



Animal &
Plant Health
Agency

Bovine tuberculosis in Great Britain in 2025

Explanatory Supplement to the annual TB surveillance reports

September 2026

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Preface

This Explanatory Supplement is produced to support annual reports that describe the surveillance data and epidemiology of bovine tuberculosis (TB) in Great Britain (England, Scotland and Wales), specifically the reports titled:

- ‘Bovine tuberculosis in Great Britain-Surveillance data for 2025 and historical trends’; referred to as the ‘2025 GB TB data report’
- ‘Bovine tuberculosis in England 2025: Epidemiological analysis of the 2025 surveillance data and historical trends in cattle’; referred to as the ‘2025 England TB Epi report’
- ‘Year End Descriptive Epidemiology Report: Bovine TB in the Low Risk Area of England 2025’ for counties or regions in the Low Risk Area (LRA) of England; referred to as the “2025 LRA reports”
- ‘Focus County Epidemiology Report(s) of Bovine TB in 2025’: for counties in England (outside the LRA) of England; referred to as the “2025 Focus County reports”

The content of this explanatory supplement is derived from the text provided in previous annual reports to describe data, methodology and definitions and is updated where appropriate and applicable each year. It is split into 4 sections:

1. Glossary of terms
2. Methodology for the TB reports
3. Overview of TB Testing in Great Britain
4. Policies for TB Control in Great Britain

For more information on Bovine Tuberculosis, please visit the [TB Hub](#).

1.0 Glossary of terms

Detail	Abbreviation	Definition or description
Annualised	N/A	Conversion of a variable into a yearly sum (for example, by multiplying a quarterly incidence by 4).
Approved Finishing Unit	AFU	A type of TB unit approved by APHA providing an outlet for the finishing of negative-testing cattle from multiple TB restricted herds. Cattle in AFUs are permanently under TB movement restrictions (TB02) and can only be moved to slaughter or another AFU. Cattle in the unit are exempt from routine TB testing. Animals may also be sourced from multiple unrestricted premises in any area of England, Scotland and Wales. AFUs without grazing are located in the HRA and Edge Area in England, and the High TB Areas in Wales.
Approved Finishing Unit (Enhanced)	AFUE	A type of approved finishing unit with grazing providing an outlet for the finishing of negative-testing cattle from multiple TB restricted and unrestricted herds. Animals must have 2 consecutive negative skin tests before being allowed out to graze on the holding. Animals on the AFUE are tested at regularly 90-day intervals until slaughter. AFUEs are in operation in the High Risk Area (HRA) of England only.
Backwards Recurrence	N/A	The percentage of TB incident herds in the current reporting year that had sustained a TB incident in the previous 3 years (or 18 months) of the disclosing test (backward-looking recurrence)
Bovine	N/A	Relating to cattle, water buffalo or bison
Bovine tuberculosis	TB	Contagious, primarily respiratory disease of cattle, water buffalo, bison and other bovines and mammals, usually caused by infection with the bacterium 'Mycobacterium bovis'
Breakdown	N/A	See 'TB incident'
Case	N/A	See 'TB incident'
Compensation	N/A	Statutory payment made by the competent authority to the owner of the animals that have been culled for TB eradication purposes. There are different statutory compensation systems for cattle slaughtered in England, Scotland and Wales.
Contiguous herd	N/A	A holding that shares a boundary with the holding of interest but can include herds separated only by a short distance (such as across a road or river), or

Detail	Abbreviation	Definition or description
		where an epidemiological assessment indicates there is likely to be risk of exposure to infection.
Direct (or dangerous) contact	DC	A non-reactor animal, usually in an OTF-W TB incident herd, considered to be at such high risk of infection that its slaughter is justified. Usually for the reason of being in close and prolonged contact with infected cattle and/or being an inconclusive reactor awaiting re-testing.
Disclosing test	N/A	The non-negative test that initiates a new TB incident (usually a tuberculin skin test), which in turn marks the start of movement restrictions (loss of OTF herd status). Includes TB incidents triggered by a laboratory-confirmed slaughterhouse case.
Earned recognition	ER	A scheme whereby lower-risk herds in 6-monthly routine surveillance areas of England may qualify for less frequent (annual) testing if they meet certain conditions (see Section 4.2.4).
Edge Area	N/A	The Edge Area encompasses a continuous group of 10 counties in Central England (plus East Sussex) that form a buffer zone between the High Risk and Low Risk areas of England. Herds in the Edge Area are subject to annual or 6-monthly routine testing depending on their geographical location, or if they qualify for Earned Recognition.
Enferplex antibody test	NA	The Enferplex TB test is another blood test that can detect antibodies to the bovine TB bacterium in serum (and potentially milk samples) from infected cattle. It gained WOAHA approval as a supplementary TB test for cattle in May 2019, but, like the IDEXX test, it has not been officially recognised by the EU yet. This test is currently not approved by Defra for statutory TB testing of cattle, although it can be used on a private basis in certain situations and subject to prior permission from APHA.
Eradication Programme	N/A	A programme aimed at achieving biological extinction of an animal disease or zoonosis, to obtain the free or officially TB free status of the territory, or both.
Fomites	N/A	Objects or materials which could potentially carry an infectious agent, such as purchased feed or bedding, vehicles or shared equipment or machinery.
Forward recurrence	N/A	The percentage of all herds with a history of TB that went on to experience a TB incident in the

Detail	Abbreviation	Definition or description
		current reporting year, compared to the percentage of all herds without a history of TB that went on to have a TB incident in current reporting year.
Genotype	N/A	A unique DNA type or 'strain' of Mycobacterium bovis, defined by a combination of spoligotype (expressed as a number) and Variable Number Tandem Repeat type (expressed as a letter). This information was used to characterise the molecular epidemiology of the TB bacterium in GB and to aid epidemiological investigations into the source of infection. Genotyping was replaced in APHA by whole genome sequencing (WGS) and WGS clades of M. bovis in April 2021.
Herd	N/A	An animal or group of animals kept on a holding as an epidemiological unit. In GB they are identified with a County Parish Holding Herd (CPHH) number.
Herd size	N/A	For a TB incident, herd size is the largest size entered into Sam (see 'Sam') for a test conducted at any time during the incident. For officially TB free herds, herd size has been changed in 2017. Median size is now recorded on the British Cattle Movement Service (BCMS) Cattle Tracing Scheme for the holding over the most recent 12 months with a recorded size. For holdings with more than one herd, or not present in BCMS, the herd size at the most recent whole herd test was recorded. Where no size is retrievable from either source the typical number of animals indicated on Sam has been used. Herd size can also be obtained from RADAR data which consists of data from the Cattle Tracing System and infers herd size from the number of on and off movements of cattle to or from the holding.
Herd test	N/A	A surveillance or control test triggered by a herd-level event. In contrast to a test triggered for an individual animal or a small group of animals within a herd.
Herd type	N/A	'Beef' includes Beef, Suckler, Beef Heifer Rearer, Beef Bull Hirer, Beef dealer, Stores herds and Meat Buffalo herds; 'Beef fattener' or 'Beef finisher' includes beef finishing herds; 'Dairy' includes Dairy, Dairy Dealer, Dairy Bull Hirer, Dairy Producer, Dairy Heifer Rearer, Producer Buffalo and Domestic herds; 'Other' includes Calf Rearers,

Detail	Abbreviation	Definition or description
		unspecified Dealer Herds, Artificial Insemination (AI), Bison and herds described on Sam as 'Other herds'.
Herd-years at risk	HYR	The total amount of time (in days, months or years) that herds in the geographical area of interest remain unrestricted (OTF). Those that have received a herd-level test for TB during the period of interest are at risk of a new incident and contribute to the denominator of the TB incidence rate.
Holding	N/A	A place where livestock, including cattle, are kept or handled in pursuit of an agricultural activity e.g. a farm, market, lairage, abattoir or showground. Some keepers may have more than one holding, and some holdings may be used by more than one keeper. A holding is not the same as a business. It is identified by a unique County Parish Holding (CPH number) and a single holding may comprise of one or more herds.
High Risk Area	HRA	The High Risk Area encompasses counties in the West and South-West of England, where the herd incidence and prevalence of bovine TB are high and the majority of new TB incidents occurring in England are detected every year. Herds in the HRA are subject to 6-monthly routine TB testing, unless they qualify for Earned Recognition.
Homerange	N/A	The geographical area in which a particular whole genome sequencing clade of <i>M. bovis</i> is typically recovered from infected cattle herds. A 5-kilometre square is considered as part of a certain homerange if there have been 3 different incidents of that clade, on at least 2 holdings, within a 5-year window. To create coherent areas for each clade, a 10-kilometre buffer is then drawn around each of the homeranges.
IDEXX antibody test	NA	The IDEXX test is an antibody blood test that gained World Organisation for Animal Health (WOAH) approval as a supplementary TB test for cattle in 2012, but it has not been officially recognised by the EU yet. This means that, although it cannot be used as a statutory TB test in England, the Animal & Plant Health Agency (APHA) can deploy it in exceptional circumstances with prior consent from the herd owner. It is a third-line test used in chronic TB breakdown herds that have been subjected to repeated skin testing and

Detail	Abbreviation	Definition or description
		one or more rounds of interferon-gamma blood testing.
Incidence	N/A	The incidence of a disease is the rate at which new cases occur in a defined population over a certain period of interest.
Inconclusive reactor	IR	An animal showing a positive skin reaction to bovine tuberculin in the comparative intradermal tuberculin test that is greater than the concurrent reaction to avian tuberculin, but not sufficiently so to be declared a reactor. Such animals are usually isolated and subjected to a second skin test after 60 days. However, they can be removed earlier as DCs (see 'DC'), IFN- γ test reactors (see 'Interferon-gamma test') or if they are voluntarily slaughtered by their owner.
Interferon-gamma test	IFN- γ or gIFN or IFN-gamma	An official laboratory-based blood test of cell-mediated immunity against M. bovis that measures the amount of the cytokine (immunological messenger molecule) IFN- γ released by the lymphocytes in blood samples from M. bovis-infected cattle, when they are stimulated with tuberculin in vitro. It is used to supplement the skin test in certain TB incident herds (mainly as a parallel test for improved sensitivity), rather than as a standalone screening test of unrestricted (OTF) herds.
Inter-quartile range	IQR	A measure of statistical dispersion equal to the difference between the upper and lower quartiles (the 75th and 25th percentiles of the distribution's values).
Laboratory Information Management System	LIMS	APHA TB laboratory information management system used to record tissue samples submitted to the APHA laboratory and the outcome of their testing.
Licensed Finishing Unit	LFU	A type of TB unit approved by APHA providing an outlet for the finishing of negative-testing cattle from multiple officially TB free (OTF) herds. LFUs are permanently under TB movement restrictions (TB02), and cattle are housed under biosecure conditions. Cattle in the unit are exempt from post-movement TB testing, providing the statutory pre-movement testing requirements have been met. Animals may be sourced from multiple unrestricted premises in any area of England, Scotland and Wales. LFUs can only be set up in the Low Risk Area (LRA) of England and the Low TB Area of

Detail	Abbreviation	Definition or description
		Wales.
Linear regression	N/A	A statistical approach for modelling the relationship between a continuous outcome variable (such as duration of restrictions, which can take any value) and one or more 'predictor' variables (such as herd size, herd type or county).
Live herd or Active herd	N/A	A herd of cattle, farmed buffalo or farmed bison defined in the CPHH notation which was "live" (not archived), flagged as active on Sam on 31 December 2024. This gives different values from the Agricultural Census, which is at holding level and updated at a different point in time.
Logistic regression	N/A	A statistical approach for modelling the relationship between a binary outcome variable (such as positive or negative result) and one or more 'predictor' variables (such as herd size, herd type or county).
Low Risk Area	LRA	The Low Risk Area encompasses much of the northern, eastern and south-eastern counties of England, where the incidence and prevalence of bovine TB are lowest and most new herd incidents occur sporadically. Herds in the LRA are subject to 4-yearly routine TB testing.
Monitoring (programme)	N/A	A programme to investigate an animal population or subpopulation, its environment (including wild reservoir and vectors), or both. This helps to detect changes in the occurrence and infection patterns of an animal disease or zoonosis.
Movement restrictions or restrictions	N/A	Legal prohibitions or restrictions on the free movement of animals into and out of a herd. Movement restrictions may be imposed on a herd because of the presence, or the suspected presence, of <i>M. bovis</i> infection. They may also be placed if statutory tests are overdue, leading to the loss of Officially TB Free herd status (see below). They can also be imposed if inconclusive reactors are disclosed in a herd with a history of OTF-W incidents in the previous 3 years. Herd restrictions triggered by overdue tests are excluded from analyses to avoid overestimates of disease.
Mycobacterium avium	M. avium	The causative organism of avian (bird) tuberculosis, which occasionally can sensitise cattle to bovine tuberculin.
Mycobacterium bovis	M. bovis	The primary causative organism of tuberculosis in cattle, other bovines and many other mammals.
Mycobacterium	M. microti	A member of the Mycobacterium tuberculosis

Detail	Abbreviation	Definition or description
microti		complex (which includes M. bovis and the human TB bacterium M. tuberculosis), which can also give rise to TB in certain species of mammals such as wild rodents, cats and South American camelids. It is very rarely identified in TB reactor cattle samples.
New TB incident	N/A	A herd that has been officially classified as infected with bovine tuberculosis (TB) in the specified reporting year following diagnostic testing. Defined as a herd previously OTF in which at least one test reactor, inconclusive reactor taken as a reactor, or a laboratory confirmed-positive slaughterhouse case, has been found. The restriction, and thus the incident, starts on the disclosing test date (or date of slaughter for a slaughterhouse case). To qualify as being 'new', the incident must have been 'disclosed' (discovered) in the period specified in the report. The incident ends on the date that APHA formally lifts the herd movement restrictions and restores the OTF status of the herd by serving the herd keeper with the so-called TB10 form (see also 'TB incident').
Non-visible lesions	NVL	No lesions typical of bovine TB could be detected in the carcass at post-mortem examination in a laboratory or meat inspection in a slaughterhouse.
Officially bovine tuberculosis free status	OTF	A bovine herd in which infection with M. bovis is not suspected, is up to date with all its TB testing and as such is able to trade animals freely. See WOAH Terrestrial Code Article 8.11.6 for a full definition of officially TB free status.
Officially bovine tuberculosis free status suspended	OTF-S	OTF-S is the status of a herd with a TB incident where there is suspicion of infection being present. A TB incident that does not meet the conditions for an OTF-W incident (see below) is classified as an OTF-S incident.
Officially bovine tuberculosis free status withdrawn	OTF-W	Refers to a herd with a TB incident where additional evidence of M. bovis infection has been identified in at least one slaughtered bovine animal. This means having either M. bovis identified on culture or PCR (see 'PCR') in a tissue sample, lesions detected in the carcass of a SICCT or IFN-γ test reactor, or both. In Wales, all herds experiencing a new TB incident are designated OTF-W by default (see section 4.4.1).
Orange markets	N/A	Dedicated sales for TB-restricted cattle that are

Detail	Abbreviation	Definition or description
		destined for slaughter or an AFU. They can only be approved by APHA in the HRA and Edge Area of England (and since 1 January 2021, in the High TB Areas of Wales).
Persistent TB incident	N/A	Refers to a TB incident that has lasted for at least 550 days (approximately 18 months).
Poisson regression	N/A	A type of statistical modelling based on a particular type of numerical distribution. Used to compare rates of rare occurrences between different population groups, different areas, or different times.
Polymerase Chain Reaction	PCR	Polymerase Chain Reaction (PCR) is a molecular diagnostic technique used to detect the presence of specific sequences (DNA targets) of <i>M. bovis</i> DNA. PCR is used as a confirmatory test to provide evidence of the presence of <i>M. bovis</i> in a tissue sample collected from a suspected animal (a TB test reactor, a slaughterhouse case or, more rarely, a clinical case of TB).
Post-mortem or 'post mortem' examination	PME	Systematic veterinary examination of the carcass and organs of a dead animals to identify the most likely cause of death or, in the case of TB test reactors and other suspect animals, to look for the characteristic (visible) lesions of bovine TB, usually undertaken at an APHA Regional Laboratory. When it is performed in the slaughterhouse by a meat inspector working under the supervision of an official veterinarian, following suspicion of infection (such as reactors, IRs and DCs), or during routine commercial slaughter, it is referred to as post-mortem meat inspection (PMMI).
Pre-movement TB testing	PrMT or PRMT	Mandatory skin testing for cattle aged over 42 days old moving out of a herd subjected to annual or 6-monthly TB surveillance, with some exemptions (such as animals moved to a slaughterhouse or an AFU). Also, for cattle moved out of herds in the LRA to Scotland, unless the animal had spent its entire life in the LRA.
Prevalence	N/A	The prevalence of disease is the proportion of a defined population (individual animals or herds) affected by that disease at a designated point in time.
Reactor	R	An animal showing a positive reaction result to a single intradermal tuberculin comparative cervical (SICCT) test, or to an interferon-gamma (IFN- γ) test, which is consistent with it being infected with

Detail	Abbreviation	Definition or description
		M. bovis. This does not include an animal first suspected to have TB at the slaughterhouse. An animal that tests twice as inconclusive reactor to the SICCT test is automatically classified as a reactor. However, this will not count towards statistics for reactors throughout these reports.
Recurrent herd incident	N/A	A herd with a TB incident disclosed in the reporting year which experienced a previous TB incident in the preceding 36 months of the disclosing test.
Reference category	Ref	In regression analyses the reference group acts as a baseline against which other groups of interest are compared.
Reservoir	N/A	The reservoir is the population of animals in which the disease is circulating and therefore a common source of infection to other animals or humans.
Risk Area or Surveillance Risk Area or Surveillance Area or TB Area	N/A	The Strategy for achieving Officially Bovine Tuberculosis Free status for England (April 2014) divided the country into 3 risk areas for TB surveillance and control purposes: High Risk area, Edge area and Low Risk area. In 2017, Wales adopted a similar regionalised approach to TB, distinguishing 5 TB areas as per the Wales TB Eradication Programme Delivery Plan 2023 . These were: Low TB Area, Intermediate TB Area North, Intermediate TB Area Mid, High TB Area West and High TB Area East.
Sam	N/A	APHA's IT system and database, which records include details of herds, TB tests, TB incidents and the details and results of any tested and slaughtered cattle.
Sensitivity (of a test)	Se	The proportion of truly infected individuals in the screened population that are correctly identified as infected (positive) by the test.
Severe interpretation	SICCT SEV	The positive cut-off criterion used to interpret the results of the single intradermal comparative cervical tuberculin skin test (SICCT) in TB incident herds to achieve a greater sensitivity than the standard interpretation of the test, at the expense of reducing its specificity. Using this test interpretation, animals are deemed TB test reactors if they show either: a positive bovine reaction and concurrent negative avian reaction or a positive bovine reaction more than 2mm greater than a positive avian reaction (standard interpretation is a 4mm greater reaction)
Short Interval Test	SIT	See 'Test code definitions'

Detail	Abbreviation	Definition or description
Single intradermal comparative cervical tuberculin (test)	SICCT	Also commonly referred to as the 'skin test' or 'tuberculin skin test'. The test involves the simultaneous injection of a small amount of <i>M. bovis</i> and <i>M. avium</i> tuberculin into 2 sites on the animal's neck skin. These are purified protein derivatives (PPD), a crude extract of bacterial cell wall antigens. Any swelling which develops at the injection sites after 72 hours are then comparatively measured to assess positivity (delayed-type hypersensitivity reaction).
Slaughterhouse case	SLH	An animal displaying lesions consistent with TB during routine post-mortem meat inspection in the slaughterhouse. If <i>M. bovis</i> is detected by PCR testing or bacteriological cultures from samples of the lesions, the slaughterhouse case triggers an OTF-W incident (if the herd in question was not already under TB incident restrictions). Pending the PCR test or culture results, a slaughterhouse case remains suspected and the OTF status of the herd of origin is suspended, but it does not contribute to the incident figures within these reports. This is unless any subsequent skin check test performed in the herd of origin identifies reactors. Negative PCR (and if applicable, culture) results will negate a suspected SLH incident, so that the temporary herd movement restrictions (OTF-S status) can be lifted and OTF herd status restored, unless it was already experiencing a TB incident for another reason.
'Smoothed' or '12-month moving average'	N/A	A 12-month moving average is the average of the values for the current month and the previous 11 months. Moving averages can be any length. But, in general, shorter lengths will be best at identifying turning points and longer lengths best at identifying trends.
Specificity (of a test)	Sp	The proportion of truly uninfected individuals in the screened population that are correctly identified as uninfected (negative) by the test.
Spoligotype	N/A	The result of Spacer Oligonucleotide typing used for genomic typing of organisms of the <i>Mycobacterium tuberculosis</i> complex. Spoligotypes and genotypes were replaced by whole genome sequencing clades in April 2021.
Standard deviation	SD	The standard deviation measures the spread of the data around the mean value. It is useful in comparing sets of data which may have the same

Detail	Abbreviation	Definition or description
		mean but a different degree of variability in raw values.
Standard interpretation	SICCT ST	The positive cut-off criterion normally used to interpret the results of a skin test. Using this interpretation of the SICCT, animals with a positive bovine reaction over 4mm greater than a negative or positive avian reaction are deemed reactors and removed from the affected herd.
Surveillance	N/A	Surveillance refers to activities to collect and record data on specific diseases in defined populations over a period of time. This helps to assess the epidemiological evolution of the diseases and the ability to take targeted measures for control and eradication.
Surveillance Streams	N/A	Any of the various components of the bovine TB surveillance regime in England that can result in the identification of a new infected herd (TB incident) on a cattle, water buffalo or farmed bison holding: Area & Herd Risk: Disease first disclosed due to tests carried out in light of any evidence that there is a higher probability of disease in the animal or herd. Trade and Other: Disease first disclosed as a result of testing scheduled due to the high impact of disease if present in the destination herd or premises. Includes tests on animals where the presence of some epidemiological risk factors may increase disease probability, but this is not the primary reason for testing. Routine: Disease first disclosed as a result of tests scheduled as part of routine surveillance with no expectation of increased or decreased probability of disclosing infection. Slaughterhouse (SLH) Surveillance: Disease first disclosed during routine post-mortem meat inspection of animals not believed at higher likelihood of being diseased. Excludes results of inspection of reactor cattle.
TB incident	N/A	A herd that has been categorised as infected with <i>M. bovis</i> . Also referred to as a 'TB breakdown' or 'case of TB'. The criteria that determine this are given under the definition of a 'new TB incident' above.
TB10 form or notice	TB10	A notice served by APHA at the end of a TB

Detail	Abbreviation	Definition or description
		incident to lift the restrictions imposed on cattle movements onto and off the holding. It restores the OTF status of the herd.
Test code definition: Hotspot Test	HS	Carried out on herds that are subject to enhanced (annual or 6-monthly) TB surveillance within a declared TB Hotspot area in the LRA of England, including herds in the Edge Area where a hotspot straddles the LRA and the adjoining Edge Area. All bovines except calves under 42 days of age are included.
Test code definition: Private Test	PRI	A test carried out on individual animals. This is commissioned and paid for by the owner and carried out by an OV with the Regional Veterinary Lead (RVL) agreement. An example of this is the use of an extra TB test in a breeding bull.
Test code definition: Radial Test	RAD	Carried out on herds within a 3 km radius of herds that have had their Officially Tuberculosis Free status withdrawn (OTF-W) in the Low Incidence Area or in the parts of the Edge Area on annual testing (England only). The initial RAD test is followed by a RAD6 test 6 months later and, in the LRA only, by a RAD12 test 12 months after the RAD6 test. All bovines except calves under 42 days of age are included.
Test code definition: Routine Herd Test	RHT	Routine surveillance herd test carried out in parishes with a 48-month testing interval. It must include: breeding bulls (for example, entire males over 12 months), females which have calved young bovines which will be used for breeding whether they are home-bred or purchased (except calves under 6 weeks old), pet cows and other non-commercial cattle resident on the holding.
Test code definition: Short Interval Test	SI Test or SIT	Carried out in breakdown herds 60 days after removal (or effective isolation) of the last reactor or from a previous short interval test with no reactors. In England, they include all bovines except calves under 42 days old (unless there is an epidemiological risk of infection within that age group). They include all bovines in Scotland and Wales.
Test code definition: Whole Herd Test	WHT	Carried out routinely every 12 months in annual testing areas, or every 6 months in 6 monthly testing areas and in individual herds requiring

Detail	Abbreviation	Definition or description
		annual testing, for example producer-retailer dairy herds, bull hirers, heifer rearers, city or open farms, artificial insemination centres. It can also be carried out via Regional Veterinary Lead (RVL) discretion in 48-month testing areas. It includes all bovines except calves under 42 days old.
Testing interval	N/A	The prescribed interval between 2 successive routine TB surveillance tests in a herd of cattle, water buffalo or farmed bison. In England the interval is either every 6 months, one or 4 years, depending on the policy applied to the risk area. In Scotland, if required, it is every 4 years, and annual in Wales since 2010. Testing interval is given by the Area Testing Interval (ATI), Area Monitoring Regime (AMR), or the Unit Monitoring Regime (UMR) to which individual herds are allocated by APHA. In Wales, the ATI is recorded for the third quarter of the year in question, irrespective of whether the herd was tested in that year. Any shorter interval assigned specifically to an individual herd within a parish has not been used.
Time at risk	TAR	Time spent not under restriction since the most recent herd-level test. Alternatively, end of incident and time at risk of being diagnosed with TB during the observation period.
Tracing tests	N/A	Tests carried out to 'trace' the potential source or spread of infection. 'Backward' tracings, also known as 'source tracing' tests investigate where infection may have originated, such as the herd of origin of purchased cattle suspected of being infected when they arrived. 'Forward' tracings, also known as 'spread tracing' tests, check individual animals that have left the herd when infection was believed to be present. This is to determine whether they are infected and may have carried infection to their destination herd(s).
VetNet database	VetNet	VetNet was the predecessor of Sam, APHA's TB control and surveillance system. Data was migrated into Sam from VetNet when Sam was launched in 2011.
Visible lesions	VL	Lesions typical of bovine TB detected in the carcass of a SICCT or IFN- γ test reactor at post-mortem examination or meat inspection.
WGS	Whole genome	Whole genome sequencing (WGS) replaced genotyping on 19 April 2021. WGS determines the

Detail	Abbreviation	Definition or description
	sequencing	entire DNA sequence of <i>M. bovis</i> isolates, allowing for characterisation of <i>M. bovis</i> strains at a higher resolution than genotyping. This ultimately allows a greater degree of discrimination between isolates and more certainty about the origin of TB infection for a herd, thus increasing our understanding of how TB spreads both locally and nationally.
WGS clade	N/A	A group of phylogenetically (for example, evolutionarily similar) related isolates of <i>M. bovis</i> , based on similarities across their whole genome sequences.

2.0 Methodology used for TB reports

2.1 Data sources and processing

2.1.1 Source of data

Data on herds, animals, bovine tuberculosis (bTB) incidents and tests applied to cattle in Great Britain were extracted from the APHA Sam RADAR TB reception database on 11 February 2026.

This dataset underpins the analyses and outputs presented in the 2025 Great Britain TB Data Report, 2025 England TB Epidemiology Report, 2025 Low Risk Area (LRA) Reports, and 2025 Focus County Reports.

As this extraction date occurs shortly after the end of the reporting period, some events associated with incidents occurring in the reporting year may not yet be fully recorded. This is particularly relevant for incident outcomes such as the lifting of movement restrictions, laboratory test results and other administrative processes that can occur several weeks or months after the initial detection of bTB.

Consequently, analyses involving incident duration and the total number of test reactors are generally restricted to incidents that had concluded within the reporting year. Where appropriate and available, supplementary data obtained after the initial extraction may be incorporated to provide a more complete representation of events.

Information on cattle markets operating during 2025 is maintained centrally by the APHA TB Customer Service Centre and, where possible, validated by local APHA veterinary staff. Although every effort is made to ensure these data are accurate, some changes in market status may not be captured in time for inclusion within the report.

2.1.2 Data validation and quality assurance

Data validation, quality assurance and data processing procedures are applied before analysis. These activities include resolving known administrative inconsistencies, reviewing anomalous records and applying epidemiologically relevant analytical rules to improve the accuracy, consistency and interpretability of the dataset.

Despite these efforts, small discrepancies may remain between datasets, reporting outputs or previously published figures. Such differences may arise from ongoing data correction activities, refinements to analytical workflows (of which there have

been substantial changes for the 2025 reports), differences in extraction timing, or the resolution of historical data issues.

Where discrepancies are identified, priority is given to investigating those with the potential to affect epidemiological interpretation, disease trends or the overall conclusions of the report. Minor residual differences that do not materially affect these outcomes may remain.

The figures presented in this report should therefore be regarded as the best representation of the available surveillance data at the time of analysis. The primary objective of quality assurance activities is to ensure that the data are fit for the purpose of surveillance and epidemiological reporting, rather than to achieve complete reconciliation of every individual record.

2.1.3 Analytical exclusions

Some records contained within operational datasets are excluded from APHA surveillance analyses following routine quality assurance and application of epidemiological case definitions. This may include administrative errors resulting in duplicate incident records, incidents that do not meet case definitions, and those subsequently determined not to represent a sustained new herd incident.

Examples include herds with PCR- or culture-negative slaughterhouse cases in which no skin test reactors are identified, and herds where only a single inconclusive reactor (IR) with no visible lesions (NVL) is detected.

Licensed Finishing Units (LFUs) and Approved Finishing Units (AFUs) which operate under specific movement and management controls, are excluded from the numbers presented in the 2025 England TB Epidemiology Report, 2025 Low Risk Area and Focus County reports but will be included in the data provided in the GB data report. These units are designed to facilitate the controlled onward movement of cattle to slaughter and typically have limited opportunities for cattle to re-enter the wider cattle population. Consequently, bTB detections within finishing units are considered to have limited epidemiological significance for understanding disease transmission, persistence and spread within the wider cattle industry.

2.1.4 Comparability with other publications and sources of discrepancy

The APHA surveillance and epidemiology reports and the Official Bovine TB Statistics are produced for different purposes and are generated using different analytical and publication processes. The Official Bovine TB Statistics are published quarterly, approximately 3 months after the reporting period, whereas APHA

surveillance reports are produced later and allow additional time for data validation, data cleaning and the resolution of administrative anomalies.

As a result, small differences may occur between figures presented in different publications. Work is continually undertaken to improve consistency between reporting systems and to harmonise analytical approaches where appropriate. The most common sources of difference are described below.

Disclosing test date and incident start date

In a small number of cases, the incident start date recorded in Sam may differ from the date of the test that initially disclosed disease. Where this occurs, incidents may be assigned to different reporting periods depending on the dataset and reporting methodology used.

Inaccurate or missing end-of-restriction information

Historically, inaccurate or missing TB10 (end-of-restriction) records represented a significant source of data quality issues within Sam. System developments, policy changes and user training have substantially reduced the frequency of these issues, although occasional cases still occur and continue to be identified and corrected.

The duration of a bTB incident can be affected by delays in administrative processes, including the return of the BT5 declaration confirming completion of cleansing and disinfection requirements, as well as discrepancies within cattle tracing records that must be resolved before restrictions can be lifted. Such delays may extend the recorded duration of incidents beyond the period directly associated with disease control activities.

In rare instances, incidents may be absent from Sam because of administrative errors despite evidence of reactors and associated testing activity. Where identified, such incidents are considered during report production.

2.2 Statistical methods

All statistical calculations were performed in R version 4.2.2 for the 2025 LRA reports, Focus County reports, GB data report and England TB Epi report.

A chi-squared test was performed for comparing data to previous years, such as the number of TB incidents in 2024 and 2025. A Fishers Exact test was used if a cell value was less than 5.

The estimated significance probability for the Fisher's Exact test for 2 x 2 tables with large numbers is taken from Pezzullo (2010). This is generally taken as a 2-tailed value.

A z-test was used to compare prevalence between 2024 and 2025.

Incidents rates were compared by analysing the deviation of the incidence rate ratio from 1.0, using the 2 tailed significance value.

The median duration of TB incidents was compared using the K-sample equality-of-means test.

The reference category selected for categorical predictors in regression analyses was chosen to be both biologically meaningful and supported by a sufficient number of observations or cases to ensure statistical robustness.

Where this was not possible, the category with the largest number of observations or cases was used as the reference category. This approach was taken when:

- the most biologically relevant category contained too few observations or cases; or
- there was no clear biological rationale for selecting one category over another

In some of the analyses performed, the number of TB incidents may vary depending on when data extraction and analysis were carried out. These variations are generally minor.

2.3 Classification of incidents

Since January 2011, cattle herds in GB have been described by their Official Tuberculosis Free (OTF) status. This can be OTF-W (OTF withdrawn), OTF-S (OTF suspended), or if free from any restrictions, OTF. This terminology is used in surveillance reports.

OTF-S incidents describe herds in which all test reactors failed to disclose visible lesions of TB and positive laboratory (PCR and/or culture) results for *M. bovis* from post-mortem tissue samples. Other herds can have their OTF status temporarily suspended without immediately triggering a new incident, for instance if:

- suspect TB lesions are detected in a slaughterhouse during routine post-mortem meat inspection and pending laboratory results, or
- a TB test becomes overdue

However, such herds do not contribute to OTF-S incident totals in these reports. In some figures differentiation is made between OTF-S incidents with 0 to 1 or more than one reactor. Infrequently, a few can be classed as 'unclassified', where no post-mortem results are available.

OTF-W incidents are those involving the detection in the affected OTF herd of at least:

- one reactor (positive animal) to the Single Intradermal Comparative Cervical Tuberculin (SICCT) test, or a positive animal to the supplementary interferon-gamma blood test, with typical lesions of TB identified at post-mortem (PM) meat inspection, or
- one animal (i.e. a skin test reactor, interferon-gamma test-positive animal, or slaughterhouse case) with *Mycobacterium bovis* (*M. bovis*) positive polymerase chain reaction (PCR) test (or bacteriological culture) results in tissue samples collected from carcasses during the PM inspection

In January 2022, the Welsh Government introduced a new "OTF-W by default" policy for cattle herds affected by TB incidents in Wales. This policy meant any new TB incidents arising from one or more skin test reactors or from 2 consecutive standard inconclusive reactor results at a skin test were automatically classified as OTF-W in Wales. Previously, herds with a single skin test reactor were classified as OTF-S in Wales, unless epidemiological assessment establishes the likelihood of infection without post-mortem evidence of infection - these were technically termed OTF-W2 but were not differentiated from OTF-W within these reports.

To qualify as being 'new' within the specified period, a TB herd incident must have been disclosed and restrictions imposed within that period.

2.4 TB Risk Areas

As in previous reports, the county boundaries that were set in 1974 are used throughout. England and Wales are divided into risk areas, as shown in Figure 2.3.

In England, outputs are for the most part broken down by the new TB risk and surveillance areas introduced in 2013. From January 2018, part Edge, part HRA split counties were re-classified as fully Edge Area. These include Cheshire, Derbyshire, East Sussex, Oxfordshire, and Warwickshire. Herds in these counties are subject to mandatory interferon gamma blood testing (IFN- γ) in TB breakdowns where animals presented with visible lesions at slaughter or had positive confirmatory tests for *M. bovis*, or both.

Herds in some parts of the Edge Area are subject to 6-monthly routine surveillance testing. These are in Cheshire, Oxfordshire and Warwickshire, and in the western areas of Berkshire and Derbyshire and the northwest of Hampshire. Cattle herds in the other parts of the Edge Area remain on annual testing supplemented with enhanced radial surveillance testing if located within a 3km radius of an OTF-W incident herd.

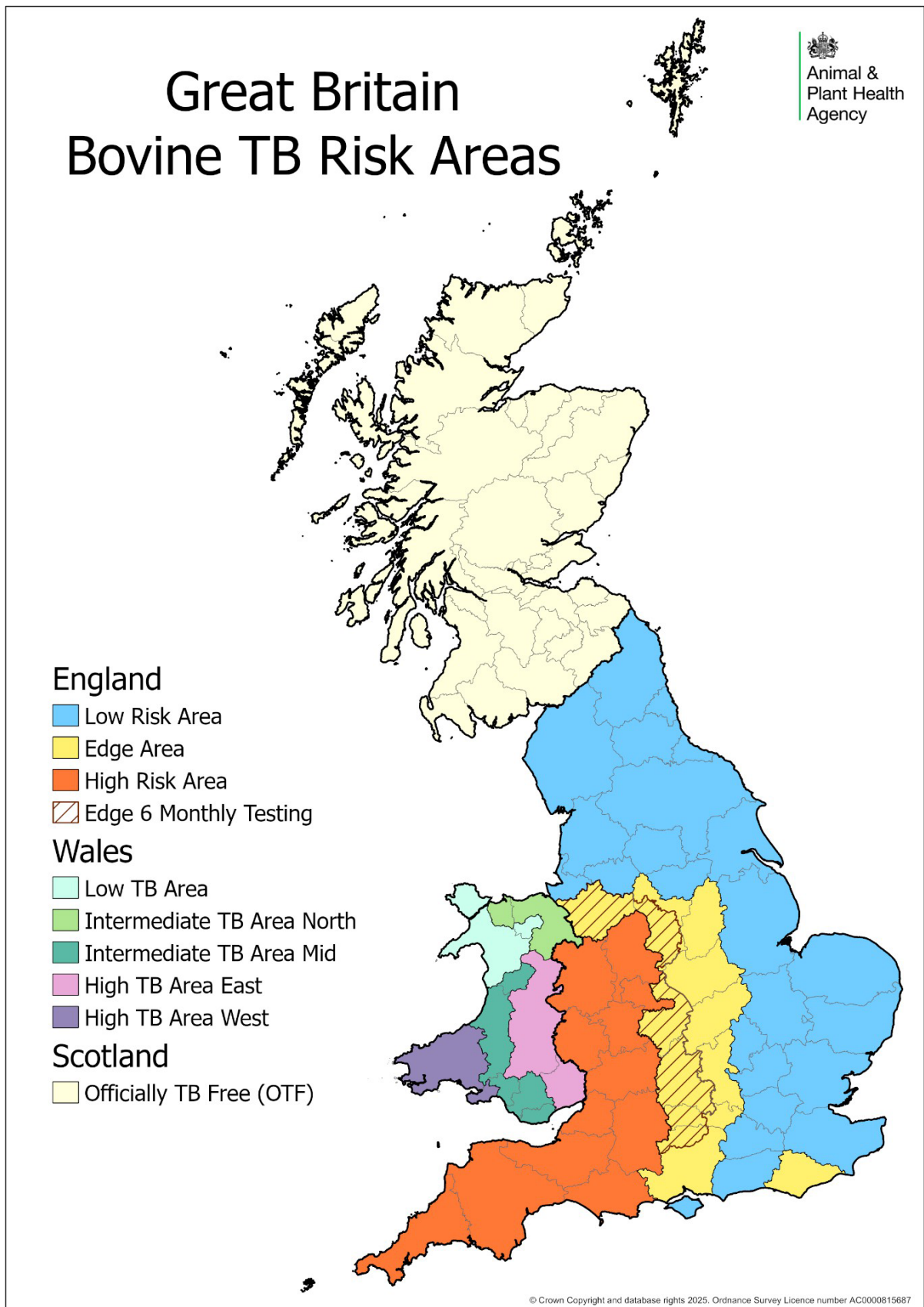


Figure 2.3 Map of Great Britain showing the Bovine TB risk areas and Edge 6 monthly testing area

2.5 Epidemiological Indicators of disease burden

2.5.1 Incidence

Incidence is the rate at which new cases of disease (incidents) occur in a population of interest over a specified period. This index is generally considered more accurate than other measures of incidence for comparing incidences between areas of different TB herd testing intervals.

The incidence rate used in the Official Bovine TB Statistics for Great Britain and in the TB epidemiology reports is the number of new incidents per 100 herd-years at risk (HYR). HYR is the sum of the time (in days, months or years) that herds in the geographical area of interest are unrestricted. The incidence per 100 HYR therefore gives the number of new cases over 100 herd-years. This measure considers the historical testing frequency and the periods that a herd is classified as unrestricted and at risk of infection. Only herds that have a test during the reporting period contribute to the measure.

The method for calculating the incidence rate in terms of new cases per 100 HYR has been modified from that described by Downs et al. (2013). The numerator is the total number of new TB incidents detected in the area of interest during the reporting year. The denominator is the sum of the times during which all herds in the same area are considered at risk of a new TB incident (time at risk).

A herd was considered to be at risk of sustaining a new TB incident between:

- a) 2 skin herd tests with negative results
- b) a skin herd test with negative results and the disclosure of a TB incident
- c) from the end of movement restrictions (date of TB10) after a TB incident to the next herd test

The time at risk is calculated as the total time the herd was not under restriction since the most recent test or end of restrictions before or at the beginning of the year. Only periods of risk that end in the period for which the rate is being estimated contribute to the denominator. Expressing incidence as TB incidents per 100 herd-years at risk aims to take better account of the opportunity for infection to be detected.

2.5.2 Different incidence measures

Historically, the simple approach of looking at the proportion of all herds with a new TB incident starting in a year (incidence per 100 live herds) was used.

The number of new TB incidents per 100 live (active) herds may be the simplest way

to calculate incidence, but it does not account for the different frequency of testing in each area of England. It also neglects the proportion of unrestricted herds that are at risk of a new TB incident. All active herds are in the denominator, but only those tested can be in the numerator.

International notifications of disease status often require a measure of incidence derived from the number of new infected herd incidents per 100 herds tested during the period (crude incidence). This excludes herds that were not tested, where TB incidents can only be triggered by slaughterhouse surveillance or ad hoc testing of individual animals (e.g. TB movement tests, spread tracings) and hence less likely to be found.

Incidence per 100 unrestricted herds tested (UHT) can be calculated in addition to incidence per 100 HYR, particularly for surveillance areas that have had a change in testing frequency. In this case, the denominator is calculated as the time herds were without restrictions, but only for the year of interest, rather than accumulated since the last test, as when calculating the time at risk for incidence per 100 HYR.

For example, in incidence per 100 UHT, a herd with no previous history of TB under a single set of restrictions between 1 September and 31 October of a year would contribute TAR up from 1 January until 31 August and then again from 1 November to 31 December.

However, the incidence rate per 100 UHT remains dependent on the proportion of the herd tested overall. TB incidents detected through slaughterhouse surveillance also contribute to the numerator, but not to the denominator.

The 3 different incidence measures (per 100HYR, per 100 live herds, and per 100UHT) tend to give similar temporal patterns. However, in areas with 4 yearly routine testing intervals, the rate per 100 HYR is usually lower than the other measures due to the larger denominator.

2.5.3 Incidence rate ratios

Incidence rate ratios (IRR) quantify the difference in disease incidence between different categories of animal or herd, for example herd size category, herd type or risk area, relative to a reference category.

The IRR should be interpreted as a proportional comparison between the reference category incidence rate (the denominator) and the investigated category (the numerator). For example, an IRR of 2.0 means the incidence rate of TB in herds within that category was twice as high as the incidence rate of the reference category. An IRR of less than 1.0 represents categories where the incidence rate is lower than that of the reference category.

The reference category chosen for categorical predictors in regression analyses varied – ideally, the reference category was both biologically relevant and had a sufficient number of observations or cases to be statistically sound. However, if the

most biologically relevant category had insufficient observations/cases or there was no clear biological advantage in selecting a reference category, then the category with the most observations/cases was chosen.

To investigate the effect of herd type, Poisson regression was used to produce IRRs that adjusted for the effects of herd size and risk area. The adjusted IRRs for the herd size categories and risk regions were very similar to the unadjusted IRRs. As expected, the incidence rate was significantly lower in the Edge Area and LRA compared to HRA, despite adjusting for herd size and type.

2.5.4 Prevalence

Prevalence describes the proportion of herds in an area that are infected at a given point in time. This can be measured using point prevalence, which is calculated by dividing the number of cattle herds under movement restrictions due to a TB incident on a given date by the number of live herds. Annual average prevalence is calculated by the average prevalence in the 12 months of the reporting year.

Herds restricted due to an overdue test rather than a TB incident are not classified as 'restricted' in these reports.

2.5.5 Recurrent TB incidents

A recurrent incident is defined as:

- a herd that had a new TB incident disclosed in the reporting year
- and had also been under movement restrictions for a different TB incident in the previous 36 months (or previous 18 months, England report only) prior to the disclosing test of the new incident

Recurrence can result from a general increase in incidence. For example, a herd would have a greater probability of a previous TB incident if the past incidence were high.

The likelihood of a recurrent herd incident can also be increased if some herds are more likely to have repeated TB incidents than others, for particular reasons relating to those herds. For example, herds within hotspots in the LRA where they are subject to enhanced surveillance and increased testing.

The 'history period' refers to:

- the 36 months (or 18 months, England report only) preceding the start date of the incident in the current period
- or, where no recurrent incident has occurred, the 36 (or 18 months) months prior to the mid-point of the reporting year

Analyses included all herds that were considered 'live' in the current period (2025),

or active at the end of it. Whether the herd was live in the history period (preceding 36 months) was not checked.

Herds under restriction for 4 months or more in 2025 from a TB incident that started in the history period were excluded from analyses. These herds had limited opportunity to become TB incidents since there may have been no further testing in the period following their closure. This 4-month threshold helps to detect any recurrence in herds where restrictions were lifted within the first 4 months of the reporting year.

Logistic regression models were used to compare the odds of a herd experiencing a new TB incident in the reporting year between those which did, and did not, have a history of TB in the preceding 36 months. Three variables were included as fixed effects in each model: herd size, herd type, and risk area. The outcome variable was if the herd experienced a new TB incident in the reporting year (binary outcome yes/no). An interaction term was included to model the interaction between whether a herd had experienced a previous incident in the preceding 36 months (binary variable yes/no), and each of the 3 risk factors listed above in a separate logistic regression model. The outputs of each model are presented in the England Epidemiology Report.

Although recurrence is calculable from TB incident data, its cause in any given TB incident is difficult to discern. With surveillance data it is difficult to distinguish between persistent undisclosed ('residual') cattle infection from a previous TB incident and a newly introduced infection event.

2.5.6 Spatial extent of endemic TB

To identify the areas of England and Wales that are affected by endemic TB, a definition of endemicity was developed under the Defra-funded research project SE3045. This enables the expansion and retraction of the endemic TB area of GB to be measured over time. It also provides a useful tool for decision makers when reviewing the efficacy and implementation of local TB control measures.

A geographical unit is considered endemic if there are at least 3 OTF-W incidents within a 7 km radius within a 2-year period. The geographical unit used to map the expansion and retraction of the endemic area is a 500 by 500 metre grid cell.

This definition was developed through analysis of TB surveillance data and with input from APHA veterinary field staff. It is the most appropriate definition that can be applied on a national level. It is not perfect and will apply better in some areas than in others. For example, small 'endemic' TB areas can appear which could be temporary artefacts due to the chosen definition of endemicity. Whilst acknowledging the limitations of this definition, it does provide a generally applicable and reproducible approach for determining the endemic area. The definition may need to be refined in future to reflect changes in the epidemiology of TB over time and to changes to surveillance regimes.

3.0 Overview of TB Testing in Great Britain

3.1 Measuring test accuracy

3.1.1 Sensitivity and specificity

Sensitivity is the probability that an infected animal will be correctly identified as positive by the test. Specificity is the probability that an uninfected animal will be correctly identified as negative by the test. Both parameters directly affect the effectiveness of TB surveillance and control measures that aim to quickly identify any infected herds, remove all the infected animals from such herds (removal of reactors), or to minimise the risk of infected animals being moved between herds (pre- and post-movement tests).

Ideally, tests should have both high sensitivity and specificity, as effective disease eradication is dependent on finding and removing all infected animals. But a trade-off between sensitivity and specificity is often the norm. Lowering the threshold of a positive result to increase sensitivity increases the chances of wrongly categorising an 'uninfected' animal as infected (as this reduces specificity).

Therefore, different test interpretation policies are applied according to the area, herd history and other factors, to make the best compromise for the circumstances. For TB, tests tend to be less sensitive, and as a result some infected animals may still give a negative test result. However, they tend to have a high specificity, so it is very unlikely that an uninfected animal will give a positive test result.

An important use of sensitivity and specificity values is to estimate a test's predictive values. These determine how accurate the test result outcome for an individual animal (positive or negative) truly is.

3.1.2 Positive and Negative Predictive Values

The positive predictive value (PPV) of a test is defined as the probability that a positive testing animal is truly infected. Conversely, the negative predictive value (NPV) is the probability that an animal with a negative test result is truly free from infection. Both measures depend on the proportion of the population that is infected (prevalence of infection) as well as the sensitivity and specificity of the test.

The higher the prevalence of infection in a population, the higher the PPV and the lower the NPV of a diagnostic test. In other words, the same test for TB infection in cattle will not have the same predictive value when used in different risk areas. Both the stage of infection and disease prevalence in different risk areas have an effect on the TB diagnostic tests. Therefore, it is not easy to calculate 'average' predictive values for the diagnostic TB tests. However, these averages in areas of different prevalence can still be useful in helping plan how tests should be interpreted.

3.1.3 Diagnostic test interpretation

The single intradermal comparative cervical tuberculin (SICCT) test is the main detection test used for TB surveillance in UK. It is highly specific (if cattle test positive, they almost certainly have TB) but can miss infected cattle. When this happens, some cattle may have no reaction, whilst others will not give a big enough reaction to be classified as positive; the latter of these are called 'inconclusive reactors' and will require an additional test to decide their true disease status. If they retest as inconclusive or positive, they are classified as infected (reactors) and are slaughtered, and incident procedures are triggered. Inconclusive reactors that are retested with negative results do not trigger a new TB incident, but those animals cannot be moved from the holding for the remainder of their life, unless direct to slaughter.

The limitations of the SICCT test can be addressed by changing the way its results are interpreted. This is done with the 'standard' or 'severe' interpretation, which changes the threshold of a positive result. It can also be improved by assessing the likelihood that IRs are truly infected, based on statistics or the use of the more sensitive gamma interferon test. These options are explored below.

The specificity of the SICCT test at different interpretations in GB was estimated by [Goodchild et al. \(2015\)](#). SICCT specificity was found to vary not only with the different positive cut-off points for standard and severe interpretation, but also across regions within GB. Table 3.1 shows how likely a positive animal is to be truly infected and how likely it is to have been exposed to infection.

According to the calculated average PPV of the SICCT test, 91.8% of reactors in GB are infected. PPV values ranged from 92.3% in the high-prevalence counties to 76.9% in the low-prevalence counties. The study indicates that the SICCT test, as used in GB, has a very high specificity. Thus, at standard interpretation it will give rise to one false positive animal for every 4,760 to 7,690 animals tested. Conversely, the findings suggest that over 90% of reactor cattle identified only by skin test in GB between 2002 and 2008 were infected. This endorses the compulsory slaughter of all SICCT test reactor cattle for effective disease control.

Table 3.1 Selected data from Table 6 in [Goodchild and others \(2015\)](#).

Calculation of the PPV for the SICCT test in 3 groups of Great Britain counties that vary in TB prevalence. The 95% confidence intervals were based on the confidence intervals of specificity.

Group of counties and description	High prevalence England High-Risk Area +4 Welsh counties	Medium prevalence England Edge Area +3 Welsh counties	Low prevalence England Low-Risk Area +Gwynedd +Anglesey +Scotland	All of GB
PPV if the interpretation was severe only for OTF-W incidents (with 95% confidence interval)	92.3% (91.1 to 93.7%)	88.6% (86.4 to 90.9%)	76.9% (72.1 to 82.0%)	91.8% (90.5 to 93.3%)
PPV if all tests had been at severe interpretation (with 95% confidence interval)	89.5% (88.2 to 91.3%)	74.8% (71.6 to 79.0%)	46.6 (39.7 to 55.4%)	87.7 (86.1 to 89.7%)
PPV if all tests had been at ultra-severe interpretation (with 95% confidence interval)	88.9% (87.4 to 90.3%)	74.3 (70.7 to 77.5%)	43.2 (35.3 to 50.3%)	86.9 (85.1 to 88.6%)

In summary, in high or intermediate prevalence situations, nearly every single reactor detected by the SICCT is truly infected. This is particularly the case in the HRA, or for short interval and herd risk tests. Thus, a positive SICCT test provides strong evidence of infection in TB incidents in these risk areas independent of post-mortem confirmatory evidence. As expected, PPV increases with test sensitivity, specificity and animal prevalence.

However, the lower predictive value of the SICCT in lower incidence areas such as the LRA, parts of Wales and in Scotland means that the test can detect positive animals which are not truly infected with *M. bovis*.

Note that measurement of all test characteristics depends on knowing the true status of the animal, which should be measured using a 'gold standard' test. However, such a test is lacking for cattle in the early stages of TB infection. The difficulty in knowing whether an animal is truly uninfected or merely asymptomatic makes estimating the specificity and NPV particularly challenging. Thus, careful use of test application or interpretation can help to improve predictive values. Consideration of other evidence is also important in deciding whether a negative animal is truly uninfected. Together, these enhance accuracy and enable the heterogeneity of the epidemic to be taken into account when designing control measures.

3.1.4 Actions to increase detection of infected cattle in a TB infected herd

Surveillance tests are imperfect, hence different options have been developed to enhance the chance of detecting all TB infected cattle in a herd (test sensitivity).

Increasing the number of SICCT tests (so called short-interval (SI) tests) with negative results that a TB incident herd must have to regain its OTF status following disclosure of one or more reactors.

Severe interpretation of skin test: Increasing the sensitivity in this way will reduce the specificity of the skin test. This means 1 in 1,111 cattle could potentially be a false positive reactor, instead of 1 in 5,000 at standard reading (View the [Strategy for achieving Official Bovine Tuberculosis Free Status for England](#)). However, these values apply to individual animals. Test sensitivity is higher at herd level and classification of a herd as infected is more accurate, particularly when more than one reactor is detected.

Consider removal of non-reactor cattle as direct/dangerous contacts: this relates to cattle that have been in contact with other infected cattle but can also be based on test history. For example, one or more previous classification as an IR, or belonging to a cohort where a high percentage of reactors have been detected.

Supplementing the skin test with the interferon-gamma blood test (and occasionally tests for serum TB antibodies) and applying a parallel interpretation of the results, so that animals reacting to any test are regarded as infected and removed from the herd.

3.2 Types of surveillance used for detecting TB

3.2.1 Surveillance overview

Bovine tuberculosis is a slowly progressing disease that is not clinically apparent for some time after infection, but which can spread during this time. This means that surveillance on apparently healthy animals is needed in addition to investigating apparent clinical cases of TB, to get ahead of disease spread. Surveillance involves active surveillance where live animals are tested at set intervals. Active surveillance can be modified in the different parts of the country to reflect the different likelihood of TB either being present or being detected. It also requires passive surveillance, where there is a requirement for the government to be notified if anyone suspects TB infection in animals. The latter occurs mainly from cattle being processed through slaughterhouses.

Detecting TB with a diagnostic test depends on how likely it is for the disease to be present and how robust the test is. The likelihood of infection with TB is associated with location, herd type and size, as well as whether the herd has previously been infected. These important differences in likelihood of disease presence in herds affect how surveillance is best carried out and how effective it is at detecting infection.

3.2.2 Surveillance Stream definitions

The term 'Surveillance Stream' was coined in 2016 to classify bovine TB surveillance systems in the England Epidemiology Report. It was designed according to the intention behind the activities carried out to detect disease. Broadly speaking, there are 2 types of activities among the 4 streams defined below: slaughterhouse surveillance and application of the TB skin test (SICCT). The definitions for the surveillance streams encompassing these are below. Tests carried out as part of the Area and Herd risk surveillance stream have been further divided by purpose: primarily aiming to detect disease (surveillance) or aiming also to stamp it out (control).

Routine animal testing and slaughterhouse surveillance help to detect TB in herds or animals not expected to be at any increased likelihood of being infected. Area and Herd Risk surveillance and Trade and Other surveillance are targeted at herds or animals thought to be at higher risk of being infected. These types of surveillance also limit the impact of the movement of unknowingly infected animals to a lower risk area.

Surveillance stream definitions are as follows:

3.2.3 Routine

Herd tests scheduled as part of routine TB surveillance with no expectation of increased or decreased probability of disclosing infection.

3.2.4 Area and Herd Risk

Targeted herd tests carried out due to the TB history of the herd. Alternatively, disease disclosed from tests carried out due to epidemiological evidence that there is a higher probability of disease in the animal or herd.

3.2.5 Slaughterhouse surveillance

Routine post-mortem meat inspection during commercial slaughter of animals not believed at higher likelihood of being infected. This excludes results of the inspection of test reactor cattle and DCs removed by APHA.

3.2.6 Trade and other surveillance

Tests scheduled on individual animal intended for movement to other herds, due to the high impact of infection spreading to the destination herd. This includes tests on animals where the presence of some epidemiological risk factors may increase disease probability but is not the primary reason for testing. Referred to as Proactive surveillance in earlier reports.

3.2.7 Surveillance Streams classification

Table 3.2 Surveillance Streams classification.

Test Code	Name	England Surveillance Report Categories (2018 onwards)	Surveillance Streams (2016-2017)	Surveillance Purpose
CON, CON6, CON12	Contiguous Test	Area and Herd Risk Contiguous tests	Area and Herd Risk	Control
RAD, RAD6, RAD12	Radial Test	Area and Herd Risk Radial test	Area and Herd Risk	Control
CT(EM)	Check Test (Exposure Mitigation) (Backward tracing herd test)	Area and Herd Risk Source tracing test	Area and Herd Risk	Control
IFN, IFN LOW IN, IFN PERSI, IFN NSR, IFN SLHERD, IFN ANOM, IFN NBCP/PBCP, IFN OTH_SP, IFN PRI, IFN_RECUR, IFN_FLEX,	Gamma Interferon Test (OTF-W LRA, OTF-W persistent TB incidents, non-specific reactor herd, whole or partial reactor herd slaughter, anomalous reactions procedure, badger control area tests, disease in other species present, private, recurrent	Area and Herd Risk Not typically disclosing tests	Area and Herd Risk	Control

Test Code	Name	England Surveillance Report Categories (2018 onwards)	Surveillance Streams (2016-2017)	Surveillance Purpose
	incidents, use of flexi – gamma, 2 x Inconclusive reactors			
PSI	Partial Short Interval Test	N/A	Area and Herd Risk	Control
SI	Short Interval Test	Area and Herd Risk Not typically a disclosing test	Area and Herd Risk	Control
IASI	SI test in OTF-S herds in Wales Intensive Action Area only	N/A	Area and Herd Risk	Control
6M	6 Month (Post-TB incident) Test	Area and Herd Risk Post-incident tests	Area and Herd Risk	Control
12M	12 Month (Post-TB incident) Test	Area and Herd Risk Post-incident tests	Area and Herd Risk	Control
TR	Traced Bovine Test	Area and Herd Risk Spread tracing tests	Area and Herd Risk	Control
ASG	Approved Segregated Group Test	Area and Herd Risk Not typically a disclosing test	Area and Herd Risk	Control (if on TB incident herd)
CT(I-I)	Check Test (Investigation and Intervention)	Area and Herd Risk Check test	Area and Herd Risk	Surveillance
CT(RTA)	Check Test	N/A	Area and Herd	Surveillance

Test Code	Name	England Surveillance Report Categories (2018 onwards)	Surveillance Streams (2016-2017)	Surveillance Purpose
	(Road Traffic Accident)		Risk	
CT-HS1, CT-HS2	Check Test (Hotspot)	Area and Herd Risk Hotspot tests	Area and Herd Risk	Surveillance
AI	Artificial Insemination Centre Test	Trade and Other Pre-movement testing	Trade and other	Surveillance
PRI	Private Test	Trade and Other Private tests	Trade and other	Surveillance
IR or IFN 2xIR	Inconclusive Reactor Test or Gamma Interferon Test severe 2xIRs (Wales only)	Area and Herd Risk Not typically a disclosing test	Area and Herd Risk	Surveillance
POSTMT or POSTMOVNC or POSTMOVVOV	Post-Movement Tests	Trade and Other Post-movement	Trade and other	Surveillance
TBU	TB Unit Test (AFUs)	Area and Herd Risk	Area and Herd Risk	Surveillance
PRMT	Pre-Movement Test	Trade and Other Pre-movement testing	Trade and other	Surveillance
PII	Post-Irish Import Test	Trade and Other Post-export	Trade and other	Surveillance
PIO	Post-Import Test	Trade and Other Post-export	Trade and other	Surveillance
EX	Export Test	Trade and Other Pre-export	Trade and other	Surveillance

Test Code	Name	England Surveillance Report Categories (2018 onwards)	Surveillance Streams (2016-2017)	Surveillance Purpose
CT-LRA-SA	LRA Pre-Sale Check Test	Trade and Other Pre-sale check LRA	Trade and other	Surveillance
WHT/2	Whole Herd Test	Routine Whole Herd tests	Routine	Surveillance
RHT24/36 or RHT48	Routine Herd Test	Routine Herd tests	Routine	Surveillance
CT-NH1/2	New Herd Test	Routine New Herd tests	Routine	Surveillance
IA6/IA12	Routine 6M or 12M test within the Welsh Intensive Action Area only	N/A	Routine	Surveillance
OT	Other	N/A	Routine	Surveillance
SLH	Slaughterhouse	Slaughterhouse Surveillance Stream	Slaughterhouse Surveillance Stream	Slaughterhouse Surveillance Stream

3.3 Tools used to support TB incident analysis

3.3.1 Genotyping

From 19 April 2021, Whole Genome Sequencing (WGS) started to replace genotyping (spoligotype and VNTR type) as the predominant technique used to genetically classify *M. bovis* isolates and genotyping was switched off fully in December 2021.

3.3.2 Whole Genome Sequencing

Attempts are made to recover *M. bovis* from all TB incidents and to subject at least one isolate per TB incident to molecular strain identification. As of 19 April 2021, all incident herds with *M. bovis* positive culture results started to have WGS results recorded instead of genotyping results. WGS is the current gold standard method for strain differentiation and can provide insights into their evolutionary relationships.

WGS provides information on the entire genome (DNA) of *M. bovis* and examines variation caused by mutations across the entire DNA sequence of the *M. bovis* genome (4.4 million base pairs in length). WGS therefore offers higher discriminatory power compared to conventional genotyping for differentiation of *M. bovis* strains. Because WGS analyses the whole genome, identical or very similar genome sequences can only be obtained from closely genetically related isolates.

WGS identified 6 major groups (B1-B6) which were subdivided into a total of 30 clades. Each isolate is assigned to a WGS clade based on its genome sequence. The WGS clade names consist of the letter 'B' for *M. bovis* followed by a number (such as B4 or B6) that indicates which major group the isolate belongs to. Further numbers (B6-13, B6-42) indicate the subgroup within the major group to which the isolate is assigned. The clades assigned to isolates are designed to be hierarchal: for instance, B6-42 is more closely related to B6-41 than it is to B6-13; and B6-41, B6-42 and B6-13 are more closely related to each other than to B3-11. Due to the slow mutating nature of *M. bovis*, isolates from multiple breakdowns assigned to the same clade are more likely to be linked.

WGS is an important tool used by APHA for investigating TB breakdowns and possible transmission pathways between cattle herds. At a farm level, WGS helps

APHA field vets to identify the most likely source of TB infection for a breakdown herd, and whether it has spread to other cattle herds. Once APHA is aware of the likely origin of a breakdown, they can advise farmers on measures they could take to reduce the risk of further infection entering the herd. WGS is also routinely applied to *M. bovis* isolates from non-bovines including South American camelids (alpacas, llamas), goats, pigs, and captive deer when investigating TB incidents affecting these species, as well as in wildlife species (such as road killed badgers) and compare them with isolates from local TB breakdowns in cattle herds and other farmed animals. This allows APHA to assess whether cattle and badgers from the same geographical area are affected by the same strain of the TB bacterium, and to assess the spread of TB strains between geographical areas and across time. For instance, WGS is being used to support TB surveillance in cattle and badgers and understand the epidemiology of TB in the hotspot area in east Cumbria (HS21), where a link between cattle and badger TB infection was first identified in 2017.

3.3.3 Homerange maps

Homerange maps are an attempt to capture the geographical localisation (endemic regions) of the various WGS clades of *M. bovis* found in GB. They have proved extremely useful for identifying the expected WGS clade at a given location, and support epidemiological investigations at national, regional and individual incident level.

A homerange defines a geographical area in which a certain WGS clade of *M. bovis* is regularly found in the local cattle herds and other susceptible animals. A simple algorithm to define the homeranges of the most common genotypes (and then WGS clades) of *M. bovis* in GB was originally developed as part of Defra research project SE3257. A 5 km square in a grid of the map of GB is considered part of a certain homerange if:

- there have been at least 3 different incidents of that WGS clade
- on at least 2 holdings
- from 3 or more discrete years within a 5-year window

To create a coherent area for each genotype, a 10 km buffer is then drawn around each of the homeranges so defined.

3.4 Tools for infection pathway assessment and attribution of sources of infection

Assessing how a herd became infected with *M. bovis* can be challenging. TB is a chronic disease, usually with a long incubation period. This means that in most animals, clinical

signs are only apparent when the disease is advanced. TB is generally disclosed through skin testing (active surveillance) on farm or post-mortem surveillance at the slaughterhouse. The detection of TB in cattle may occur sometime after an animal arrives in a herd. As such, the evidence to retrospectively establish the source and routes of infection for an infected herd (the 'risk pathway') can be difficult to reconstruct. However, clarifying the most likely risk pathway facilitates the use of targeted on-farm biosecurity measures to reduce the risk of reinfection for that herd.

This section presents 2 complementary approaches used to assess the likely source and route of infection for new TB incidents in England. The first is based on veterinary investigations (using Disease Report Forms or 'DRFs'), which draw upon testing, laboratory and epidemiological evidence, farm-specific information, local knowledge and veterinary judgement to assess likely infection pathways.

In the HRA, one third of new incidents are randomly selected for an investigation, in addition to a triage system to target certain incidents such as those with a high proportion of reactors in the herd (explosive incidents), or those with particular public health components. The aim is to investigate all new incidents in the Edge Area and LRA. However, resource constraints may exist meaning it is not possible to investigate all TB incidents. Where there are resource limitations, guidance on prioritisation is developed and as many new incidents in the risk area as possible are triaged for an investigation visit.

The second approach uses data-driven methods that apply standardised criteria to routinely collected surveillance, cattle movement and whole genome sequencing (WGS) data to assess evidence supporting specific infection pathways.

The data-driven methods are intended to complement existing veterinary investigations rather than replace them. Veterinary investigations incorporate local epidemiological knowledge, herd management information, biosecurity assessments and professional judgement that cannot be fully captured within automated analyses. Conversely, the data-driven methods provide a consistent and reproducible assessment of selected infection pathways across all TB incidents using structured surveillance, movement and genomic data. Together, these approaches provide complementary evidence that can improve understanding of the epidemiology of bovine TB at both herd and population level.

Neither approach can determine the definitive source of infection for most TB incidents. Rather, both seek to identify infection pathways that are most consistent with the available evidence at the time of assessment. Consequently, the results should be interpreted as assessments of likely infection pathways rather than confirmation of the true source of infection.

3.4.1 Disease Report Form (DRF) – veterinary risk pathway assessment

TB incidents (both OTF-W and OTF-S) are investigated to assess the hazard (source of infection) and risk pathway. These investigations follow the set protocol described below. A 'provisional assessment' is made early on during the management of an incident, to help guide and prioritise immediate actions. A 'final assessment' is then determined when all evidence has been gathered, including post-mortem, animal movement tracing and laboratory results. The same protocol is used for both provisional and final assessments. However, the final assessment has 2 added categories of hazard, for the rare cases where infection was ultimately judged not to have been present. These are 'non-specific reaction' and 'anomalous result'.

Refresher training is provided to investigating officers to ensure that, as far as possible, the protocol for risk pathway assessment is applied consistently.

3.4.1.1 Protocol for risk pathway assessment

The investigating officer assesses all the available evidence to identify the likely route by which TB entered the holding. Several plausible risk pathways are usually identified. The protocol asks the investigator to use all available evidence plus veterinary judgement to describe how likely each of the risk pathways are. Up to 3 risk pathways can be recorded, and each must be scored using the following scale: 'definite', 'most likely', 'likely' and 'possible'. The investigator must summarise the evidence in support of their selections.

They are advised that although it will often not be possible on a particular farm to say for certain how the cattle got infected, consideration of how this may have happened in light of the husbandry practised, biosecurity measures in place, and other findings in the investigation will make some pathways more likely than others.

Within the TB epidemiology reports, the terms likelihood and certainty are utilised to describe the score ascribed to each risk pathway during the veterinary risk pathway assessment.

Each assessment is comprised of 2 components. The first is a 'hazard', which is the original source of infection (for example infected cattle, badgers, other domestic or wild animals). The second is a risk pathway (for example cattle movements from a defined risk area or exposure during housing or at pasture). Additionally, investigators are asked to record which risk pathways have been excluded from the list of options in Table 3.4 (such as movements on a closed farm or contiguous contact with no neighbouring cattle).

The following table shows how the 28 combinations of hazards and risk pathways selected by investigating officers in 2025 were aggregated. Nine sources of infection were identified and used to present the results of the risk pathway analysis at risk area and county level.

Table 3.4: Hazards and risk pathways used in DRF to determine the likely source of infection.

Hazard	Risk Pathway	Source of infection
Infected badgers	Exposure at grazing, where all feed at grazing is inaccessible to badgers	Badgers
Infected badgers	Exposure at grazing, where feed at grazing is accessible to badgers	Badgers
Infected badgers	Exposure at housing, where all feed is inaccessible to badgers	Badgers
Infected badgers	Exposure at housing, where feed stores are accessible to badgers	Badgers
Infected cattle	Movements from Edge	Cattle movement
Infected cattle	Movements from High TB Area Wales	Cattle movement
Infected cattle	Movements from HRA	Cattle movement
Infected cattle	Movements from Intermediate TB Area Wales	Cattle movement
Infected cattle	Movements from Low TB Area Wales	Cattle movement
Infected cattle	Movements from LRA	Cattle movement
Infected cattle	Movements from NI or other country (imports)	Cattle movement
Infected cattle	Movements from Scotland	Cattle movement
Infected cattle	Contiguous over the fence or straying	Contiguous infection
Infected cattle	Residual infection in the herd	Residual infection
Infected domestic animals	Co-located	Domestic animals
Infected domestic animals	Contiguous	Domestic animals
Anomalous result	Anomalous Result	Non-specific reactor
Non-specific reaction	Mycobacterium other than M. bovis, or false positive result	Non-specific reactor
Uninfected	No pathway	Non-specific reactor
Fomites, undetermined source	Contaminated cattle slurry or manure	Fomite source
Fomites, undetermined source	Contaminated purchased feed or bedding	Fomite source

Hazard	Risk Pathway	Source of infection
Fomites, undetermined source	Contaminated vehicles	Fomite source
Fomites	Other	Fomite source
Fomites, undetermined source	Shared equipment or machinery	Fomite source
Other infected wild animals	Other	Other wildlife
Other infected wild animals	Wild boar	Other wildlife
Other infected wild animals	Wild deer	Other wildlife
Other or unknown	Rare sources (must specify) or unknown (must explain logic)	Other or unknown

3.4.1.2 Combining risk pathways and the likelihood score

During the assessment, the APHA case veterinarian selects up to 3 possible risk pathways of infection for each TB incident herd. Each risk pathway is given a score that reflects the assessed likelihood of that pathway being the true one. The weighting applied to the certainty score was updated in 2019 to reflect the developing understanding of how likelihood is being assessed in practice. It is as follows:

- Definite - score 8
- Most likely - score 6
- Likely - score 4
- Possible - score 1

Any combination of definite, most likely, likely, or possible contributes towards the overall picture for possible routes of introduction into a herd (see example 1).

Example 1 – identification of the potential risk pathways for a TB incident.

Source of infection	Certainty	Certainty score	Weighted contribution
Cattle movement	Most likely	6	0.55
Contiguous cattle	Likely	4	0.36
Badgers	Possible	1	0.09
Total herd score	n/a	11	1

If the total herd score is less than 6 (see example 2), then the score is made up to 6 using the 'Other/Unknown Source' option – see the example 2 (continued) table.

Buffering up to 6 in this way helps to reflect the uncertainty in assessments where only 'likely' or 'possible' sources are identified.

Example 2 – identification of the potential risk pathways for a TB incident with low certainty of the pathway,

Source of infection	Certainty	Certainty score
Infected cattle HRA	Possible	1
Infected cattle LRA	Possible	1
Other or unknown	Possible	1
Total herd score	Not applicable	3

The total herd score is 3. As this is less than 6, 'Other or unknown' gets increased to 4 points, so that the total score is 6. Thus, the final weighted contribution of each risk pathway is as follows:

Example 2 (continued) – risk pathway buffering where there is high uncertainty around the source of infection.

Source of infection	Certainty	Certainty score	Weighted contribution
Infected cattle HRA	Possible	1	0.17
Infected cattle LRA	Possible	1	0.17
Other or unknown	Possible	4	0.67
Total herd score	n/a	6	1

3.4.1.3 Interpreting source of infection outputs

The DRF source of infection output combines data from multiple herds. They provide the proportion of pathways in which each source was identified, weighted by certainty, as described above. The outputs do not show the proportion of herds where each pathway was identified (as this is skewed by the certainty calculation). The relative proportions of each risk pathway are approximations, and only broad generalisations should be made from these data. Where a greater proportion of OTF-S herds are investigated there will be more uncertainty in the risk pathways, as *M. bovis* is not isolated and genomic evidence is not available.

3.4.2 Data-driven risk pathway assessments

In the absence of field-derived assessments of hazards and risk-pathways for a proportion of new TB incidents, a new method was developed to provide an automated data-driven risk pathway assessment based on currently available data. For 2025, the method has been updated to combine a third algorithm. The outputs of these 3 separate algorithms, provide an independent assessment of 3 potential risk

pathways:

(1) the Cattle Movement Algorithm (CMA), which provides a likelihood for TB introduction via undetected infected cattle movements.

(2) the Local Infection Indicator (LII), which provides a likelihood for local transmission of infection.

(3) the Residual Infection Algorithm (RIA) which provides a likelihood of undisclosed infection within the herd from a previous breakdown.

The outputs of these algorithms are combined to give an overall risk pathway assessment for an incident, referred to as source attribution.

Binary decision trees were developed for the cattle movement and residual risk pathways which each map a series of questions for each individual animal relating to the presence or absence of risk and mitigating factors. These were translated into automated algorithms.

3.4.2.1 Cattle Movement Algorithm (CMA)

The **cattle movement algorithm assesses the likelihood that:**

- a) Reactors were infected prior to arrival on the case incident.
- b) Other individuals, moved into the herd during the high-risk infection window (60 days prior to the last clear herd test until 28 days before the start of the incident), introduced infection to the herd which transmitted laterally to the reactors disclosed. Where they were co-located with reactors or slaughterhouse cases it was assumed that direct contact was possible.

The risks throughout the individual's entire source history, since birth or import, are evaluated in the context of their testing history. Cattle are considered to have a higher likelihood of undisclosed infection on arrival at premises if a previous premises of residence had:

- a recent TB incident (within its parish herd testing interval plus 18 months),
- high risk-based trade (RBT) score of 4 or 5 (based on years since previous TB incident and movements from RBT score 5 premises),
- or was located within an area of high local prevalence (more than 10% within 5km area at time of departure).

Cattle are also considered to have a higher likelihood of undisclosed infection if

imported from Northern Ireland based on the annual national herd incidence.

Clear testing reduces the likelihood of the individual being a source of infection but does not exclude it due to imperfect test sensitivity, which is taken into account. The likelihood is increased by inconclusive and recurrent positive bovine reactions or positive results on subsequent holdings that individuals have moved to.

Where the case incident WGS clade is available it is compared with the case and source location within the homerange maps and with any genomic clade data available for source incidents to increase or reduce the likelihood of that pathway.

The highest level of likelihood (negligible, very low, low, medium, high, very high) for an individual pathway is assigned to the herd, for example if at least 1 animal is considered to have a high likelihood of being infected when it moved on, the incident is graded as having a high likelihood that the infection was brought in through animal movement. Herds are classified as having either:

- a) cattle movements associated with a high likelihood of infection (a herd with any movements scored as a high or very high likelihood)
- b) no cattle movements with a high likelihood of infection (the highest likelihood score was negligible, very low, low or medium)

Where there are 10 or more individual pathways with the highest likelihood level being at least 'low', an aggregated effect is assumed, and the likelihood level is raised by one. For example, if 10 individuals were rated as having medium likelihood of being the source of infection, the likelihood of introduction of infection to that herd via cattle movements would be raised to high. Where the likelihood of infection for individual movements are all very low, more than 100 individuals with this score are required to raise the herd-level assessment to low. This is due to evidence suggesting a log₁₀ scale relationship exists between number of movements and the likelihood of introduction of infection, which concurs with the fact that the timing of these movements is the only significant risk factor identified.

A herd-level assessment of high or very high is interpreted in these reports as providing strong evidence to support the introduction of infection through cattle movements.

It is recognised that some assumptions will affect confidence in these outputs. The key assumptions which raise uncertainty relate to the risk from Northern Ireland (based on national herd incidence in the absence of any premises history in the appropriate time period), lateral spread (cohabitation implies direct contact between reactor cattle and all others in the herd), the positive predictive value of testing where a single NVL reactor is disclosed and most significantly, the absence of genomic data for some source and case incidents. The latter point has been addressed to some extent by reporting case incidents where no WGS data is

available separately.

This automated approach incorporates whole genome sequence (WGS) data at clade level only and is structured around individual cattle movements and how likely they were to have been the source of new cattle TB breakdowns. This is not directly comparable with the outcome of veterinary investigations which may include interpretation of complex phylogenetic trees and a wider consideration of how infection was introduced to the locality.

CMA updates for 2025

Previously, incidents assessed as having a high or very high likelihood of infection being introduced through cattle movements were further classified according to the presence or absence of local movements. For 2025, this classification has been removed for the purposes of simplification.

Table 3.5: Record of updates to the Cattle Movement Algorithm.

Year	Update	Reason	Impact
2024	Selection was amended to include all 'movements on' in the infection window, not all cattle present.	Development issue. Time period most relevant to introduction of infection (extended 10-year window available on request)	Reduction of high / very high likelihood of introduction by cattle movements (estimate around 20%)
	Reduction of association between length of time in herd and number of reactors disclosed.	Response to peer review. Uncertainty around transmission rates.	Minimal on incidents with strong evidence for cattle movements
	Amendments relating to risk from source histories with a different WGS clade from the case.	Response to peer review. Limitations of sampling strategy. Potential for multiple sources of undisclosed infection.	Minimal on incidents with strong evidence for cattle movements
2025	Removal of local movement classification	Simplification following introduction of residual infection algorithm.	None on evidence for cattle movements but no differentiation

3.4.2.2 Residual infection algorithm (RIA)

An algorithm for the residual infection risk pathway is also now available. This assesses the likelihood of the source of an incident being residual infection remaining in the herd from a previous breakdown. This may be due to individuals

having been infected during a previous breakdown but remaining undisclosed or due to lateral spread of infection within the herd.

All reactors disclosed at the first herd test, all those with visible lesions at the first breakdown skin or blood tests as well as all those with increased risk of undisclosed infection (slaughterhouse case or higher risk previous individual testing history) are assessed.

Factors considered include the TB history of the herd, number of reactors disclosed at previous incidents, the timing and results of any supplementary testing, clearing test herd size and number of clear tests since and where WGS information is available, whether it is within home-range and whether the WGS clade matches any isolates previously disclosed. It also considers the length of time individuals were in the herd, whether they were present during a previous incident and if there was any increased risk of undisclosed infection based on their individual testing histories.

Again, the highest level of likelihood of an individual reactor is assigned to the herd and some assumptions apply, reactors are assumed to belong to the same epidemiological group as previous reactors if any cattle within the herd were homebred or present during that previous breakdown and co-location with previous reactors is assumed to imply direct contact was possible.

Herds are classified as having either:

- Individuals associated with a high likelihood of residual infection (a herd with any individuals scored as a high or very high likelihood)
- No individuals associated with a high likelihood of residual infection (the highest likelihood score was very low, low or medium)

A herd-level assessment of high or very high is interpreted in these reports as providing strong evidence to support residual infection within the herd from a previous breakdown being the source of a new incident.

3.4.2.3 Local Infection Indicator (LLI)

Infection may have been introduced through local transmission of infection, for example, by infected cattle via local movements, shared boundaries, or residual infection within the herd or by infected wildlife. To assess the risk of introduction from a local source of infection, the *M. bovis* whole genome sequence associated with the TB incident is extracted and compared against any other *M. bovis* sequences that:

- were obtained from a herd located within a 9km radius of the infected herd, including previous incidents within the herd that had occurred historically
- AND had a maximum of 3 single nucleotide polymorphism (SNP) differences between its sequence and the sequence of the M. bovis isolate taken from the new TB incident (this suggests local spread or a common source of infection between these 2 herds due to the similarity between the sequences)
- AND occurred between 4 years prior or 6 months after the new TB incident.

If the TB incident did have evidence of being linked to another M. bovis sequence according to the criteria above, then there was evidence to suggest that the incident was introduced through a local transmission event. TB incidents where the M. bovis sequence relatedness was 4 SNPs or more away, or outside the criteria for time and space, were not considered to have strong evidence for a local transmission event.

For all OTF-S incidents (and OTF-W incidents where an M. bovis sequence could not be extracted from the culture), WGS information was missing, and these incidents are classified into a separate category. Thus, the Local Infection Indicator generates 3 categories of incident classification:

- Local transmission event detected by WGS (the sequence meets all the criteria above, suggesting strong evidence of local transmission of infection)
- No local transmission event detected by WGS (sequence only partially meets (or not) the criteria above, suggesting weak evidence of local transmission of infection)
- No WGS data available (no sequence from the incident, so no further conclusions could be drawn)

The criteria selected have been validated against veterinary assessments, but work is ongoing to refine the approach going forwards.

3.4.2.4 Source attribution from data-driven methods

The overall risk pathway reported for an incident is derived from the Cattle Movement Algorithm, Residual Infection algorithm and the Local Infection Indicator outputs. These are combined to determine which one of the outcome classifiers an incident falls under, as shown in Figure 3.1. There is always a variable degree of uncertainty about the estimated true routes of TB infection into a herd. However, the absence of local transmission of infection and/or cattle movements associated with a high likelihood of infection does not completely negate these pathways. Nonetheless, the evidence provided by cattle movements, WGS data, herd testing

and TB history when combined, can provide valuable insights into infection risk pathways.

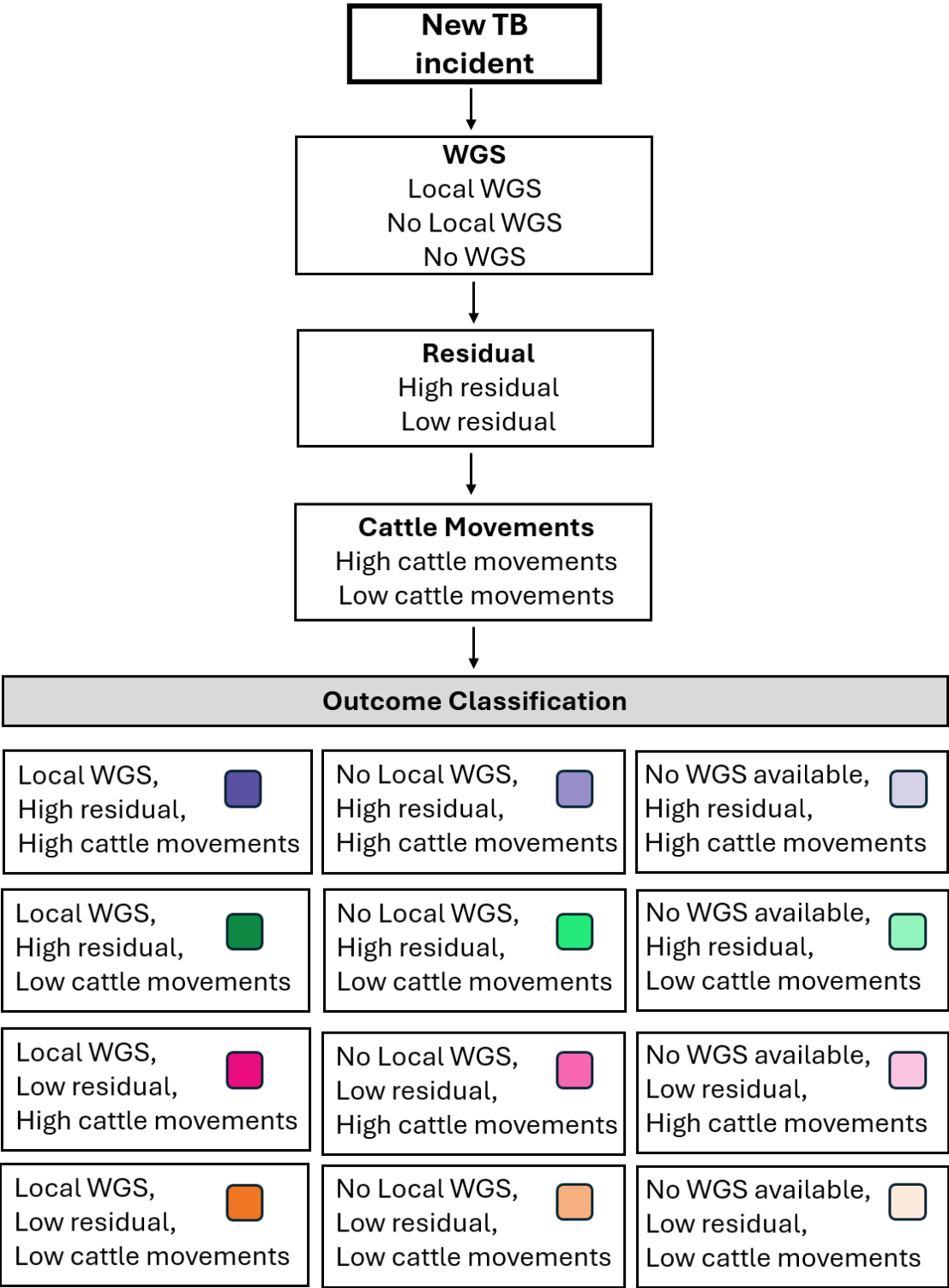


Figure 3.1: Diagram detailing the classification of new TB incidents according to the 3 data-driven algorithms (cattle movement, residual infection and WGS local transmission).

3.5.5 Other tools under development

A new Disease Report Form (DRF), for recording cattle TB incident investigations, is under development. This aims to enhance data capture and review the methodology around how we assess source attribution to improve understanding of TB transmission pathways and the evidence base for biosecurity advice as recommended in the [Bovine TB Strategy Review for England \(2018\)](#) led by Sir Charles Godfray.

As described above, the cattle movement and residual infection risk pathway assessments have been automated using data already held in APHA and Defra systems. These assessments will be available in the new DRF as benchmark assessments that vets can compare against their own conclusions. Where their conclusions differ, vets will be able to record the reasons for the difference.

Evidence-based binary decision trees are also being developed for other potential source risk pathways that rely more heavily on information collected during farm investigations. These will combine existing data with information gathered during the investigation to provide a consistent assessment of the likelihood of each risk pathway. Examples include exposure to infected wildlife and contiguous contact with neighbouring livestock.

3.6 Statistical model to estimate individual slaughterhouses' ability to detect TB in cattle processed for routine slaughter

The model was set up to explore patterns in residual variation in detection rates between slaughterhouses after accounting for different animal level risk factors. These were: sex, age, breed, days in high or low risk herds, contact with high or low risk herds, surveillance testing status, year, quarter, and risk area. Estimations of the likelihood that a slaughterhouse will detect a TB infected animal during routine slaughter according to which animals it processes, can then be carried out. These patterns can be summarised by the posterior mean odds ratio (OR). Slaughterhouses with positive posterior ORs are detecting more tuberculous carcasses at commercial slaughter of non-reactor cattle than the average expected. Slaughterhouses with negative posterior ORs are finding fewer than the average expected. However, by design it would be expected that the ORs for the different slaughterhouses to be distributed above-and-below the average. Thus, due to the large heterogeneity in throughputs, the ORs for some slaughterhouses will be better estimated than others.

The perceived reliability of this estimation is measured by the posterior variance. Those slaughterhouses with a lower variance are likely to have a more accurate estimation of the posterior mean. By considering the 95% credible interval around the posterior mean OR using the variance, the slaughterhouse's performance can be statistically estimated. If this interval includes zero, then the model does not provide sufficient evidence that the slaughterhouse is detecting any more or fewer cases than expected. If the interval is entirely below zero, then the model suggests that the slaughterhouse is detecting statistically significantly fewer cases than expected given the other factors. Equally, if the interval is entirely above zero then the model is suggesting that the slaughterhouse is detecting statistically significantly more cases than expected. The size of the interval is mainly down to the throughput of the slaughterhouse. The higher the throughput, the narrower the interval, and hence the more precisely the mean is estimated.

4.0 Policies for TB control in Great Britain

The policies and control measures summarized in this section were in place during the period of time covered by the reports (2024).

4.1 TB control in England

Bovine TB is statutorily controlled in England following [The Strategy for achieving Officially Bovine Tuberculosis Free status for England](#) (2014) and the [Bovine TB Strategy Review](#) (2025) and [2026-Recommended-Bovine-TB-Strategy.pdf](#).

The aim of the Strategy is to eradicate TB by 2038, whilst maintaining an economically sustainable cattle industry. Under the Strategy, England is divided into 3 areas reflecting the level of disease in each and controls differ accordingly (Figure 2.3). Control in all areas is based on a range of surveillance and control measures. Up to date information on current policies can be found at the [TB hub website](#).

4.1.1 Summary of control measures in the HRA

Surveillance measures are:

- slaughterhouse surveillance
- 6 monthly herd testing by default (but see earned recognition below)
- compulsory pre-movement testing

Incident management controls are:

- within herd: movement restrictions, isolation, slaughter and compensation, epidemiological investigation, tracing, additional skin tests and IFN- γ blood testing in some OTF-W incident herds.
- additional skin testing in neighbouring herds

Reduce risk of TB from badgers through:

- licensed injectable badger vaccination
- licensed badger culling

Other disease prevention measures are:

- promotion of herd biosecurity measures to increase herd resilience to TB
- promotion of risk-based trading

4.1.2 Summary of control measures in the Edge Area

Surveillance controls are:

- slaughterhouse surveillance
- Annual or 6 monthly herd testing in different parts of the Edge Area (for 6-monthly testing parts of the Edge Area see earned recognition below)
- Compulsory pre-movement testing
- Compulsory post-movement testing of cattle moved to herds in the annual testing portion of the Edge Area from other herds situated in higher risk areas of England or from Wales.

Incident management controls are:

- within herd: movement restrictions, isolation, slaughter and compensation, epidemiological investigation, tracing, additional skin tests and compulsory IFN- γ blood testing in some OTF-W incident herds.
- additional skin testing in neighbouring herds
- additional skin testing in herds within a 3km radius of a holding affected by an OTF-W incident (in annual herd testing areas only)

Reduce risk of TB from badgers through:

- licensed injectable badger vaccination
- licensed badger culling

Other disease prevention measures are:

- biosecurity measures
- risk-based trading

4.1.3 Summary of control measures in the LRA

Surveillance controls are:

- slaughterhouse surveillance
- 4-yearly testing (annual for high risk herds)
- pre-sale check tests
- compulsory post-movement testing for cattle entering the LRA (to live) from the annual or 6 monthly surveillance areas of England and from Wales

Incident management controls are:

- within herd: movement restrictions, isolation, slaughter and compensation, epidemiological investigation, tracing, additional skin tests and compulsory IFN- γ blood testing in all OTF-W incident herds
- additional skin testing in herds within a 3 km radius

Reduce risk of TB from badgers through:

- licensed injectable badger vaccination
- licensed badger culling (in exceptional circumstances)

Other disease prevention measures are:

- biosecurity measures
- risk-based trading

4.1.4 Earned Recognition Scheme

Since May 2019, cattle herds in the 6-monthly testing areas that meet certain criteria have been eligible to return to annual surveillance testing through earned recognition. These criteria are either:

- the herd has been in existence for at least 6 years and has not had a TB incident in that 6-year period
- the herd is registered to a bovine TB health scheme accredited under the Cattle Health Certification Standards (CHeCS) at level one or above

4.1.5 New TB control measures introduced in England in 2025

- The third and final phase of the field trials for a new cattle TB vaccine (CattleBCG) and allied DIVA skin test (to Detect Infected among Vaccinated Animals) commenced in September 2025, to evaluate the diagnostic specificity of the test in a broader cohort of vaccinated cattle from 8 OTF herds in the LRA of England and 3 OTF herds in the Low TB Area of Wales. Field work ended at the beginning of July 2026, and APHA is preparing its Final Study Report to support the marketing authorisation application for the DIVA skin test reagent.
- More than 4,000 badgers were vaccinated against TB in 2025 across England, a similar number to 2024 and more than a 30% increase on the numbers vaccinated in 2023. To increase the rollout of badger vaccination, work began with a range of organisations on large-scale vaccination delivery by APHA field teams, and an industry-delivered vaccination approach in East Sussex.
- From 1st September 2025, APHA began offering government-funded voluntary interferon-gamma (IFN- γ) blood testing to keepers of new TB incident herds with OTF status withdrawn (OTF-W) in the High Risk Area and 6-monthly TB surveillance part of the Edge Area of England that did not qualify for a mandatory herd blood test under the existing policy. This was an interim measure pending the staged rollout of mandatory IFN- γ testing for such herds [which started in the Edge Area from 1st July 2026].
- The Tuberculosis in Animals (England) (Amendment) Order 2025 came into force on 15 July 2025. This amendment enabled Defra and APHA to share animal-level TB risk data with cattle keepers to support more informed cattle purchasing decisions. Linked to this, a version of the interactive bovine TB mapping application [iBTB \(www.lbTB.co.uk\)](http://www.lbTB.co.uk) went live in September 2025 including new eartag search facility for animal-level data (DOB, sex, breed and date/type of last TB test) and details about current and supplier herds.

- 2025 marked the final year of widespread industry-led badger culling in England's High Risk and Edge Areas. Natural England (NE) re-authorised culling operations to resume in 11 intensive badger control areas in the High Risk and Edge Areas of England, and one Low Risk Area licence was re-authorised in Cumbria. However, all the intensive and supplementary badger culling licences ended by January 2026, in line with the current Government policy to end the badger cull by the end of this Parliament. The Low Risk Area licence was revoked in July 2026. As a result, badger culling has now ended in England.
- During 2025, a 'Strategy refresh' process to develop a new recommended approach to controlling bovine TB in England brought together farmers, vets, scientists, industry representatives and government through working groups and stakeholder engagement to review the current system and identify improvements. The work was led by the Steering Group of the bTB Partnership for England, which brought together expertise from across sectors to develop the recommended strategy. In June 2026, this co-designed bovine TB control strategy for England, developed and recommended by the Steering Group of the Bovine TB Partnership, was published on the government-industry TB Hub website [2026-Recommended-Bovine-TB-Strategy.pdf](#)

4.1.6 Previous TB control measures in England introduced before 2025

In February 2024, the use of PCR test was extended to post-mortem tissue samples taken from TB test reactor cattle, direct contacts and compulsory or privately slaughtered IRs.

From 30 August 2024, the entry window for a TB isolation unit was increased from 42 to 60 days.

From 30 September 2024, keepers of restricted herds could apply for an amended TB24c Licence to cover the movement of cattle from a TB restricted premises to an approved slaughterhouse in GB, either directly or via an approved TB slaughter gathering in England or Wales.

A new version of [iBTB](#) went live in early 2023 including an AFU finder.

The [Tuberculosis in Animals \(England\) \(Amendment\) Order 2023](#) came into force on 1 August 2023, which extended the requirement for [mandatory post-movement testing](#) of cattle moved to herds in the annual surveillance testing parts of the Edge Area from higher TB risk regions of England and from Wales. A small number of specific exemptions apply.

From the 2 October 2023, keepers of restricted herds were able to apply for a new general licence to cover the movement of cattle directly or through an orange market to an AFU or a slaughterhouse.

The [Badger Edge Vaccination Scheme \(BEVS 2\)](#), which provided funding towards the cost of vaccinating badgers in the Edge Area of England, concluded in February 2023.

Badger vaccination operations were carried out between 1 May and 30 November 2025 on 4,080 badgers across England (compared to 4110 in 2024), of which 2,418 were vaccinated by APHA.

Due to changes in the vaccine licensing process by Defra, vaccinated land is no longer routinely mapped and determined other than where vaccination is carried out by APHA. Badger vaccination operations took place in 19 counties in 2025: 10 in the HRA, 5 in the Edge Area and 4 in the LRA. More details can be found in the [Summary of badger vaccination in 2025 - GOV.UK](#).

In 2025 there were 11 areas carrying out an intensive cull, 9 areas carrying out supplementary badger culling, and 1 area in the LRA carrying out culling as part of specific enhanced control measures in a Hotspot. No new areas were issued with a badger disease control licence for badger culling under the Badger Control Programme (BCP) in 2025. More information can be found here: [Bovine TB in cattle: badger control areas monitoring data up to 2025 - GOV.UK](#).

4.1.7 Hotspot management stages

In 2025, hotspots were categorised into 5 stages depending on the surveillance and control strategies in place. For further information on Hotspots see [April 2025: TB hotspots in the Low Risk Area of England](#). Table 4.1 describes the Hotspot management stages 1 to 5, their definitions and the Hotspots within each stage as of May 2026.

Table 4.1 Hotspot management stages.

Stage	Definition	Hotspot
Stage 1: launch	APHA introduce enhanced cattle surveillance and begin stakeholder engagement in the defined area.	

Stage 2: review	After sufficient testing of cattle is completed, e.g. 2 years of 6-monthly herd testing, and thereafter annually, there is a thorough review of the available evidence, and controls are reduced or increased as justified. APHA also consider introducing wildlife surveillance.	
Stage 3: wildlife involvement	Initiate wildlife surveillance to identify if disease is present in the local wildlife and linked to cattle cases.	HS30
Stage 4: wildlife disease control	Introduce appropriate wildlife disease control based on the evidence gathered from enhanced cattle and wildlife surveillance.	HS21 HS23 HS28 HS29
Stage 5: closure	Reduce cattle controls when evidence allows, ensure effective completion of any wildlife controls introduced.	

4.2 TB control in Scotland

Scotland has been officially bovine TB (TB) free (OTF) since 2009. The Scottish Government is committed to a comprehensive, practical and proportionate programme of actions to maintain current low levels of TB and safeguard OTF status.

TB controls in Scotland are underpinned by the Tuberculosis (Scotland) Order 2023 and by the risk based routine herd testing policy introduced in 2012. These policies meant 'low risk' herds became exempt from the 4 yearly routine herd testing programme.

Further information on TB in Scotland can be found on the [Scottish Government website](#).

4.2.1 New TB control measures in Scotland introduced in 2025

There were no new TB control measures introduced in Scotland in 2025.

4.2.2 Previous TB control measures in Scotland introduced before 2025

On 18 May 2023 the new [Tuberculosis \(Scotland\) Order 2023](#) came into force.

The following policies were taken forward as part of the new Order:

- ending the practice of accepting a clear final short interval test (SIT) at the end of all TB breakdowns as a valid pre-movement test
- shortening the period during which a pre-movement test with negative results remains valid from the current 60 days to 30 days after tuberculin injection
- reducing compensation for unclean reactor cattle at slaughter by 50%
- including requirements for 'isolation' in legislation to ensure that proper isolation of reactors and IRs is undertaken
- reducing compensation for reactors or IRs which are not properly isolated

In November 2022, the new [Tuberculosis \(Scotland\) Amendment Order 2022](#) came into force, introducing a new requirement for prior permission to be obtained from Scottish Ministers before taking samples from cattle located in Scotland with the intention of applying a test for tuberculosis.

On the 12 December 2018 the [Tuberculosis \(Miscellaneous Amendments\) \(No 2\)](#)

[Order 2018](#) came into force. These new rules include changes to disease control measures and compensation arrangements.

4.3 TB control in Wales

Bovine tuberculosis (TB) is subject to statutory control in Wales and is directed by the principles set out in the Bovine TB eradication programme. TB controls are underpinned by the Tuberculosis (Wales) Order 2010. Details about TB in Wales and the surveillance and control measures associated with the eradication programme can be found on the [Welsh Government website](#).

4.3.1 New TB control measures introduced in Wales in 2025

It was announced in October 2025 that from 1st January 2026, all standard interpretation IRs in Wales that have a negative result will be restricted for the rest of their life.

This affects all standard interpretation IRs that have a negative result under standard interpretation at the re-test. They will be restricted to the holding on which they were found. The only permitted off movements for such animals are to a slaughterhouse or Approved Finishing Unit (AFU). Full details can be found here: [Bovine TB: Whole life restrictions on resolved standard interpretation Inconclusive Reactors | GOV.WALES](#)

4.3.2 Previous TB control measures introduced in Wales before 2025

In February 2024 pre-movement testing of cattle located in the low TB area of Wales (LTBA) was reintroduced.

Additional requirements were implemented for the post-movement testing of cattle moved on or after 1 February 2024 into the intermediate TB areas (ITBAs) from:

- the high TB areas of Wales
- the HRA of England (including any herds on annual surveillance testing from these areas)
- Northern Ireland

Additional legislative changes in February 2024 included:

- allowing the publication of TB information on OTF herds
- minister approval required for all samples collected
- animals could no longer be moved between TT1 and TT2 of a skin test, or after blood sampling until notified of a blood test result

In 2024, Action Plans were replaced with a letter and biosecurity guidance, but enhanced testing measures were retained.

In June 2024, all routine 6 monthly TB skin testing in AFUs and LFUs ceased. In addition, the requirement to conduct an immediate TB Check Test (CT(I&I)) after a slaughterhouse case in an Officially Tuberculosis Free (OTF) herd or an AFU or LFU ceased by default for all SLH cases reported to APHA Wales on or after 8th June 2024. In instances where the PCR test (or bacterial culture) is negative for the SLH case, movement restrictions will usually be revoked, without further testing. In instances where the PCR test (or bacterial culture) is positive for the SLH case, a SIT will be instructed at least 60 days from the SLH case leaving the farm.

From June 2024, calves under 42 days old were no longer included routinely in incident testing, and only animals traced from confirmed incidents were included in trace testing.

From 30 August 2024 the entry window for a TB isolation unit was increased from 42 to 60 days.

On 4 November 2024, following an interim process, the delayed slaughter of reactors was allowed for heavily pregnant and recently calved cows, medicine withdrawal (max 15 working days) and passport/identification reasons (max 15 working days).

One new policy was introduced in Wales in April 2023. Herds in specified higher risk areas of the Low TB Area, the Intermediate TB North Area and the Intermediate TB Area Mid had the following tests read under severe interpretation:

- tests conducted 6 months and 12 months after the conclusion of a TB incident Contiguous tests

If only IRs (and no reactors) over 6 months old are identified at these tests, then these animals are subject to an IFN- γ test.

The policy introduced in June 2021 of blood testing (IFN- γ and IDEXX antibody tests) non-homebred animals with a positive reaction to bovine tuberculin in herds that had a recent clear surveillance skin test ceased at the end of January 2023.

From January 2022, all new TB incidents in Wales were classified as OTF-W. The only exceptions to this, resulting in herds having suspended (OTF-S) status, were:

- herds had one or more suspect slaughterhouse cases with laboratory results pending, or
- herds where non-homebred animals were positive to blood (IFN- γ and IDEXX antibody tests) but had a clear skin test previously and disease has not been confirmed by post-mortem or culture

This policy also affects incident management, meaning that even the relatively low number of OTF-S incidents remaining that only had a single reactor and no high risk epidemiological reasons were now managed as OTF-W cases unless they were as a result of a slaughterhouse cases or a blood test positive result (which had additional surveillance measures in North Wales).

From January 2022, the 3-year IR rule was revoked meaning all herds, where only IRs were identified at a surveillance test remain under TB02 restrictions until the status of the IR is established.

From January 2022, DRF assessments were conducted over the telephone due to the impact of the 2021-2022 AI outbreak on APHA resources. All telephone assessments were conducted within 30 working days of the issue of a TB181 or TB2 form for breakdowns in Wales.

Approved Tuberculin Testers (ATTs) in private veterinary practices are now permitted to carry out tuberculin skin testing of cattle in Wales.

New guidance was published in December 2022 to support the changes to TB surveillance activities due to the impact of 2022 to 2023 AI outbreak on staff resources.

5.0 References

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