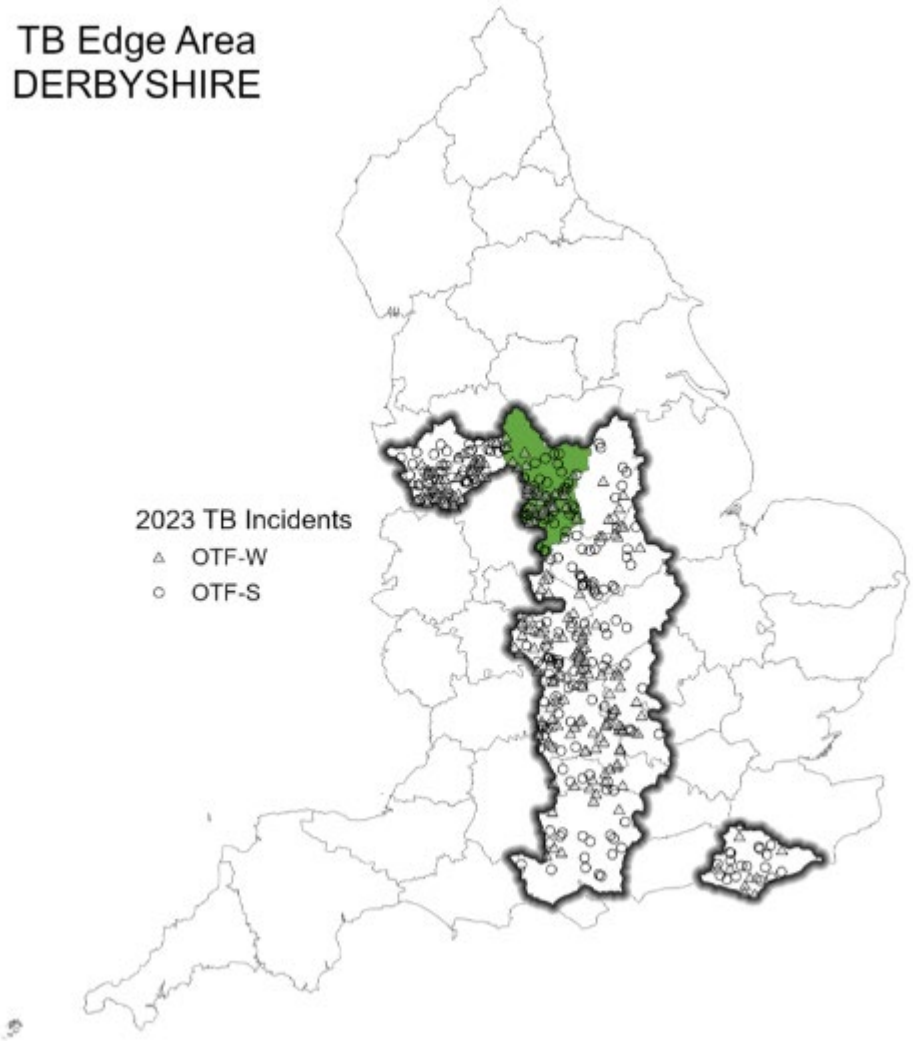
Animal &
Plant Health
Agency

Year End Descriptive Epidemiology Report: Bovine TB in the Edge Area of England 2023

County: Derbyshire



Contents

Introduction

The Edge Area was originally established in 2013, along with the Low Risk Area (LRA) and High Risk Area of England. In 2014, the 3bovine tuberculosis (TB) risk areas were incorporated into the UK government's strategy to achieve Officially TB Free (OTF) status for England by 2038. A key action was to recognise the different levels of TB in different parts of the country and to adjust the approaches to TB surveillance and control in each risk area accordingly. The current aim is to obtain OTF status for the Edge Area as soon as possible.

This report describes the frequency and geographical distribution of TB in cattle herds in Derbyshire, an Edge Area county, in 2023. It examines what factors are likely to be driving TB in this area, and the risks the disease in this county may pose to neighbouring areas.

TB in cattle and other mammals is primarily caused by the bacterium *Mycobacterium bovis* (*M. bovis*), and the disease is subsequently referred to in this report as TB. Although other sources may refer to TB 'Incidents', this report will use the term 'incidents' throughout.

This report is intended for those involved in the control of TB, both locally and nationally. This includes, but it is not limited to, cattle farmers, government and private veterinarians, policy makers and the scientific community.

Details of the data handling methodology used in this report, a glossary of terms, and the TB control measures adopted in the Edge Area, can be found in the explanatory supplement for the annual reports 2023.

Types of TB incidents

Unless otherwise specified, this report includes all new TB incidents detected during the reporting period (1 January to 31 December 2023). This includes both 'Officially Tuberculosis-Free Status Withdrawn' (OTF-W) and 'Officially Tuberculosis-Free Status Suspended' (OTF-S) incidents.

OTF-W incidents are those involving at least one skin test reactor, an animal positive to the sSingle Intradermal Comparative Cervical Tuberculin (SICCT) test, with either:

- typical lesions of TB identified at post-mortem (PM) meat inspection
- at least one animal with *M. bovis*-positive polymerase chain reaction (PCR) test (or bacteriological culture) results in tissue samples collected from carcasses during the PM inspection.

OTF-S incidents are triggered by reactors to the skin test, but without subsequent detection of TB lesions or positive PCR test (or culture) results in any of those animals.

TB incidents in Approved Finishing Units (AFUs) without grazing are not included in the prevalence and incidence calculations in this report, due to the limited epidemiological impact of these incidents.

Furthermore, the number of TB incidents and designation of those incidents as OTF-W or OTF-S may differ in this report compared to other official TB statistics. This is due to differences in the information available at the time datasets are accessed.

Cattle industry

Appendix 1 provides some cattle industry demographics for Derbyshire. Small herds of up to 50 cattle are the most common in this county, representing 48% of all cattle herds. The predominant cattle enterprises in Derbyshire are beef suckler and fattening herds (56% of herds). The total number of herds has declined slightly (2%) since 2021 Appendix 2, Table 3.

In 2023, one AFU without grazing ceased to operate, taking the total number of licensed AFUs without grazing in the county to 13. As in 2022, there was one Exempt Finishing Unit (EFU) operating in the county in 2023 Appendix 2, Table 3. In 2023, there was one livestock market in the county at Bakewell. Additionally, there was a market in Leek, Staffordshire close to the Derbyshire border.

The number of cattle markets in operation in 2023 is captured and maintained centrally by the Animal and Plant Health Agency (APHA) TB Customer Service Centre. Where possible, this data is then subject to further validation by APHA veterinarians subject to their best knowledge of the local area. Some small discrepancies may therefore exist where changes to markets were not captured in time for this report.

Derbyshire was originally divided between 2 TB risk areas: HRA in the west, mid and south, Edge Area in the north and east. The whole of Derbyshire was fully incorporated into the Edge Area in January 2018. Herds in the original HRA part of the county currently undergo routine surveillance TB testing every 6 months by default, while herds in the original Edge Area of the county are tested annually.

Herds within the 6-monthly TB surveillance testing area of Derbyshire that meet certain criteria, and thus are identified as having a lower risk of TB, can benefit from the "earned recognition scheme" where they are tested annually. In 2023, 546 (47%) herds in the 6-monthly testing area qualified for earned recognition.

New TB incidents

There were 77 new TB incidents in Derbyshire in 2023 compared to 85 in 2022. As shown in Figure 1a and 1b, this was the third consecutive year of decline and the lowest annual number of new TB incidents reported in this county over the last 10 years.

The number of OTF-W incidents reduced by one, from 30 in 2022 to 29 in 2023, continuing the downwards trend seen since 2018. The number of OTF-S incidents also decreased to 48, from 55 in 2022. The decline in incidents is encouraging and it is likely to be due to the various TB control measures and education options in place across Derbyshire.

Suckler and fattening beef herds sustained 17 OTF-W and 23 OTF-S incidents, with dairy herds accounting for 12 OTF-W and 25 OTF-S incidents, showing an even distribution across cattle enterprises.

Herds of size ranging between 101-200 animals recorded the most TB incidents (19), while herds size 351-500 animals had the lowest with 6 incidents.

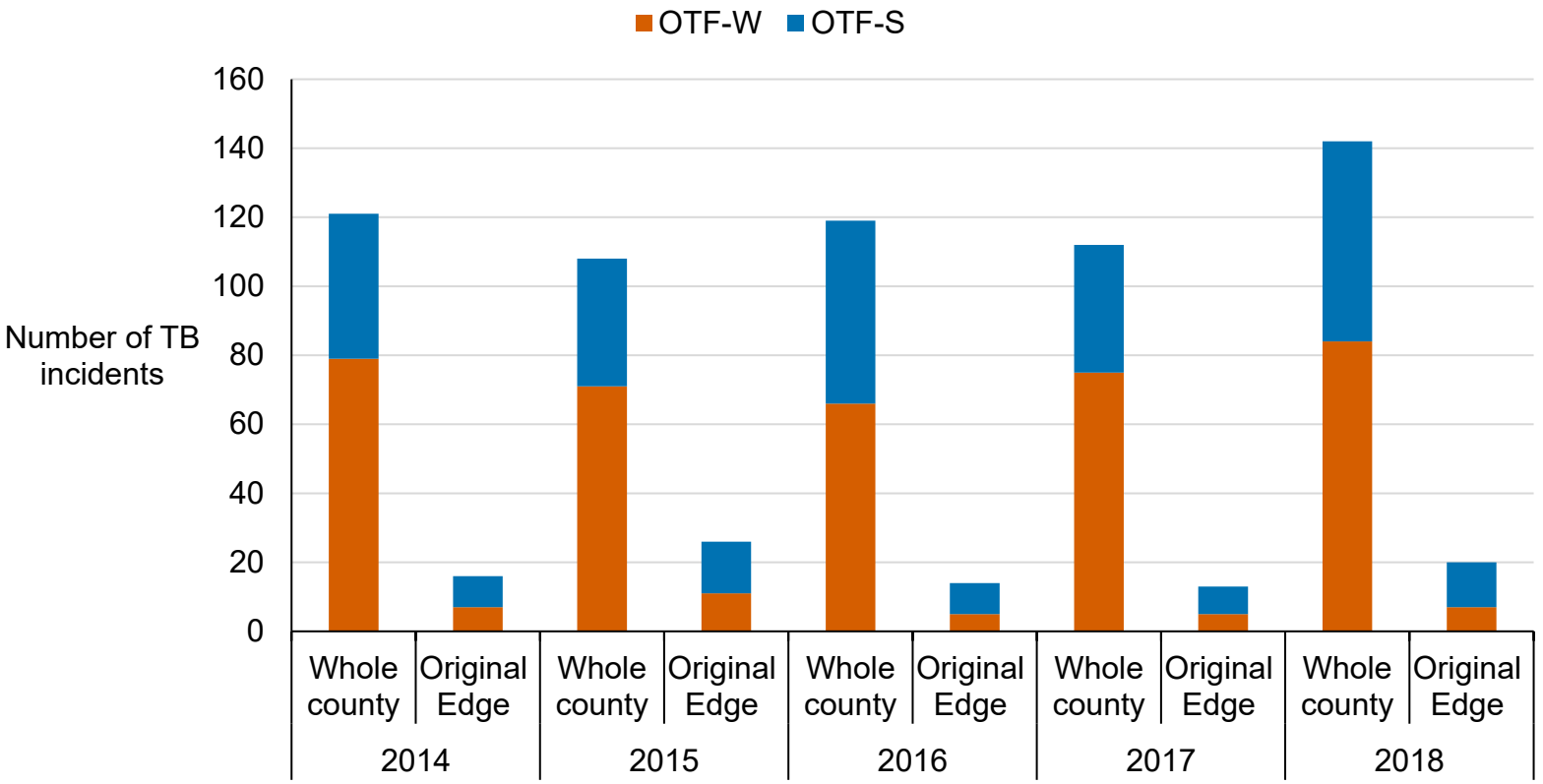


Figure 1a: Annual number of new TB incidents in Derbyshire, from 2014 to 2018.

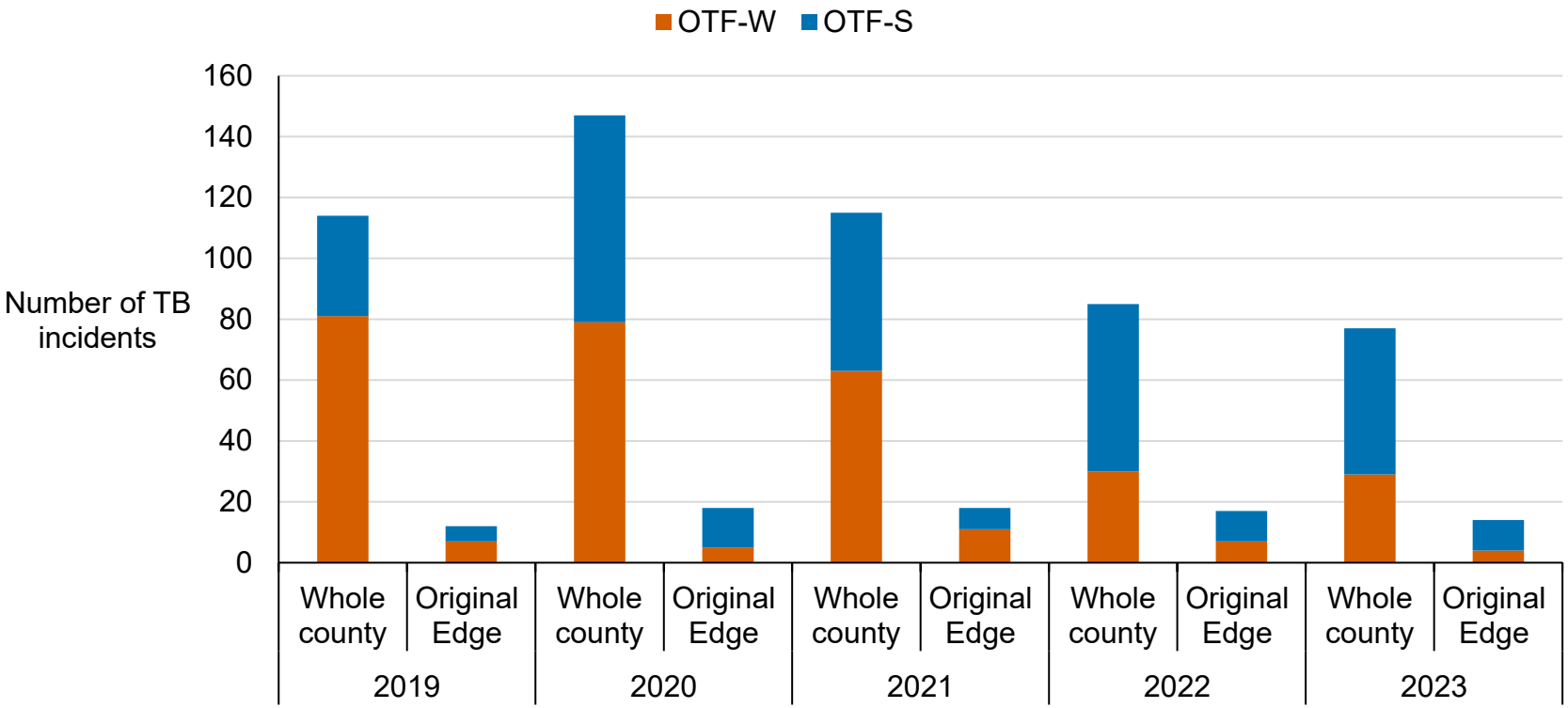


Figure 1b: Annual number of new TB incidents in Derbyshire, from 2019 to 2023.

Figure 1a and 1b description: Bar chart showing the number of confirmed TB incidents (OTF-W, in orange) and suspected (OTF-S, in blue) in the whole of Derbyshire and the original Edge part of Derbyshire (prior to the incorporation of the HRA part in 2018) between 2014 and 2023. In 2023, there were 77 TB incidents in the whole county, 29 OTF-W and 48 OTF-S. Out of those 77, 4 OTF-W and 10 OTF-S were in the original Edge Area of Derbyshire.

Disclosing test types

As in previous years, whole-herd (6-monthly or annual routine surveillance) testing continued to detect the most incidents of TB in Derbyshire (55), followed by 6-month post-incident testing (12) as shown in Figure 2. Slaughterhouse cases resulted in the disclosure of 7 OTF-W incidents, pre-movement tests detected 2 incidents and one incident was detected by radial surveillance in 2023. This highlights the ongoing importance of compliance with both active (routine testing) and passive (examination of suspect infection with *M. bovis*, either clinically or at post-mortem) veterinary surveillance.

There were no incidents detected by radial testing in the annual TB testing area of Derbyshire for the whole of 2023, due to emergency measures issued in December 2022 following the highly pathogenic avian influenza outbreak in 2022 to 2023. During that period all radial testing was temporarily replaced with check testing of herds immediately contiguous to a holding affected by an OTF-W incident.

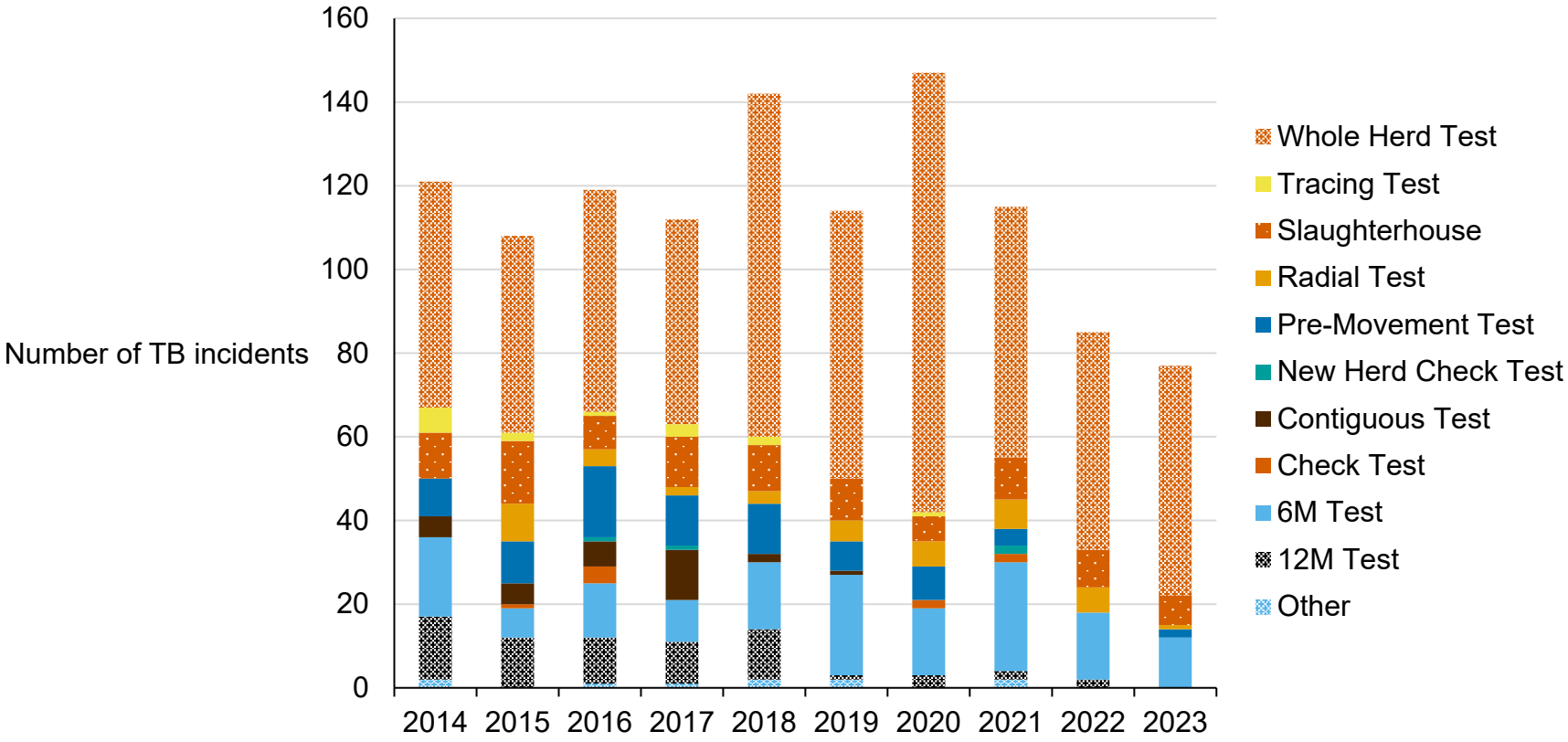


Figure 2: Number of new TB incidents (OTF-W and OTF-S) in Derbyshire in 2023, according to the surveillance methods that detected them.

Figure 2 description: A bar chart showing the number of new TB incidents disclosed by test type in Derbyshire between 2014 and 2023. In 2023, most incidents were disclosed by whole herd tests (55), followed by a 6 month post-incident test (12), slaughterhousecases (7), pre-movement tests (2) and radial tests (1) .

Duration of TB incidents

A total of 81 TB incidents were resolved in Derbyshire during 2023. Of these, 39 had started in 2023, 35 started in 2022, 5 were from 2021, one started in 2020, and one started in 2018.

The median duration for OTF-W incidents that ended in 2023 was 217 days, interquartile range (IQR) 171 to 354. Most OTF-W incidents were resolved within 240 days (19 out of 31).

The median duration for OTF-S incidents that ended in 2023 was 177.5 days (IQR 151 to 231). Most OTF-S incidents that ended in 2023 (39 out of 50) were resolved within 240 days, with 11 taking between 241 and 550 days to resolve.

Four incidents that had lasted more than 550 days ended in 2023 (3 OTF-W, one OTF-S).

The median duration for all incidents that ended in 2023 in Derbyshire was 195 days (IQR 158 to 250). This was longer than the median duration of 180.5 days (IQR 158 to 238) for incidents that ended in 2022. For the whole Edge Area, the median duration of TB incidents that ended in 2023 was 188 days (IQR 159 to 265).

There were 42 TB incidents still open at the end of the reporting year on 31 December 2023. This included 3 OTF-W and one OTF-S incidents which were considered persistent (more than 550 days under restrictions).

Unusual TB incidents

An explosive OTF-W incident occurred in a medium-sized dairy herd. This farm business had a separately managed beef herd in which no reactors were found. In the dairy herd there were increasing numbers of reactors at each short interval skin test, alongside a high percentage of visibly lesioned animals. Nearly 90% of the herd were removed as reactors through testing, leading to a Defra-funded depopulation of the dairy herd in the middle of 2023 and conclusion of the breakdown.

TB in other species

There is no statutory routine TB surveillance of non-bovine species, apart from Post-Mortem Examination (PME) of animals slaughtered for human consumption. Targeted TB testing takes place in non-bovine herds under TB movement restrictions due to laboratory-confirmed incidents of *M. bovis* infection, and in specific herds of camelids, goats and captive deer at an elevated risk of infection.

There were no reports of TB incidents in Derbyshire occurring in non-bovine species during 2023.

Incidence of TB

Figure 3 provides the annual incidence rate of all incidents (OTF-W and OTF-S) detected over the last 10 years in Derbyshire. TB incidence per 100 herd-years at risk decreased in the whole county in 2023, from 6.5 in 2022 to 5.9 in 2023, the lowest incidence rate recorded in the past 10 years and the sixth lowest of the 11 counties of the Edge Area. This was below the overall rate for the Edge Area (7.2) and the third consecutive year in which the incidence rate decreased in Derbyshire, potentially indicating the beginning of a continuing downward trend.

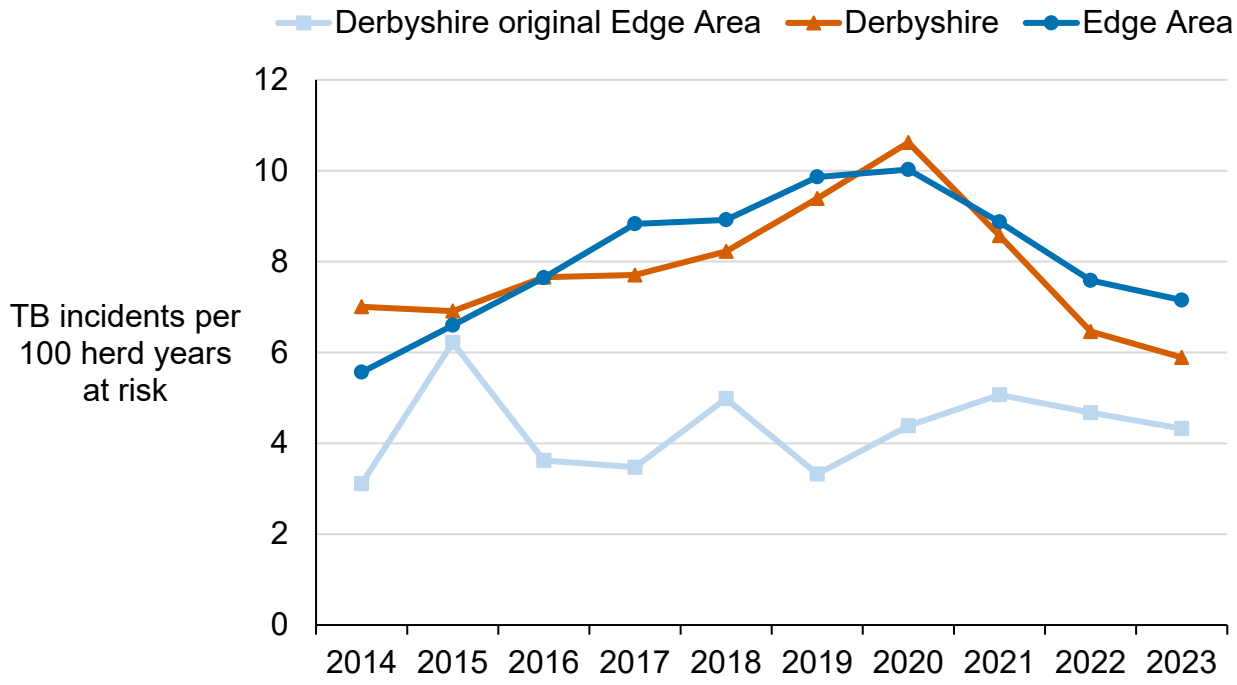


Figure 3: Annual incidence rate (per 100 herd-years at risk) for all new incidents (OTF-W and OTF-S) in Derbyshire, from 2014 to 2023.

Figure 3 description: Line chart showing the incidence rate of new TB incidents per 100 herd years at risk (100 HYR) in Derbyshire, the original Edge Area of Derbyshire, and the overall Edge Area between 2014 and 2023. Incidence in Derbyshire has been declining consistently since 2020 and in 2023 was the lowest level seen in the last 10 years. The incidence in the original Edge Area of Derbyshire declined since 2021. In 2023, the incidence rate in Derbyshire overall was 5.9 new incidents per 100 HYR, and 4.3 new incidents per 100HYR in the original Edge Area of Cheshire. In the Edge overall, incidence in 2023 was 7.2 new incidents per 100 HYR.

Prevalence of TB

Figure 4 shows the herd prevalence of TB in Derbyshire at the end of the year. Prevalence in Derbyshire rose to a peak in 2020 (5.9%) but has since been falling. This continued in 2023, where the end-of-year prevalence declined from 2.8 in 2022 to 2.6 in 2023, the lowest recorded in the last 10 years. This may be due to a combination of factors such as:

- increased awareness of herd biosecurity
- increased knowledge of TB and risk pathways through visits by private veterinary surgeons, APHA and the TB Advisory Service
- more sensitive testing of herds affected by TB incidents
- compliance with TB control measures with prompt removal of infected cattle
- reduced infection pressure from the wildlife reservoir, through licensed badger culling and vaccination

However, the pattern change is most likely due to the reduction in OTF-W incidents seen since 2018, which normally have a longer duration.

Derbyshire had the fourth lowest end of year prevalence out of the 11 counties in the Edge Area. This was lower than the overall rate for the whole of the Edge Area in 2023 (3.7%).

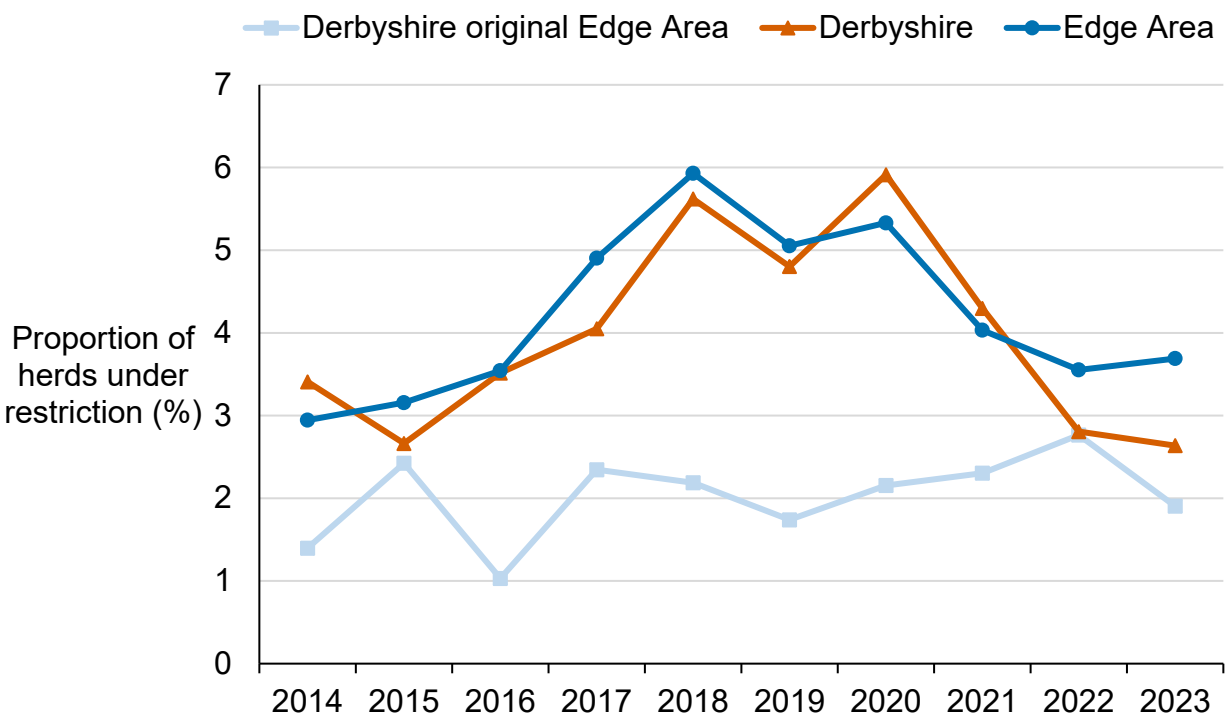


Figure 4: Annual end of year prevalence in Derbyshire, from 2014 to 2023.

Figure 4 description: Line chart showing the annual end of year prevalence in Derbyshire county overall, in the original Edge area of the Derbyshire county, and within the overall Edge Area, between 2014 and 2023. Annual end of year prevalence has been decreasing consistently since 2018 in Derbyshire overall. In the Edge part of Derbyshire, the

prevalence increased steadily between 2019 and 2022, then decreased in 2023. In 2023, the end of year prevalence for Derbyshire was 2.6% of herds placed under TB restrictions in the county; this was the lowest level seen in the last decade. In the original Edge part of Derbyshire, prevalence was 1.0% of herds placed under TB restrictions. Prevalence in the Edge Area overall in 2023 was 3.7% of herds.

Recurring TB incidents

Three-year recurrence

In Derbyshire 34 (44%) new TB incidents in 2023 occurred in herds that had experienced another TB incident in the previous 3 years, as shown in Figure 5. There was a higher percentage of OTF-W TB incidents occurring in herds with another TB incident in the previous 3 years compared to OTF-S incidents (48% and 42% respectively).

There was a slightly lower percentage of recurring TB incidents in the county than for the whole of the Edge Area (54%), with Derbyshire ranking the fourth lowest in the Edge Area counties. However, recurrent infections continue to be a problem in Derbyshire herds.

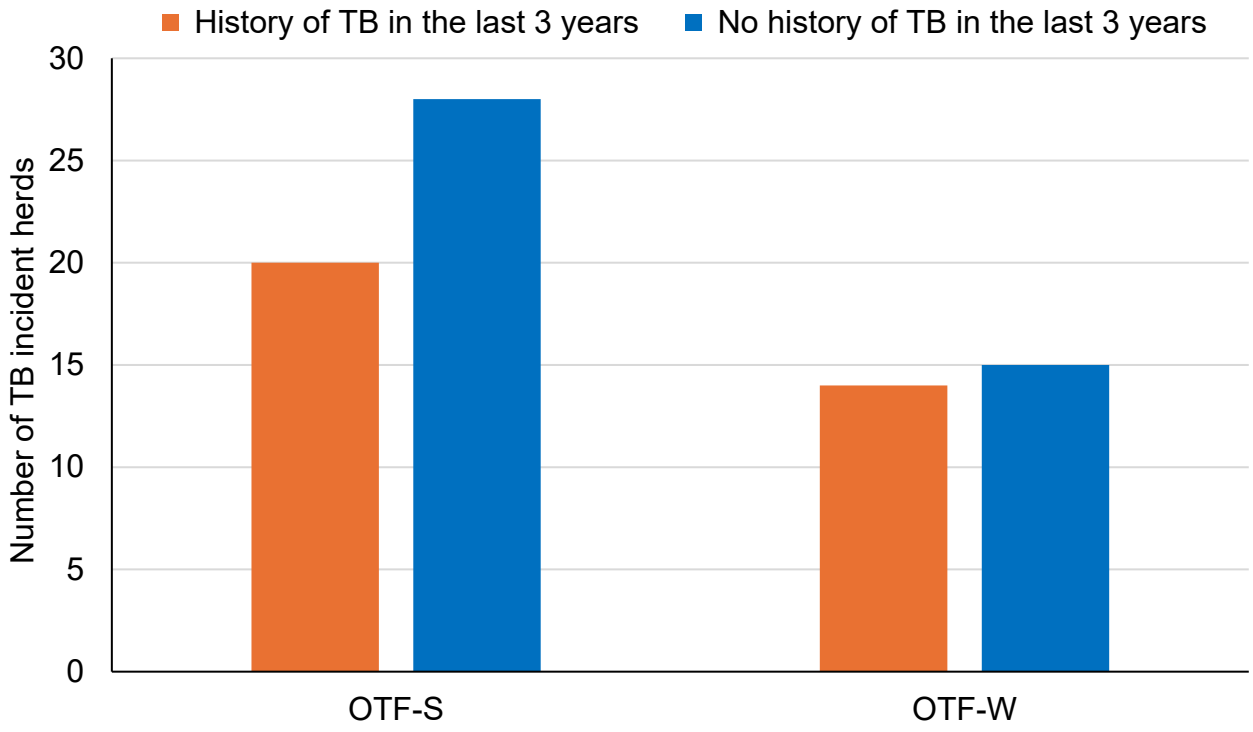


Figure 5: Number of herds with a TB incident (by OTF-W and OTF-S) in Derbyshire in 2023, with and without a history of any TB incident in the previous3 years.

Figure 5 description: Bar chart showing the number of herds with (in orange) and without (in blue) a history of a TB incident in the last 3 years in 2023, for OTF-S and OTF-W herds. A description of the data is provided in the text.

Overall recurrence

As shown in Figure 6, in 2023 82% of incidents reported across the county occurred in herds with a history of a TB incident in the herd's lifetime (42 out of 48 OTFS and 21 out of 29 OTFW).

This overall percentage of TB incident recurrence in Derbyshire was stable compared to 2022 (83%, 45 out of 54 OTF-S and 25 out of 30 OTF-W).

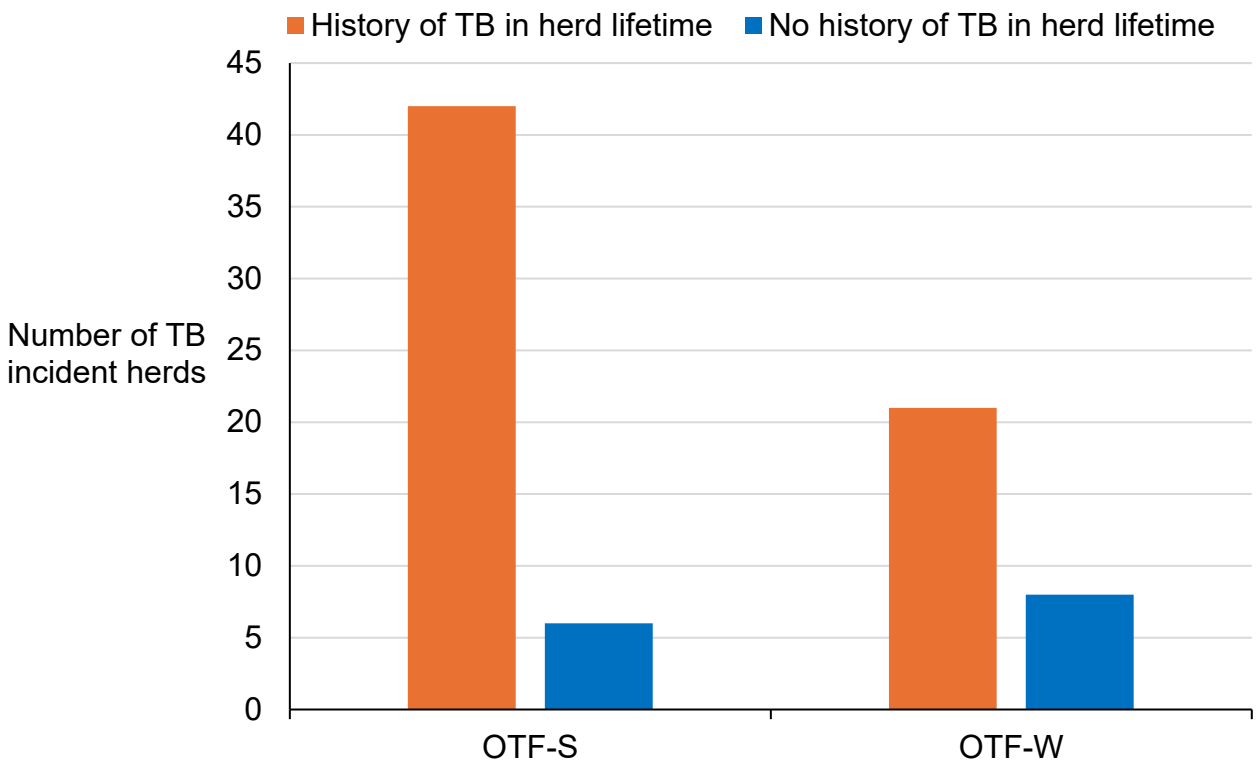


Figure 6: Number of herds with a TB incident (by OTF-W and OTF-S) in Derbyshire in 2023, with and without a history of any TB incident during the herd's lifetime.

Figure 6 description: Bar chart showing the number of herds with (in orange) and without (in blue) a history of a TB incident in the herd's lifetime in 2023, for OTF-S and OTF-W herds. A description of the data is provided in the text.

Geographical distribution of TB incidents

As in previous years, new TB incidents in Derbyshire in 2023 were concentrated in the original HRA portion in the south and west of the county adjoining Staffordshire (HRA) and Cheshire (Edge Area). This also mirrored the higher density of cattle holdings, as shown in Figure 7.

As mentioned above, the incident rate in Derbyshire for 2023 was 5.9 incidents per 100 herd years at risk (sixth lowest in Edge Area), in spite of being surrounded by HRA and Edge Area counties with much higher incidence rates, such as Staffordshire (9.8) and Cheshire (9.3).

An area of concern surrounding Bakewell in the north of the county, which was identified in 2021 due to multiple OTF-W incidents, continued to record a decrease in the number of incidents in 2023.

In comparison to 2022, there appears to be an increase in the number of OTF-W incidents located North of Ashbourne on the Staffordshire border and the north-west of Derby. The geographical distribution of OTF-S incidents has remained relatively similar in 2023.

All TB incidents that could be whole genome sequenced in 2023 were caused by Whole Genome Sequencing (WGS) clade B3-11 of *M. bovis,* which includes isolates of spoligotype 25 such as genotype 25: and has a homerange spanning much of Cheshire, Staffordshire and West Derbyshire, as well as north-east Shropshire and North Leicestershire). Most isolates of this clade in 2023 in Derbyshire were associated with a low or medium cattle movement risk in Figure 7.

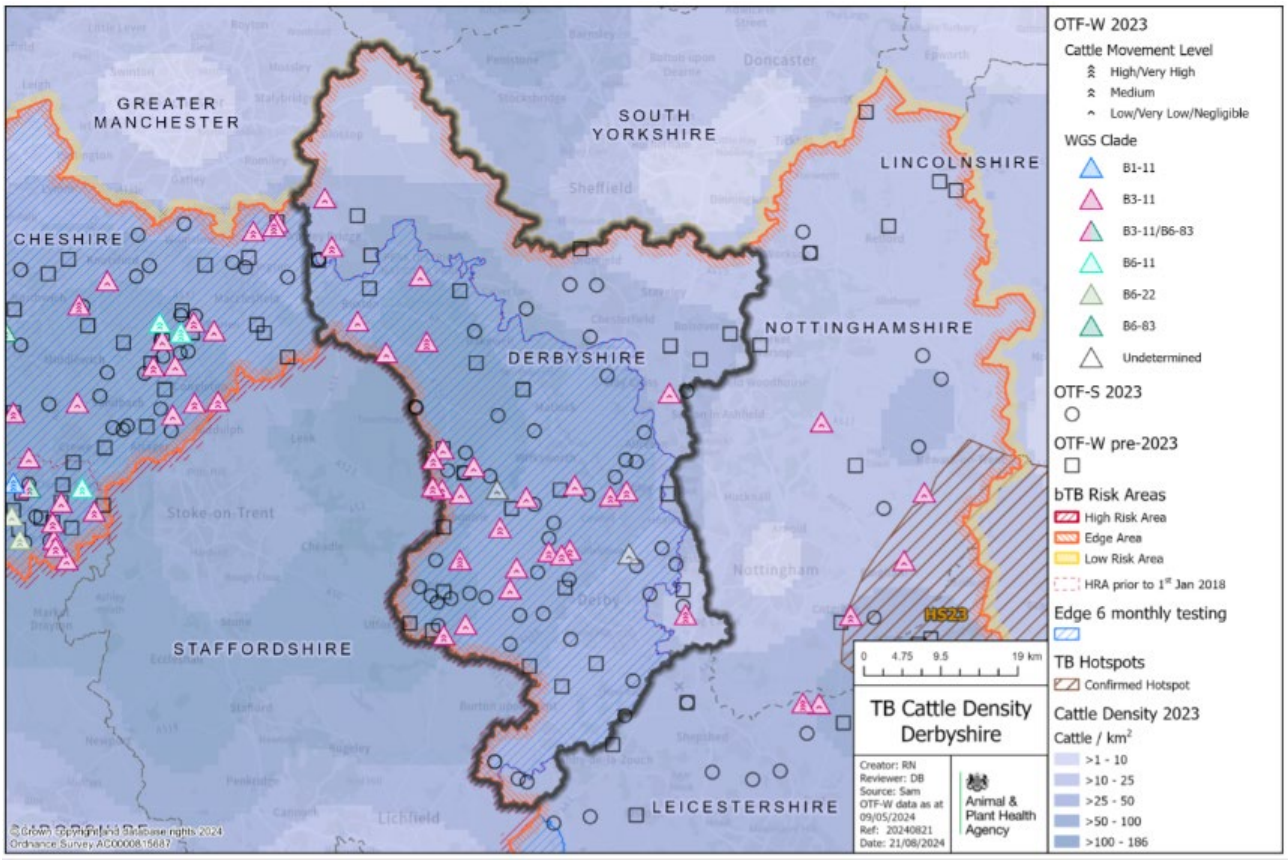


Figure 7: Location of cattle holdings in Derbyshire with new TB incidents (OTF-W and OTF-S) in 2023 and cattle holdings with pre-2023 OTF-W incidents still ongoing at the beginning of 2023, overlaid on a cattle density map. The movement score for each farm is

symbolised with 3 chevrons for cattle movements associated with a high likelihood of infection, 2 chevrons for a medium likelihood and one chevron for a low likelihood.

Figure 7 description: Map of Derbyshire showing the locations of cattle holdings with new TB incidents (OTF-S and OTF-W) in 2023 and pre-2023 OTF-W incidents that continued into 2023. The 2023 OTF-W incidents are shown as triangles, 2023 OTF-S as circles and pre-2023 OTF-W as squares. The 2023 OTF-W incidents are also coloured by WGS clade and contain chevrons to show the cattle movement algorithm score allocated to the incident (low/medium/high risk of cattle movements). Most incidents occurred in the south and west of the county in the original HRA portion – further detail provided in the text.

Skin test reactors and interferon gamma test positive animals removed

Appendix 2 provides of the headline cattle TB statistics in Derbyshire. A total of 499 cattle were removed from TB incidents during 2023, of which 397 were detected by the tuberculin skin test and 102 through the interferon gamma (IFN-γ) blood test, as shown in Figure 8. This was an increase of 91 cattle since 2022, both in the number of skin test reactors (from 341 to 397) and IFN-γ test positive animals (from 67 to 102). There was an increase in the number of test positive animals removed per incident, from 4.8 to 6.5 reactors detected per incident in 2022 and 2023, respectively.

The total number of test positive animals removed from herds in 2023 was still far below the peak of 1,290 animals in 2019. This was likely a reflection of:

- reductions in TB incidence and prevalence since 2020
- the change in IFN-γ testing policy introduced in the 6-monthly TB surveillance section of the Edge Area in July 2021, where only recurrent and persistent OTF-W incidents are automatically eligible for mandatory sampling. This includes herds that have had a new OTF-W incident within 18 months of a previous OTF-W incident

APHA and its Veterinary Delivery Partners continued to quality assure the delivery of tuberculin skin testing by official veterinarians to maximise detection of infected cattle.

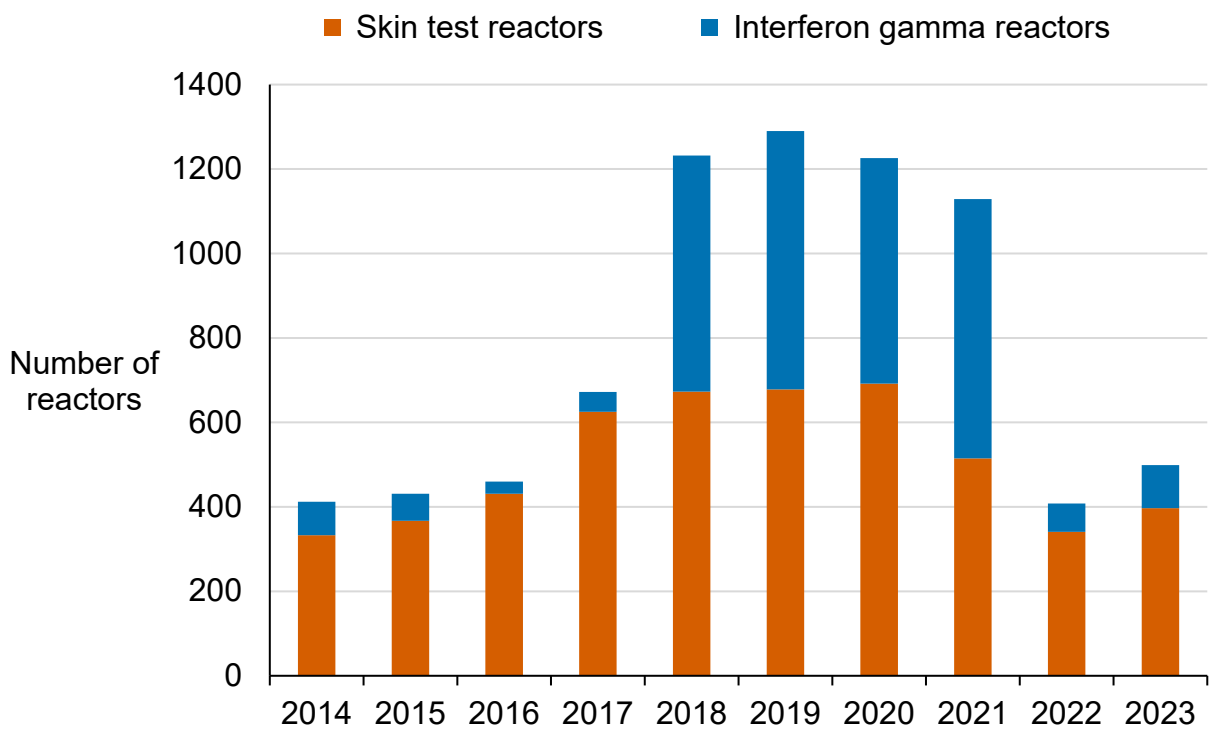


Figure 8: Number of skin test reactors (SICCT) and interferon gamma (IFN-γ) test positive cattle removed by APHA for TB control reasons in Derbyshire, from 2014 to 2023.

Figure 8 description: Bar chart showing the number of skin test reactors and interferon gamma test reactors removed for TB control reasons in Derbyshire between 2014 and 2023. In 2023, 397 skin test reactor cattle and 102 interferon gamma reactors were removed in Derbyshire, the lowest number in the last 10 years.

Main risk pathways and key drivers for TB infection

It is important to try to understand the risk pathways and key drivers that are likely to have introduced TB infection into a herd. This information can help identify biosecurity measures that may reduce the TB risk for individual businesses.

Implementing practical measures can help to reduce the risk of TB incursion into a herd that is TB free (biosecurity), as well slowing disease spread within a herd where TB is present (biocontainment).

Furthermore, the ibTB online mapping tool can be used to inform purchasing choices, reducing the risk of introducing undetected infection when moving cattle into a herd.

In 2023, 14 out of 77 (18%) new TB incidents in Derbyshire received a preliminary or final APHA veterinary investigation to identify the source of infection. The findings from those investigations are reported in Appendix 3. The small number of investigations carried out in 2023 was mainly due to the diversion of field resource to the bluetongue outbreak which

affected the south-east of England and East Anglia between November 2023 and March 2024.

New data-driven methods to quantify the likelihood of risk pathways for TB infected herds have been developed by APHA. These include the:

- cattle movement algorithm
- WGS local transmission of infection indicator

The cattle movement algorithm uses cattle movement data to identify individual animals that were moved into a TB incident herd as having a negligible, very low, low, medium, high or very high likelihood of being the source of the TB infection. At the herd level, the cattle movement score is dictated by the animal with the highest ranked movement into that herd. Herds are classified as having either:

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

The WGS local transmission of infection indicator uses WGS data from cattle *M. bovis* isolates to identify TB incidents that are linked by genetics, time and space. A TB incident where at least one other TB incident is identified that satisfies all the following 3 criteria is considered to have evidence of a local indicator of infection:

- it had a WGS with no more than 3 single nucleotide polymorphism (SNP) differences relative to the TB incident of interest
- it occurred within 4 years before or 6 months after the start date of the incident of interest
- it was within a 9km radius of the incident of interest

Further details about the methodology used can be found in the explanatory supplement to the annual reports 2023.

There is always a degree of uncertainty about the estimated true routes of TB infection into a herd. The absence of a local transmission event, or cattle movements associated with a high likelihood of infection does not completely negate these pathways. Nonetheless, the evidence provided by the cattle movement and WGS data, when combined, can provide valuable insights into the possible risk pathways. Figure 8 provides the percentage of herds where each risk pathway combination was identified. The spatial distribution of these categories are presented in Figure 9. Each category is described in greater detail in the following text.

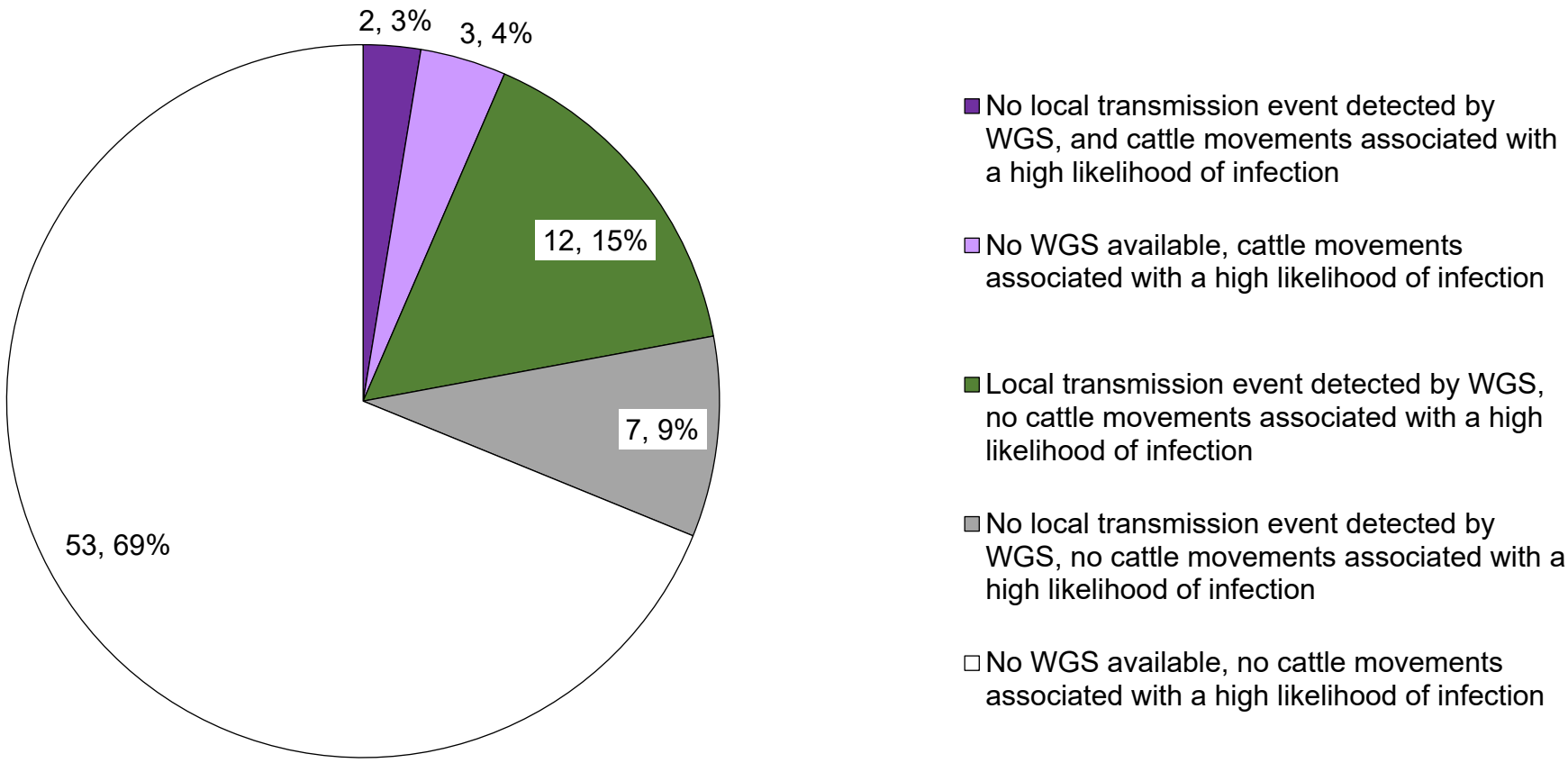


Figure 9: Risk pathway combinations identified by the WGS local transmission of infection indicator and cattle movement algorithm for all 77 new TB incidents starting in Derbyshire in 2023.

Figure 9 description: Pie chart showing the risk pathway combinations identified by the WGS local reservoir indicator and cattle movement algorithm for all 100 new TB incidents in Derbyshire in 2023. Most (53, 69%) did not have any WGS and no cattle movements were identified with a high likelihood of infection. Further description provided in the text.

WGS data was available for 21 (27%) of all new TB incidents in Derbyshire. The WGS local transmission of infection indicator identified a local transmission event for 12 (15%) of new TB incidents in 2023, all without evidence of cattle movements associated with a high likelihood of TB infection. These are the dark green symbols in Figure 10. For these incidents, a broad spectrum of local pathways cannot be ruled out, including:

- residual infection in the herd
- contiguous contact with infected cattle
- direct or indirect contact with potentially infected wildlife
- location close to HRA Staffordshire.

In Derbyshire, 2 TB incidents (3%) had cattle movements associated with a high or very high likelihood of TB infection, and no evidence of a local transmission event where WGS was available. For those herds it was considered more likely than not that cattle movements played a part in the introduction of infection (dark purple symbols, Figure 10).

A further 3 TB incidents (4%) had cattle movements associated with a high likelihood of TB infection, but WGS data was not available to look for a local transmission event. These are depicted in light purple in Figure 10 due to the lack of genetic evidence.

For 7 TB incidents (9%) the WGS local transmission of infection indicator did not find evidence of a local transmission event and there was no evidence of cattle movements associated with a high likelihood of TB infection. The source of infection is unclear for these incidents (grey symbols, Figure 10).

There was no evidence of cattle movements associated with a high likelihood of TB infection and no WGS available to explore the presence of a local transmission event for 53 of the 77 (69%) TB incidents. It can be difficult to differentiate between residual cattle infection in the herd, suspected local wildlife infection or local cattle movements. These are shown as white dots in Figure 10, as there is insufficient evidence to determine a likely infection pathway.

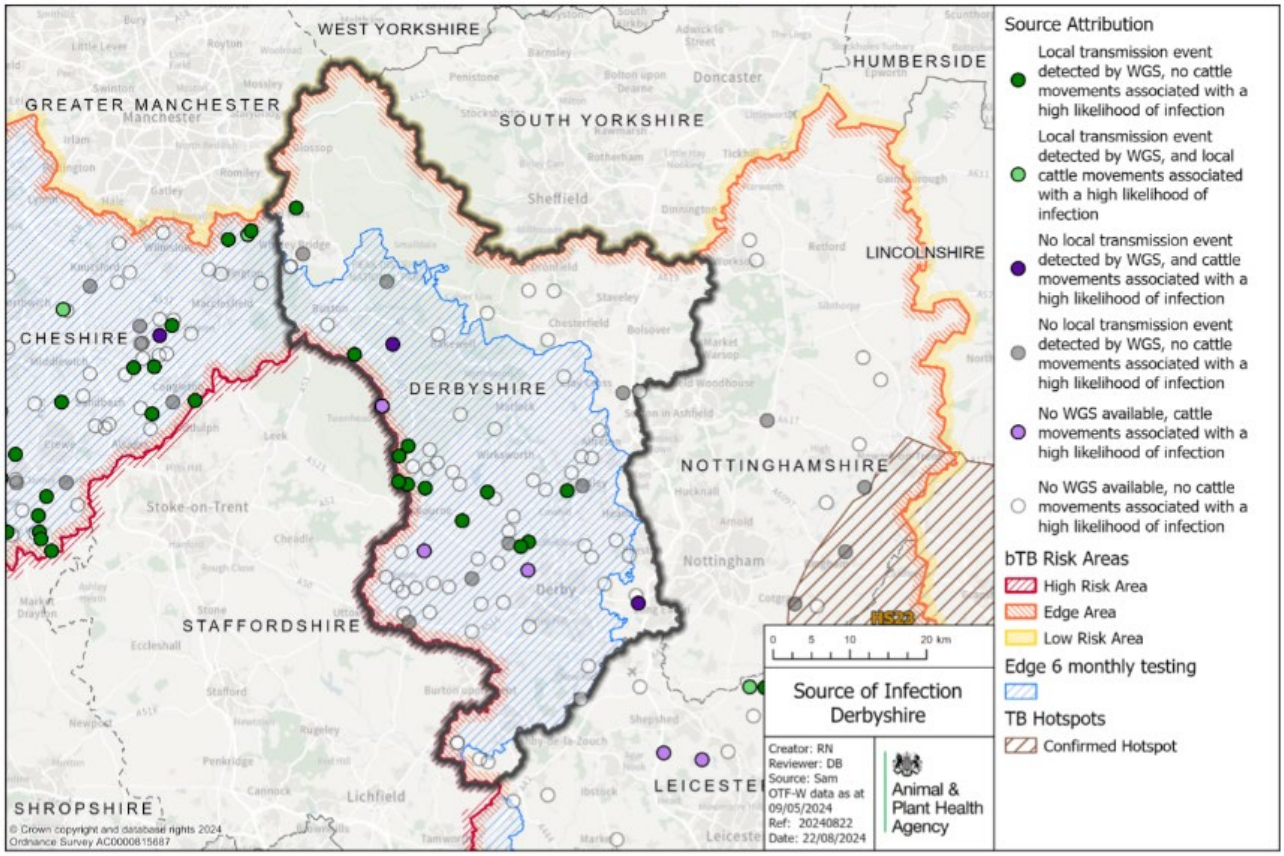


Figure 10: Map of the available evidence for risk pathways of TB infection into the herd, for all TB incidents (OTF-W and OTF-S) in Derbyshire that started in 2023.

Figure 10 description: Map of the Derbyshire showing the locations of the 77 new TB incidents detected in 2023, coloured by the risk pathway identified for the incident. Dark green are herds with a local transmission event was identified from WGS and no cattle movements with a high likelihood of infection were identified in the herd. Light green represents incidents where local transmission event was identified from WGS and cattle movements with a high likelihood of infection were identified in the herd. Dark purple represents incidents where no local transmission event was identified from WGS and there were cattle movements identified with a high likelihood of infection in the herd. Light purple represents incidents with no WGS available and where there were cattle movements identified with a high likelihood of infection in the herd. Grey shows incidents where no local transmission event was identified from WGS and there were no cattle movements with a high likelihood of infection were identified in the herd either. White shows incidents with no WGS available and where there were no cattle movements with a high likelihood of infection were identified in the herd either. A breakdown of the incidents by group is provided in the text.

Genotyping was replaced with WGS of *M. bovis* isolates at APHA in 2021. All OTF-W incidents with a confirmed WGS clade in Derbyshire in 2023 were caused by infection with clade B3-11 of *M. bovis* Figure 11. As seen in previous years, this continues to be

concentrated in the, former HRA portion (south/central west) of the county, along the border with the HRA county of Staffordshire. The single isolation of WGS clade B6-11 south of Derby, along the border with Leicestershire, in 2021 has not recurred since.

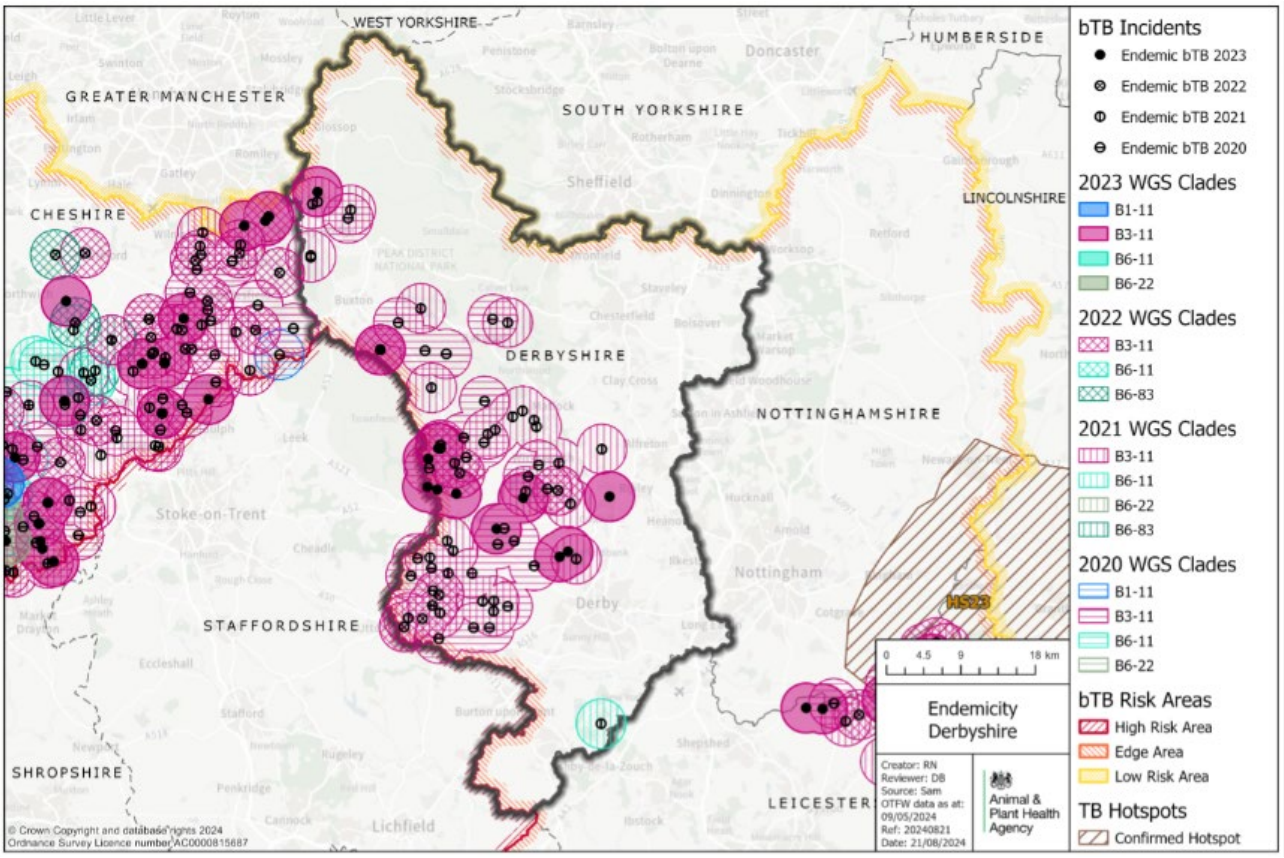


Figure 11: WGS clades of *M. bovis* detected in Derbyshire between 2020 and 2023, where the WGS identified in the infected herd was within 3 SNPs of another TB incident in the past 4 years and 9km (OTF-W incidents only).

Figure 11 description: Map of Derbyshire showing the WGS clades of *M. bovis* detected in Derbyshire between 2020 and 2023, where the WGS identified in the infected herd was within 3 SNPs of another OTF-W incident in the past 4 years and within 9km of it. Clades are shown as circles on the map with each clade represented by a different colour. The year from which the clade was identified is shown by either having the colour be solid (2023) or different types of hash (2022 to 2020). All incidents show in the southern and western parts of Derbyshire. Further detail is provided in the text.

Forward look

The '2014 Strategy for achieving Official Bovine Tuberculosis Free Status for England', set out a target to reduce herd prevalence to below 1% overall in the Edge Area by 2025. Prevalence in Derbyshire at the end of the reporting year was 2.6%.

Based on current information, achieving OTF status is not conceivable for Derbyshire by 2025. Residual infection continues to be a problem in Derbyshire. The reasons for this are unclear, may be multi-factorial, and is likely to include herd type, wildlife populations, farming practices and proximity to the HRA county of Staffordshire. Practical measures that would help address the main risk pathways for TB infection in Derbyshire include:

- incentivising the uptake of effective farm biosecurity measures
- increasing awareness of the imperfect sensitivity of the TB skin test. Approximately 1 in 5 TB-infected cattle are not identified by a single round of testing - a pre-movement TB skin test with negative results does not guarantee freedom from infection. Therefore, statutory TB movement testing should be used in combination with other methods when screening cattle to purchase, such as assessing the frequency of TB herd incidents in the area of origin of the incoming cattle through the ibTB online mapping tool
- encouraging informed cattle trading
- expanding the mandatory deployment of the supplementary interferon gamma blood test in new TB incident herds occurring in the 6-monthly surveillance (former HRA) portion of the county, to help bring down the risk of residual cattle infection.
- continuation and further adoption of disease control measures to prevent the spread of TB between cattle and wildlife, including biosecurity, badger culling or vaccination, and local control of the wild deer population, where appropriate
- increased awareness of TB in deer and encouragement to report suspect lesions in culled deer

Appendix 1: cattle industry demographics

Table 1: Number of cattle herds by size category in Derbyshire as of 31 December 2023 (RADAR data on number of holdings in the report year)

Size of herds	Number of herds in Derbyshire
Undetermined	12
1 to 50	677
51 to 100	256
101 to 200	227
201 to 350	139
351 to 500	66
Greater than 500	48
Total number of herds	1,425
Mean herd size	115
Median herd size	55

Table 2: Number (and percentage of total) of animals by breed purpose in Derbyshire as of 31 December 2023 (Sam data showing the number of herds flagged as active at the end of the report year)

Breed purpose	Number (and percentage of total) cattle in Derbyshire
Beef	91,917 (56%)
Dairy	65,591 (40%)
Dual purpose	6,454 (3%)
Unknown	4 (0.002%)
Total	163,966

Appendix 2: summary of headline cattle TB statistics

Table 3: Herd-level summary statistics for TB in cattle in Derbyshire between 2021 and 2023

Herd-level statistics	2021	2022	2023
(a) Total number of cattle herds live on Sam at the end of the reporting period	1,642	1,653	1,606
(b) Total number of whole herd skin tests carried out at any time in the period	2,263	2,130	2,013
(c) Total number of OTF cattle herds having TB whole herd tests during the period for any reason	1,429	1,400	1,378
(d) Total number of OTF cattle herds at the end of the report period (herds not under any type of TB movement restrictions)	1,508	1,545	1,518
(e) Total number of cattle herds that were not under restrictions due to an ongoing TB incident at the end of the report period	1,569	1,603	1,560
(f.1) Total number of new OTF-S TB incidents detected in cattle herds during the report period	52	55	48
(f.2) Total number of new OTF-W TB incidents detected in cattle herds during the report period	63	30	29
(g.1) Of the new OTF-W herd incidents, how many can be considered the result of movement, purchase or contact from or with an existing incident based on current evidence?	4	5	2
(g.2) Of the new OTF-W herd incidents, how many were triggered by skin test Reactors or twice-inconclusive reactors (2xIRs) at routine herd tests?	32	12	18

Herd-level statistics	2021	2022	2023
(g.3) Of the new OTF-W herd incidents, how many were triggered by skin test reactors or 2xIRs at other TB test types (such as forward and back-tracings, contiguous or check tests)?	31	18	11
(g.4) Of the new OTF-W herd incidents, how many were first detected through routine slaughterhouse TB surveillance?	9	9	7
(h.1) Number of new OTF-W incidents revealed by enhanced TB surveillance (radial testing) conducted around those OTF-W herds	0	0	0
(h.2) Number of new OTF-S incidents revealed by enhanced TB surveillance (radial testing) conducted around those OTF-W herds	0	0	0
(i) Number of OTF-W herds still open at the end of the period (including any ongoing OTF-W incidents that began in a previous reporting period)	40	22	20
(j) New confirmed (*M. bovis* PCR- or culture-positive) incidents in non-bovine species detected during the report period (indicate host species involved)	0	0	0
(k.1) Number of approved finishing units with grazing that were active at end of the period	0	0	0
(k.2) Number of approved finishing units without grazing active at end of the period	13	14	13
(k.3) Number of grazing exempt finishing units active at end of the period	1	1	1
(k.4) Number of non-grazing exempt finishing units active at end of the period	1	0	0

Table 4: Animal-level summary statistics for TB in cattle in Derbyshire between 2021 and 2023

Animal-level statistics (cattle)	**2021**	**2022**	**2023**
(a) Total number of cattle tested with tuberculin skin tests or additional IFN-γ blood tests in the period (animal tests)	320,197	297,646	284,086
(b.1) Reactors detected by tuberculin skin tests during the year	515	341	397
(b.2) Reactors detected by additional IFN-γ blood tests (skin-test negative or IR animals) during the year	614	67	102
(c) Reactors detected during year per incidents disclosed during year	9.8	4.8	6.5
(d) Reactors per 1,000 animal tests	3.5	1.4	1.8
(e.1) Additional animals slaughtered during the year for TB control reasons (dangerous contacts, including any first time IRs)	26	1	40
(e.2) Additional animals slaughtered during the year for TB control reasons (private slaughters)	3	7	7
(f) Slaughterhouse (SLH) cases (suspect tuberculous carcasses) reported by Food Standards Agency (FSA) during routine meat inspection	25	19	9
(g) SLH cases confirmed by *M. bovis* PCR testing or bacteriological culture	12	13	7

Note (c) Reactors detected during year per incidents disclosed during year, reactors may be from incidents disclosed in earlier years, as any found through testing during the report year count in the table above.

Note (g) SLH cases confirmed by culture of *M. bovis*, not all incidents reported are submitted for culture analysis. All incidents reported are from any period prior to or during restrictions.

Appendix 3: suspected sources of *M. bovis* infection for all the new OTF-W and OTF-S incidents identified in the report period

In 2023, 14 out of 77 (18%) new TB incidents in Derbyshire received a preliminary or final APHA veterinary investigation to identify the source of infection. Not all Disease Report Form (DRF) investigations were carried out in 2023. This was due to the continued impact and diversion of field resources as part of the 2022 to 2023 avian influenza outbreak which continued into spring 2023, in addition to the Bluetongue Virus outbreak from summer 2023 onwards.

Each TB incident could have up to 3 potential risk pathways identified. Each risk pathway is given a score that reflects the likelihood of that pathway bringing TB into the herd. The score is recorded as either:

- definite (score 8)
- most likely (score 6)
- likely (score 4)
- possible (score 1)

The sources for each incident are weighted by the certainty ascribed. Any combination of definite, most likely, likely, or possible can contribute towards the overall picture for possible routes of introduction into a herd. If the overall score for a herd is less than 6, then the score is made up to 6 using the ‘Other or unknown source’ option. Buffering up to 6 in this way helps to reflect the uncertainty in assessments where only ‘likely’ or ‘possible’ sources are identified.

Table 5 combines the data from multiple herds and provides the proportion of pathways in which each source was identified, weighted by the certainty that each source caused the introduction of TB. The output does not show the proportion of herds where each pathway was identified (this is skewed by the certainty calculation). WGS of *M. bovis* isolates can be a powerful tool in identifying a likely source of infection, however WGS clades are not determined for OTF-S herds. As a result of varying levels of uncertainty, only broad generalisations should be made from these data. A more detailed description of this methodology is provided in the explanatory supplement for the annual reports 2023.

Table 5: Suspected sources of *M. bovis* infection for the 14 incidents with a preliminary or a final veterinary assessment in Derbyshire, in 2023

Source of infection	Possible (1)	Likely (4)	Most likely (6)	Definite (8)	Weighted contribution
Badgers	8	10	5	0	51.4%
Cattle movements	0	4	6	0	32.8%
Contiguous	0	0	0	0	0.0%
Residual cattle infection	2	0	1	0	5.9%
Domestic animals	0	0	0	0	0.0%
Non-specific reactor	0	0	0	0	0.0%
Fomites	0	0	0	0	0.0%
Other wildlife	1	1	0	0	3.3%
Other or unknown source	0	0	0	0	6.7%

Each TB incident could have up to 3 potential pathways so totals may not equate to the number of actual incidents that have occurred.

© Crown copyright 2024

You may re-use this information (excluding logos) free of charge in any format or medium, under the terms of the Open Government Licence v.3. This licence can be found at this link or requested by this email.

Data Protection:
For information on how we handle personal data visit www.gov.uk and search Animal and Plant Health Agency Personal Information Charter.

This publication is available Bovine TB epidemiology and surveillance in Great Britain.

Any enquiries regarding this publication should be sent to us at the National TB Epi Mailbox.

www.gov.uk/apha

APHA is an Executive Agency of the Department for Environment, Food and Rural Affairs and also works on behalf of the Scottish Government, Welsh Government and Food Standards Agency to safeguard animal and plant health for the benefit of people, the environment, and the economy.