

# BOVINE TUBERCULOSIS INCIDENCE IN THE UK USING 'TIME AT RISK'

## Measuring Incidence

Bovine Tuberculosis (BTb) is an infectious disease of cattle caused by the bacterium *Mycobacterium bovis* and can additionally cause disease in other livestock, wildlife and companion animals. The disease is endemic in England and Wales and cases are generally detected through routine screening using comparative tuberculin skin tests and meat inspection at slaughter. Historically, incidence has been measured as BTb incidents per 100 tests on unrestricted herds or BTb incidents per 100 live herds. These approaches, whilst useful, have problems dealing with the differences in testing frequency within GB and estimating incidence for herds which haven't been tested in the time period of interest. This work describes the application of a 'Time at Risk' (TAR) methodology commonly used in public health to BTb epidemiology.

Methods for measuring BTb incidence:

**Incidents per 100 live herds**

- Doesn't take into account test frequency
- EU reporting requirement

**Incidents per 100 herd tests**

- Only accounts for herds tested with a herd level test
- Generally a reflection of testing policy and frequency

**Incidents per 100 herd years at risk**

- Reflects number of new incidents detected for every 100 unrestricted herds tested in that year



## Methodology

The incident rate we are calculating (incidents per 100 herd years at risk) measures time an individual (or herd) is disease free. It can therefore take account of historical test information and differences in testing frequency which affect a) the probability of detecting disease b) the probability of within herd and between herd transmission. This allows its use in further epidemiological analyses and monitoring differences in the rate between areas and time

The incidence rate is calculated as the number of new herd incidents (breakdowns) detected during the reporting period, divided by the total time that herds under surveillance during that period were at risk of infection (Time at Risk)

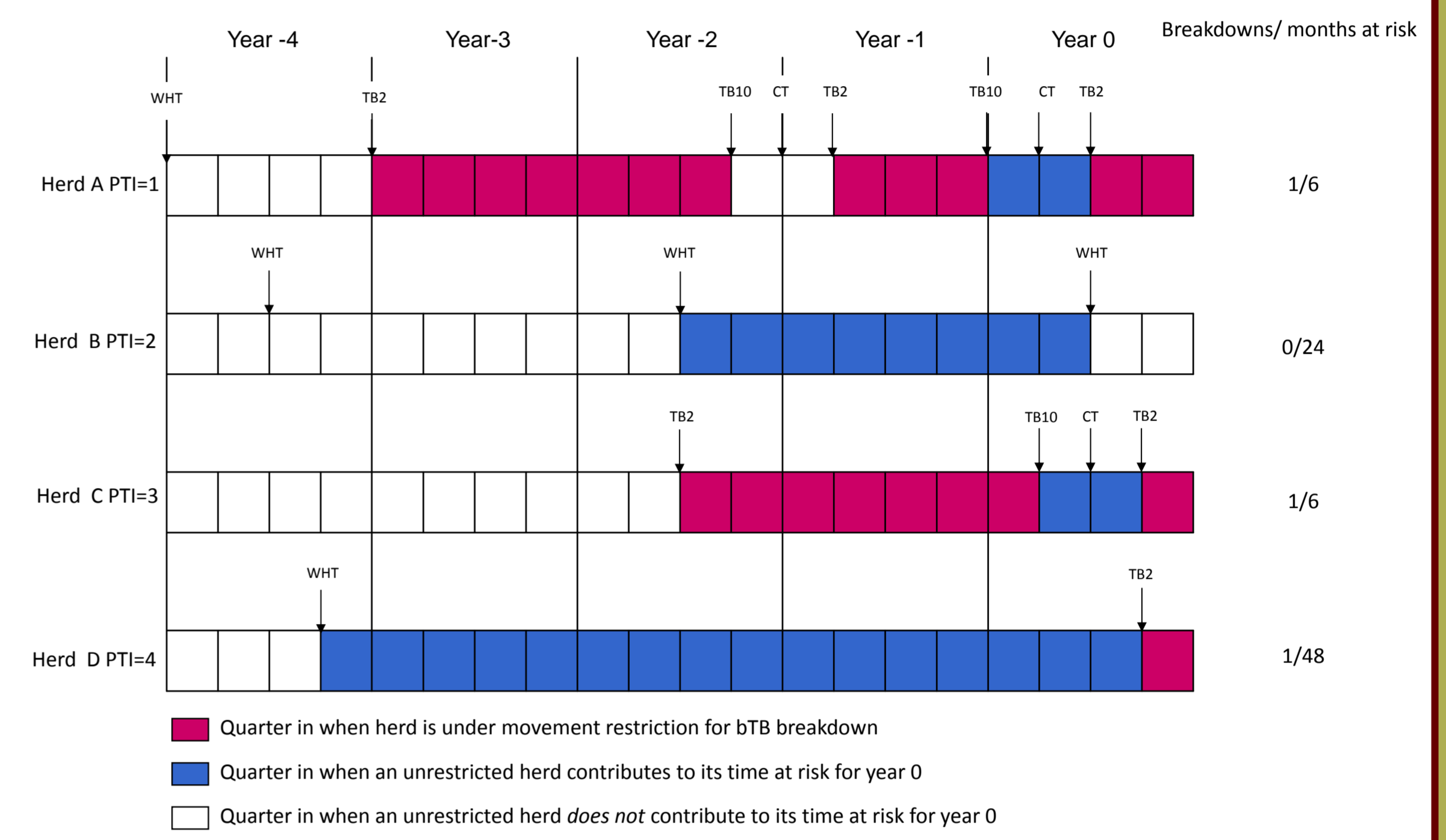
Time at risk is the amount of time between:

- Two negative herd tests
- A negative herd test and a test disclosing a breakdown
- The end of breakdown-related movement restrictions and the next herd test
- A negative test or end of breakdown-related movement restrictions and the detection of an infected animal at meat inspection in a slaughterhouse.

This means that for any twelve month period, the calculation takes any herd which had a test during that period – whether the test resulted in a breakdown or not – and adds up the amount of time each herd had spent since its last negative TB test.

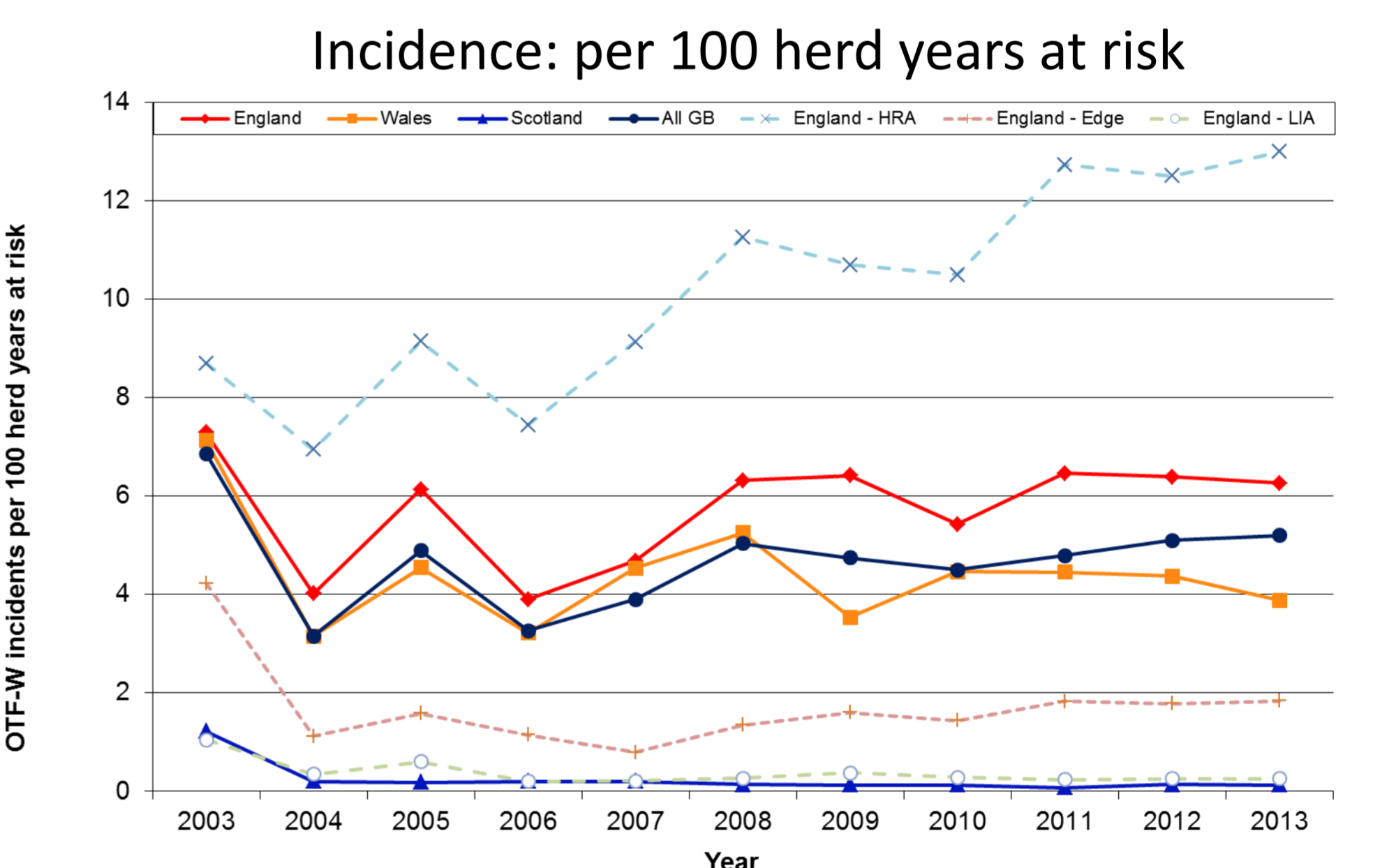
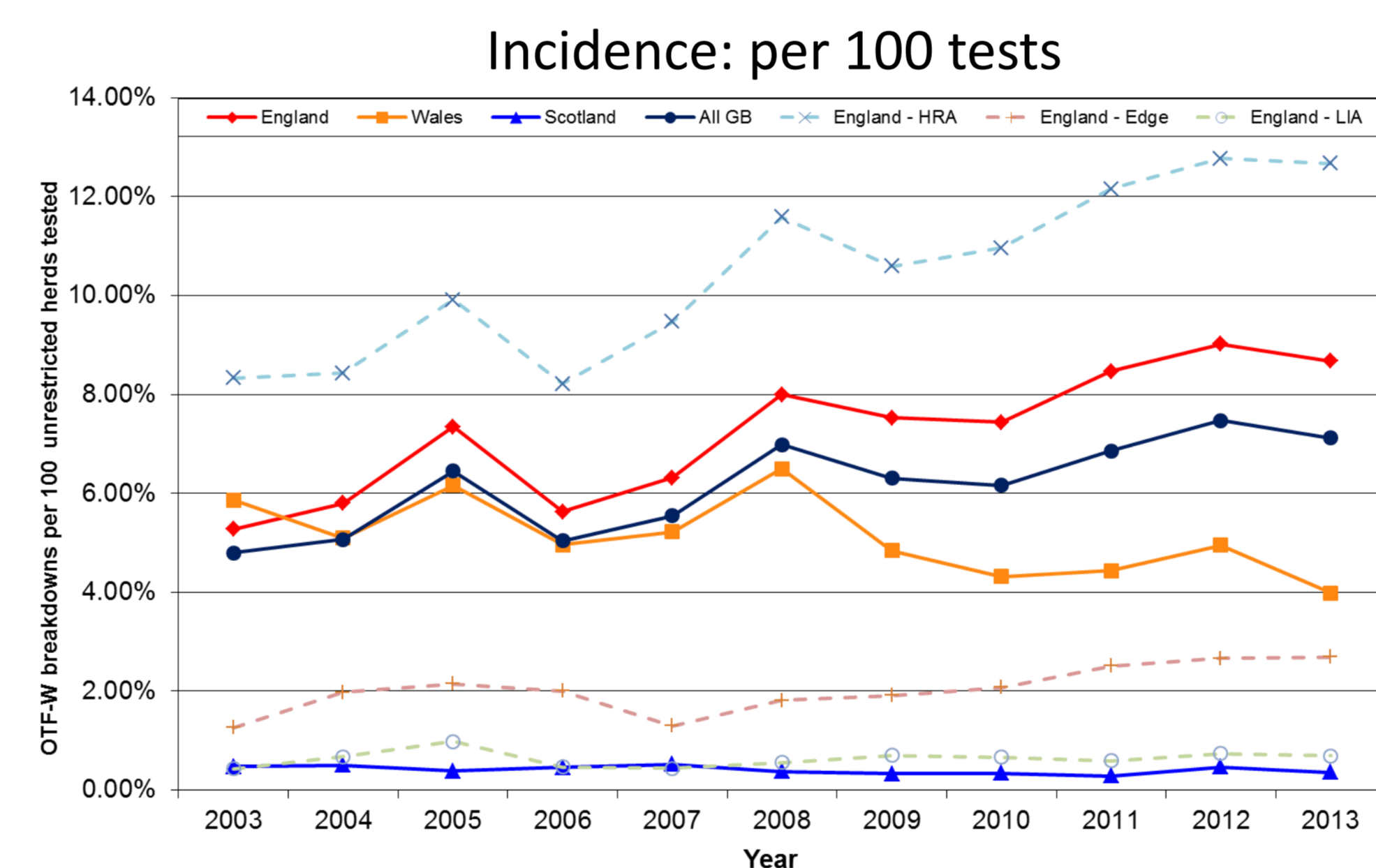
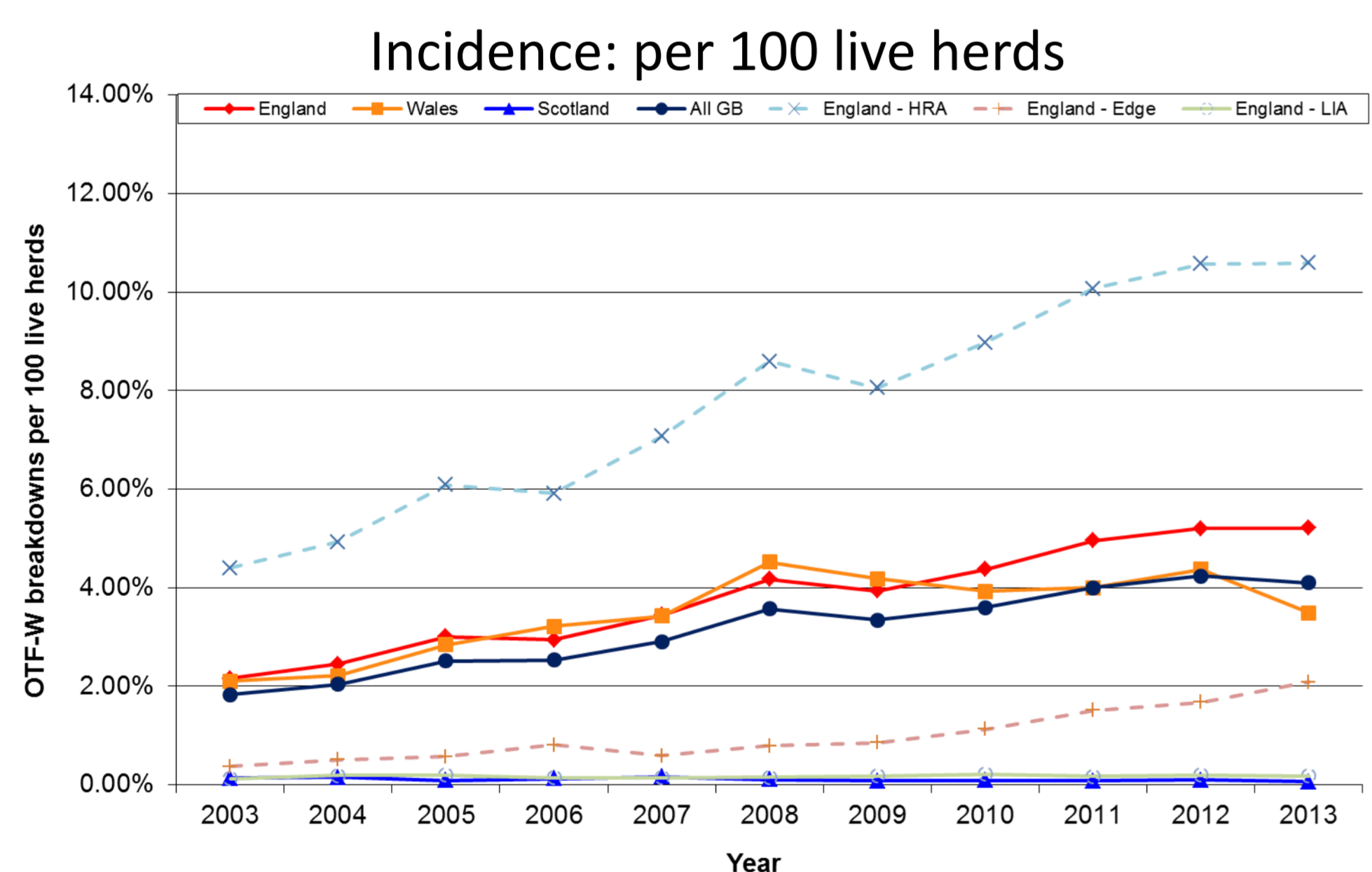
Whilst this incidence rate was originally designed in 2007 for use with BTb data and particular in comparison studies of tuberculin efficacy, it has been developed further as a headline statistic for use in the official recording of Bovine TB National Statistics. These developments include capping the amount of TAR any individual herd can contribute to the denominator due to periods of inactivity where there are no eligible cattle to be tested. Additionally, new herds will have a TAR estimated from their time of registration.

### Pictorial representation of calculating Time at risk



Breakdown incidence rate in year 0 = 3/84 herd months at risk  
=43 breakdowns per 100 herd years at risk

TB2 = Start of movement restrictions  
TB10 = End of movement restrictions  
WHT = Whole Herd Test  
CT = Check Test  
PTI = Parish Testing Interval (Frequency of Test)



## Application of outputs

Statistics notices: Quarterly National stats on incidence for BTb in GB

Department for Environment Food & Rural Affairs

Revised quarterly publication of National Statistics on the incidence and prevalence of tuberculosis (TB) in Cattle in Great Britain – to end September 2015

These statistics were initially released on Wednesday 9 December 2015 at 9:30 but the figures on disease restricted herds at the end of the period and the prevalence headline statistics were removed from the series following the discovery of an error in a calculation. These statistics and this quarterly statistical notice covering the period to September 2015 were reissued on 13 January 2016. The underlying monthly datasets for the period ending October 2015 were also published on 13 January 2016.

These statistics are obtained from the Animal and Plant Health Agency (APHA) work management IT support system (Sam), used for the administration of TB testing in GB. They are a snapshot of the position on the date on which the data were extracted. These statistics may be subject to regular revision until all test results are available. In particular figures from 2013 onwards will be subject to further revision as test and incident records are completed.

Short term changes in these statistics should be considered in the context of long term trends. The charts in this statistical notice give the latest indication of how trends in bovine TB have changed since 1996.

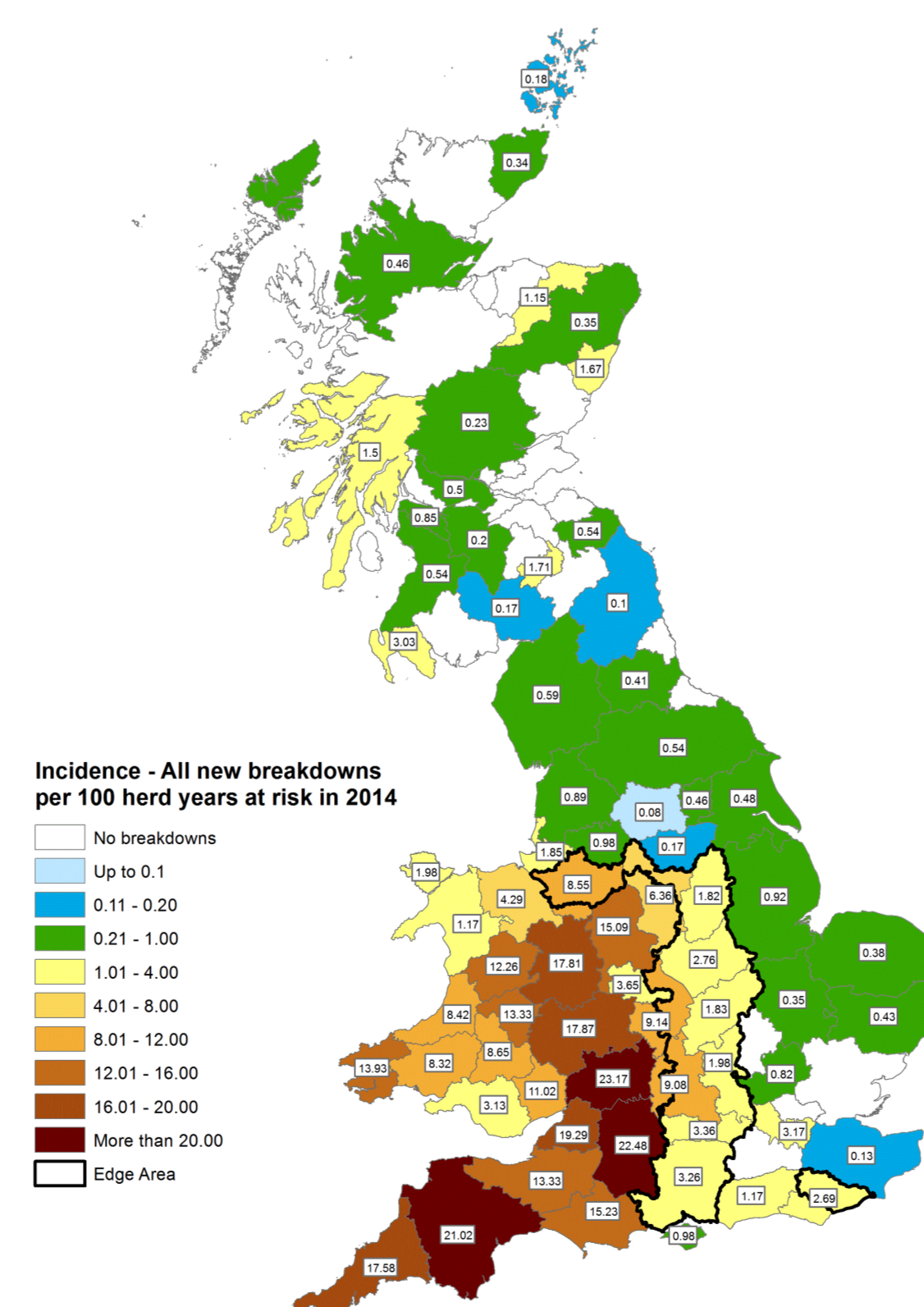
Key points – September 2015

Please read the detailed guidance on how these measures are calculated at <https://www.gov.uk/government/statistics/data-and-methodology>.

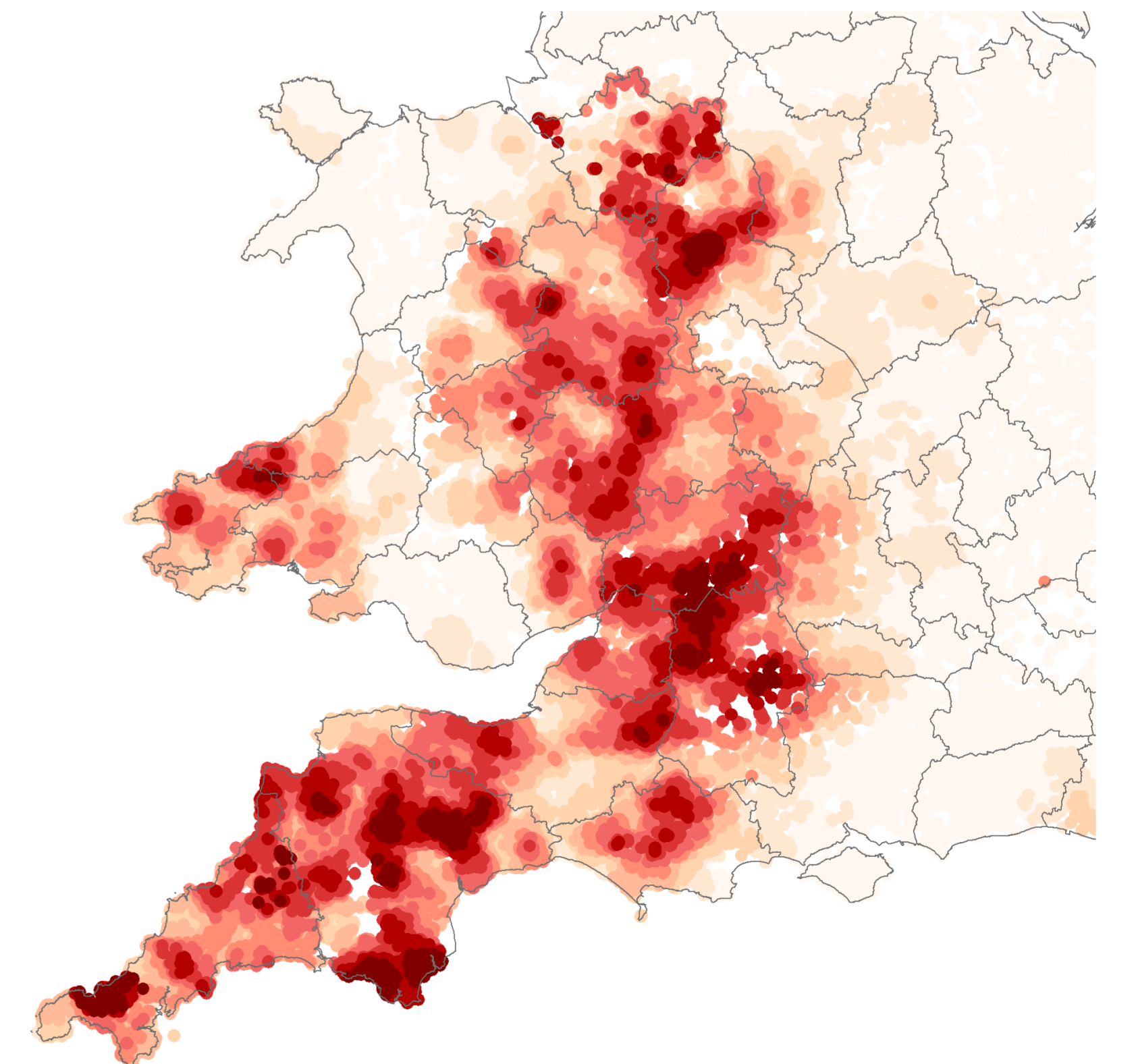
	New herd incidents per 100 herd years at risk		Disease restricted herds as a percentage of registered herds at risk	
	12 months to end Sept 2014	12 months to end Sept 2015	Sept 2014	Sept 2015
England	8.7	9.0	5.0%	5.5%
High risk area	17.6	18.1	9.9%	10.9%
Edge area	4.1	5.0	3.0%	3.2%
Low risk area	0.7	0.8	0.2%	0.3%
Scotland	0.5	0.6	0.2%	0.2%
Wales	7.8	8.4	4.6%	5.3%

Both the herd incidence rate and herd prevalence rate have increased between the last two 12-month periods though the latter has remained stable in Scotland. Incidence and prevalence are highest in the High Risk Area of England (HRA) and lowest in the Low Risk Area of England (LRA) and in Scotland.

Publications: County level incidence reported in BTb annual surveillance report



Exploring new methodologies: Herd level incidence for 100 closest herds using herd years at risk



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References:

- Downs S.H et al. Tuberculin manufacturing source and breakdown incidence rate of bovine tuberculosis in British cattle, 2005-2009. *Veterinary Record* 2013 Jan 26;172(4):98.
  - The Incidence of TB in Cattle in Great Britain: Consultation on changes to the National Statistics, Feb 2015. <https://www.gov.uk/government/statistics/consultation-on-changes-to-statistics-on-tb-in-cattle>
  - Latest statistics on tuberculosis (TB) in cattle in Great Britain : <https://www.gov.uk/government/statistics/incidence-of-tuberculosis-tb-in-cattle-in-great-britain>
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