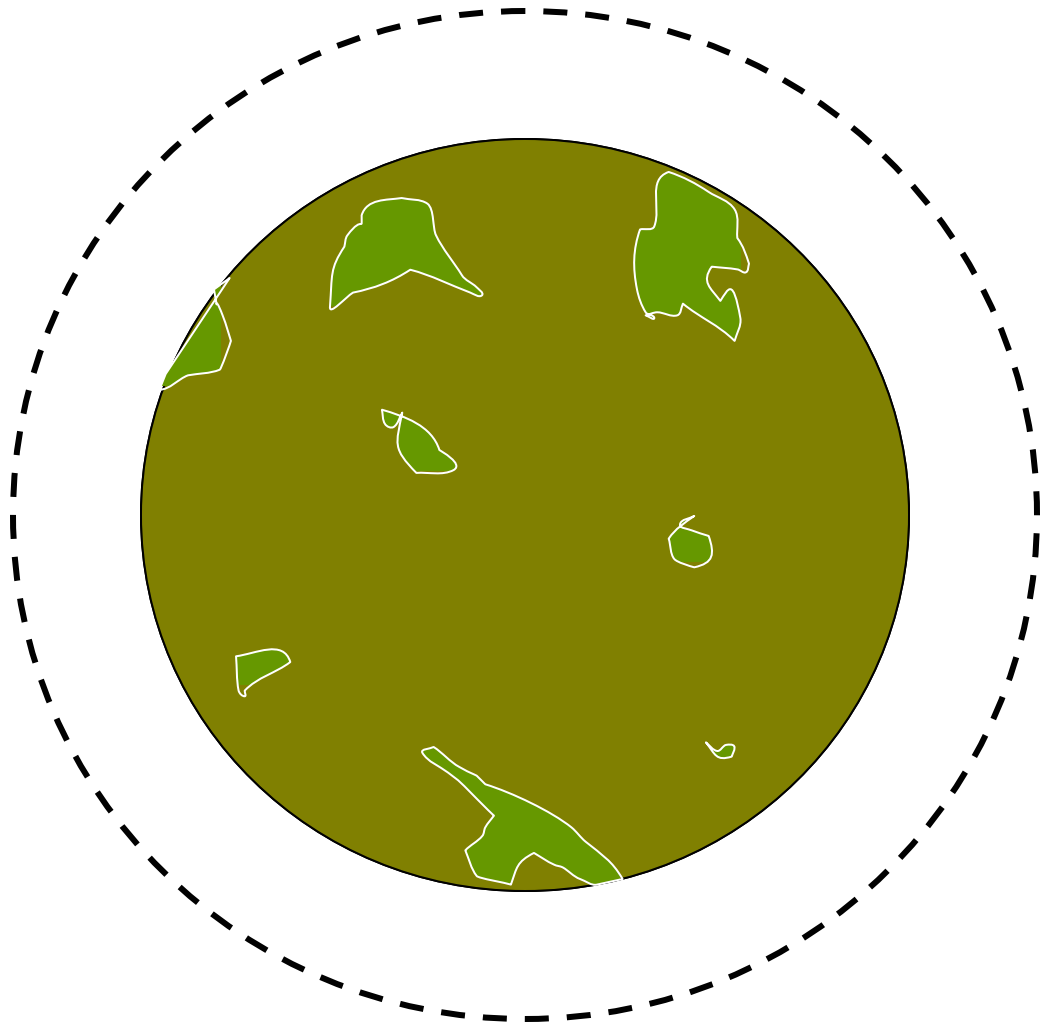
(b) Proactive cull treatment



Overall incidence of confirmed herd breakdowns in culled area fell by 20%

But incidence in the surrounding areas (within 2km of boundary) rose by 30%

## (b) Proactive cull treatment

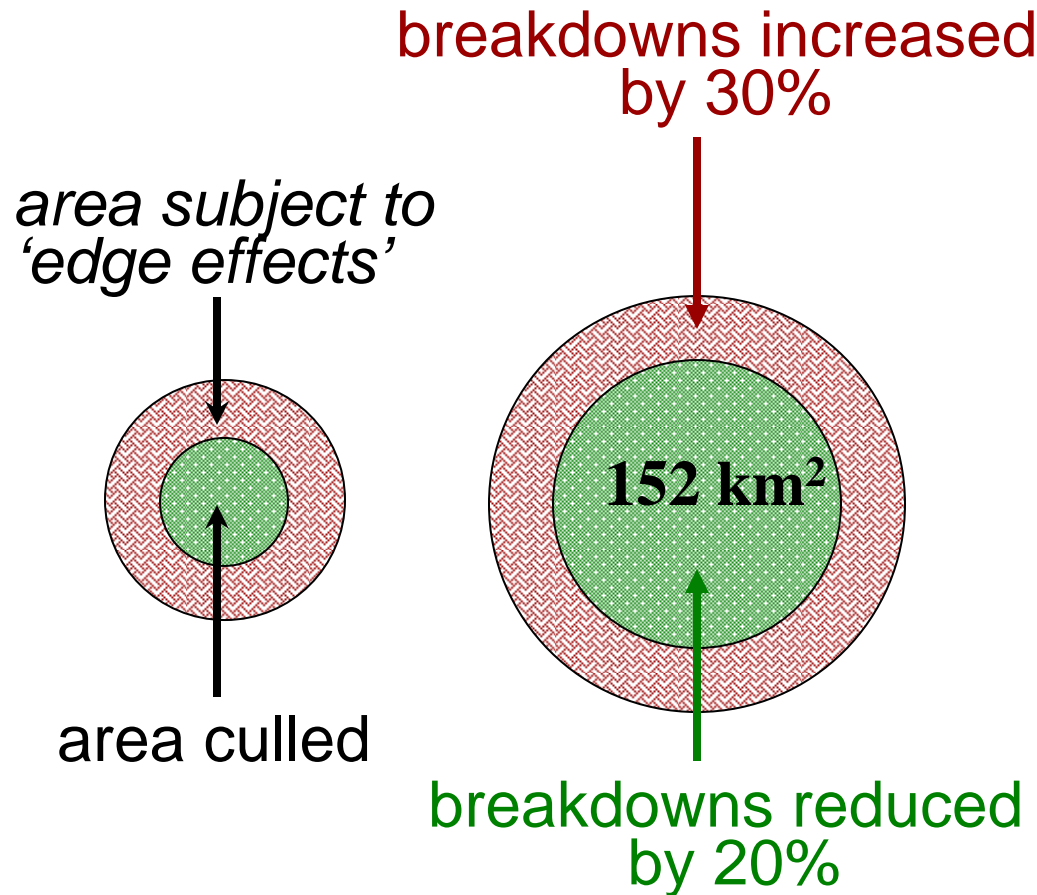


Overall incidence of confirmed herd breakdowns in culled area fell by 20%

But incidence in the surrounding areas (within 2km of boundary) rose by 30%

Explanation due to 'social group perturbation', increasing ranging behaviour of remaining badgers and increasing probability of contacts – and hence disease transmission

## When do benefits of badger culling become positive?



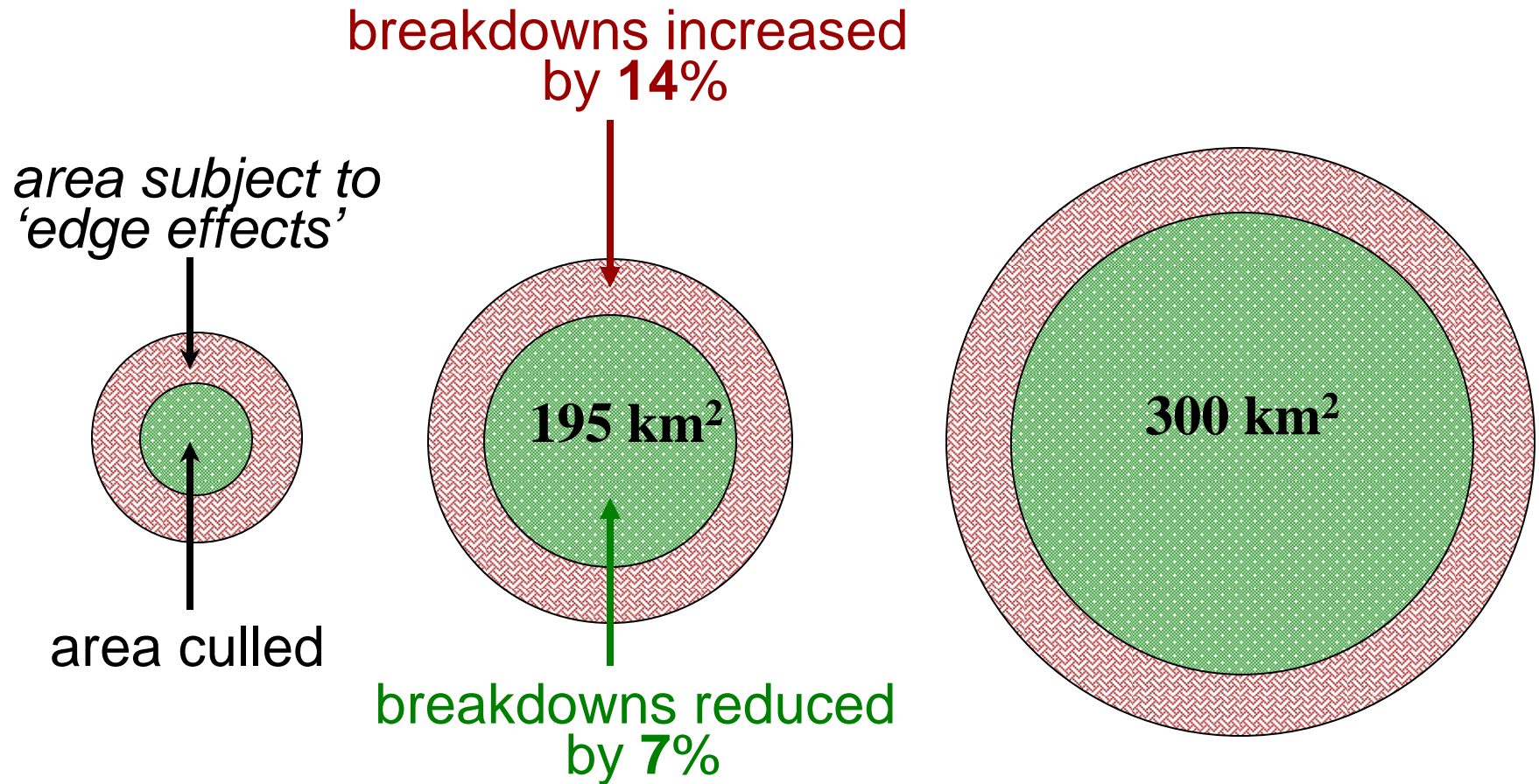
### Inference:

*an area in excess of some 150km<sup>2</sup> needs to be culled before the adverse effects on herd breakdowns are outweighed by the beneficial effects*

*But badger culling is expensive (£3750 per km<sup>2</sup> if trapping used)*

*The foregoing estimates imply an expenditure of well over £0.5 million before any economic benefits start to flow!*

# When do benefits of badger culling become positive?



*(measured as all breakdowns, confirmed and unconfirmed)*

In livestock farming, the *occurrence of disease* causes:

- destruction of capital (animal mortality)
- reduced productivity (efficiency)
- reduced quality of output
- loss of trade
- extra cost elsewhere in the food chain
- loss of output
- perhaps human illness
- reduced animal welfare

i.e. some form of ***economic loss*** to someone

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We respond by taking measures for *disease control*:

- research, testing, diagnosis, inspections
- treatment
- prevention - vaccination, biosecurity, restrictions
- culling

i.e. we choose to incur ***deliberate expenditures***  
in order to avoid/reduce the possible disease losses

Cattle TB involves all the potential sources of loss listed

Interestingly, we don't know what they might amount to, since we have had a universal control policy for decades

So the economic benefit of avoiding/preventing a TB breakdown is not the disease losses that have been avoided but avoiding the expenditures that would have been incurred in response to a breakdown

Defra estimates:    £

<i>Direct costs</i>	9,369	(cattle)
	439	(restrictions)
	224	(isolation)
	7,864	(testing)
<i>Indirect costs</i>	2,263	(tests avoided)
	6,603	(spread avoided)

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**£26,762**

*This is not the same as the economic loss that would be incurred if did nothing when TB hit a cattle herd*

# Who is affected by all this?

affected

nearby

unconnected

cattle farmers

non-cattle/arable farmers

dealers, livestock markets

others in the food supply chain

veterinary practices

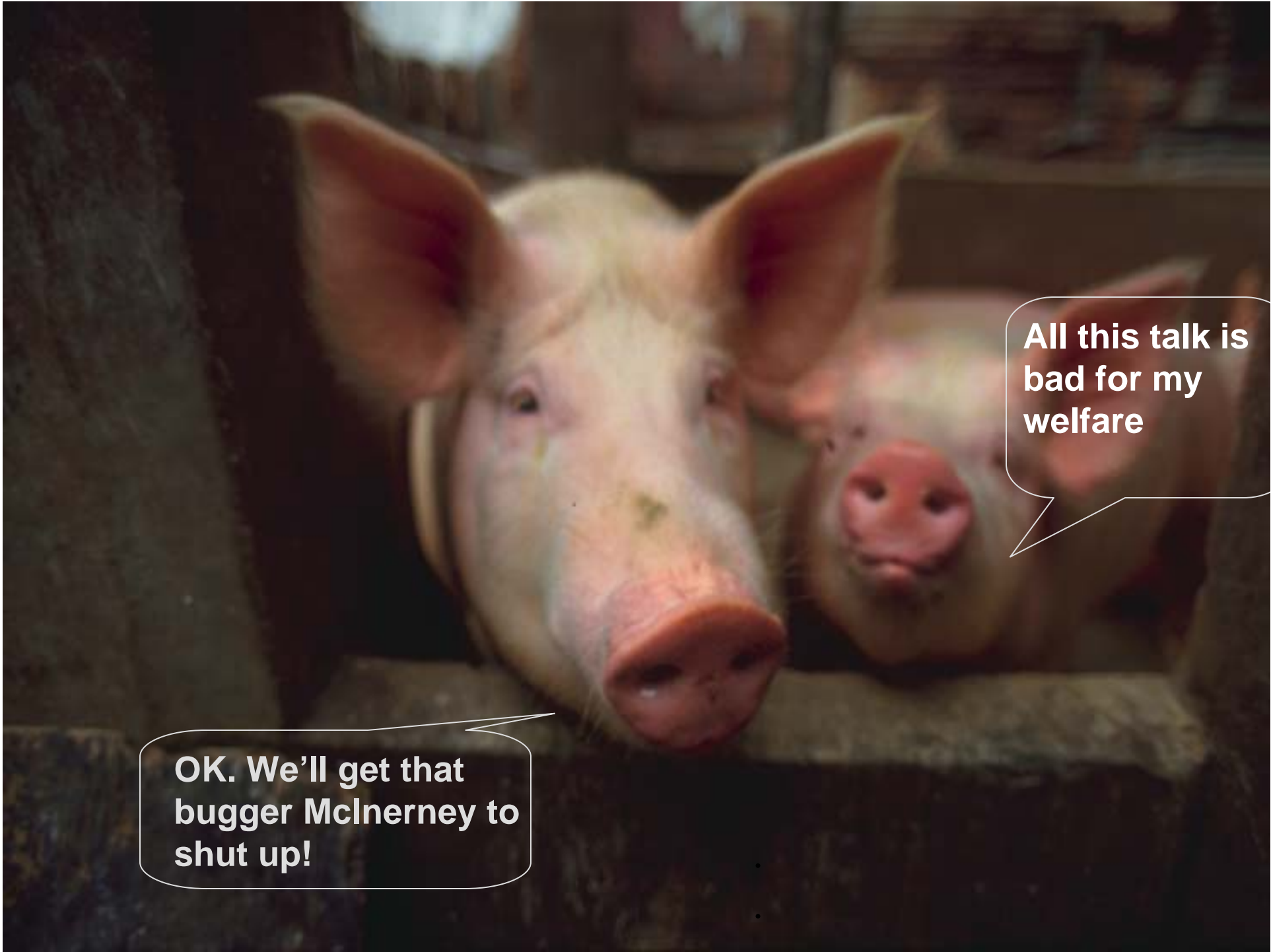
the Exchequer

wildlife interests

animal welfare interests

the rural population

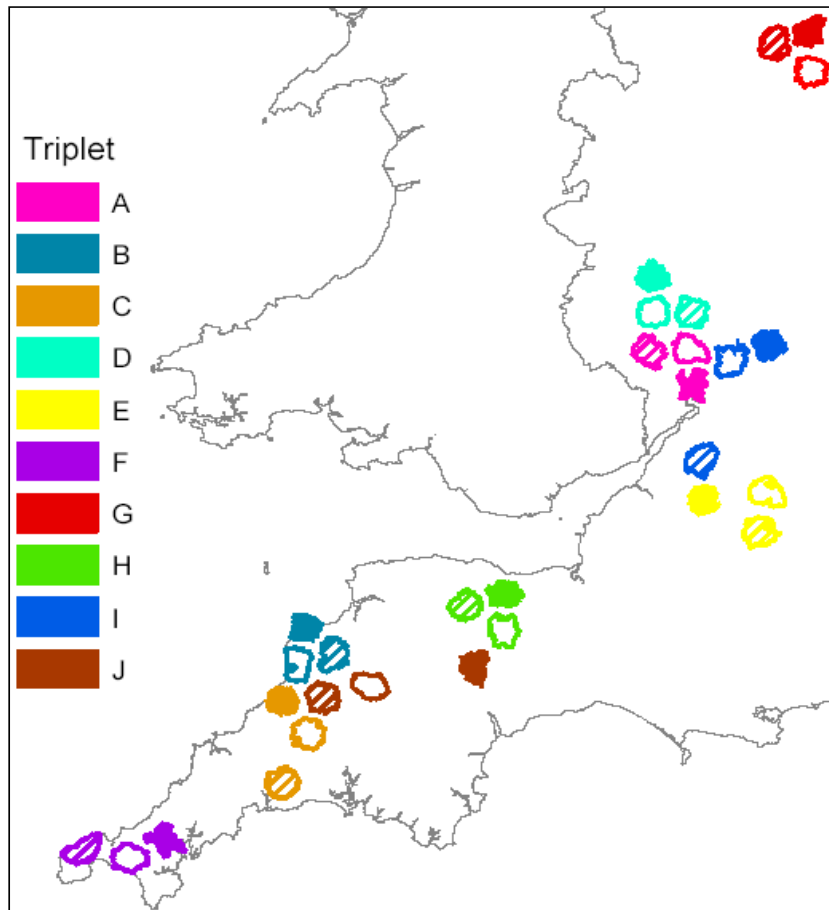
'the general public'



All this talk is bad for my welfare

OK. We'll get that buggger McInerney to shut up!

## Randomised Badger Culling Trial (RBCT) areas




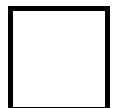
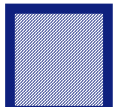
Randomised to about 30 100km<sup>2</sup> areas where the incidence of confirmed TB breakdowns was greatest

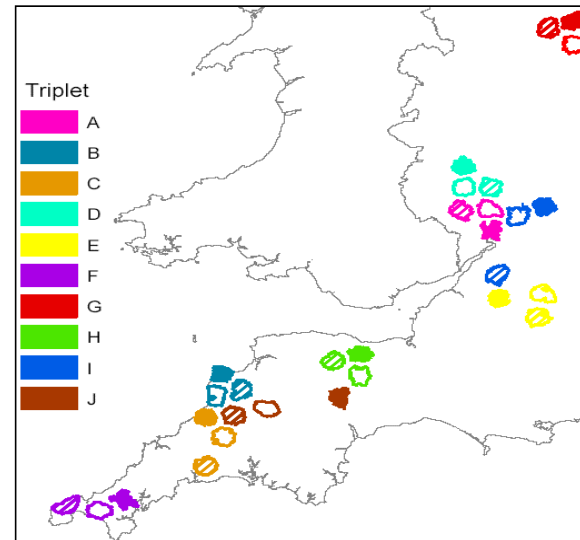
- No culling
- Reactive culling
- Proactive culling

No culling outside the field trial areas

# A trial to determine the impact of badger culling on bovine TB (RBCT)

10 sets of 3 TB hotspots (100 km<sup>2</sup>) – hotspots within each triplet subjected to different randomised treatments:

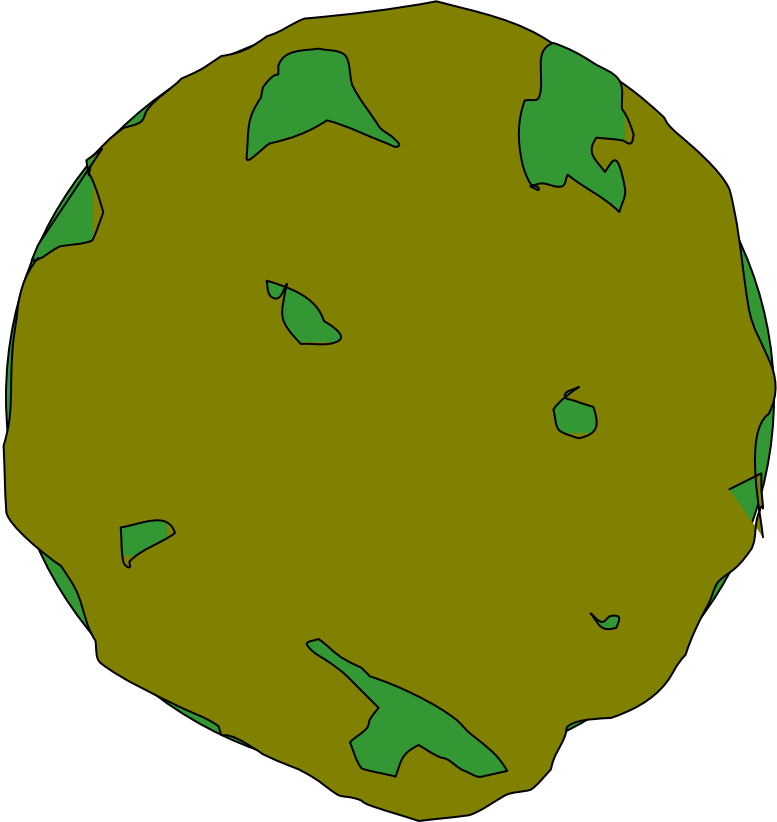
-  No culling – surveyed only
-  Reactive culling - following herd breakdowns, culling of badgers whose territory impinges on reactor farm
-  Proactive culling - culling throughout the hotspot annually



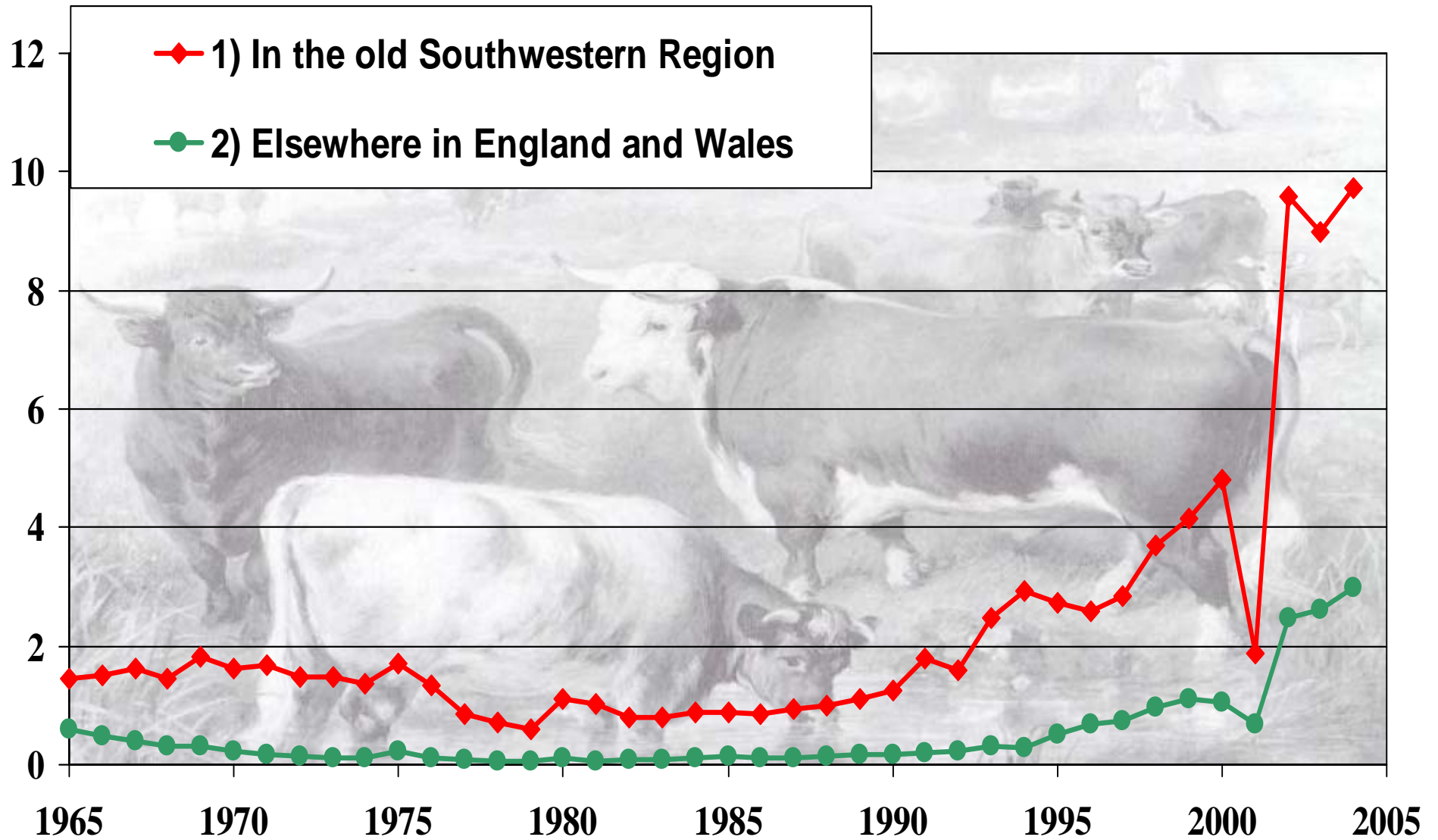
Method: Saturation cage trapping over 10 -12 days  
Trail to run 5 years (50 triplet years)  
No culling outside trial areas

(b) Proactive cull treatment

Overall incidence of herd breakdowns in culled area fell by 25%

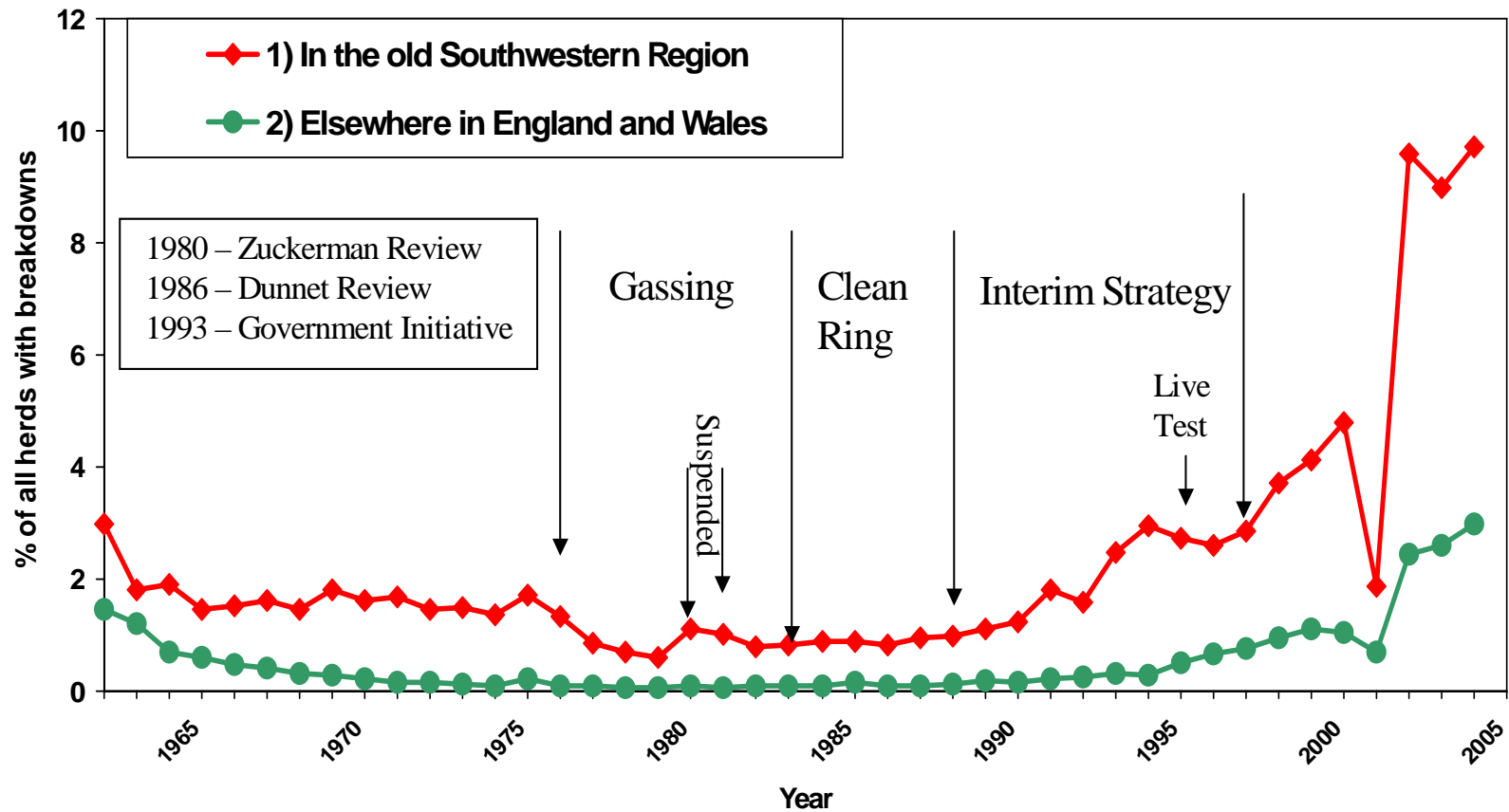


## *Proportion of herds that had reactors*





# BADGER CONTROL STRATEGIES AND INCIDENCE OF TB



# *Proportion of herds with TB reactors*

