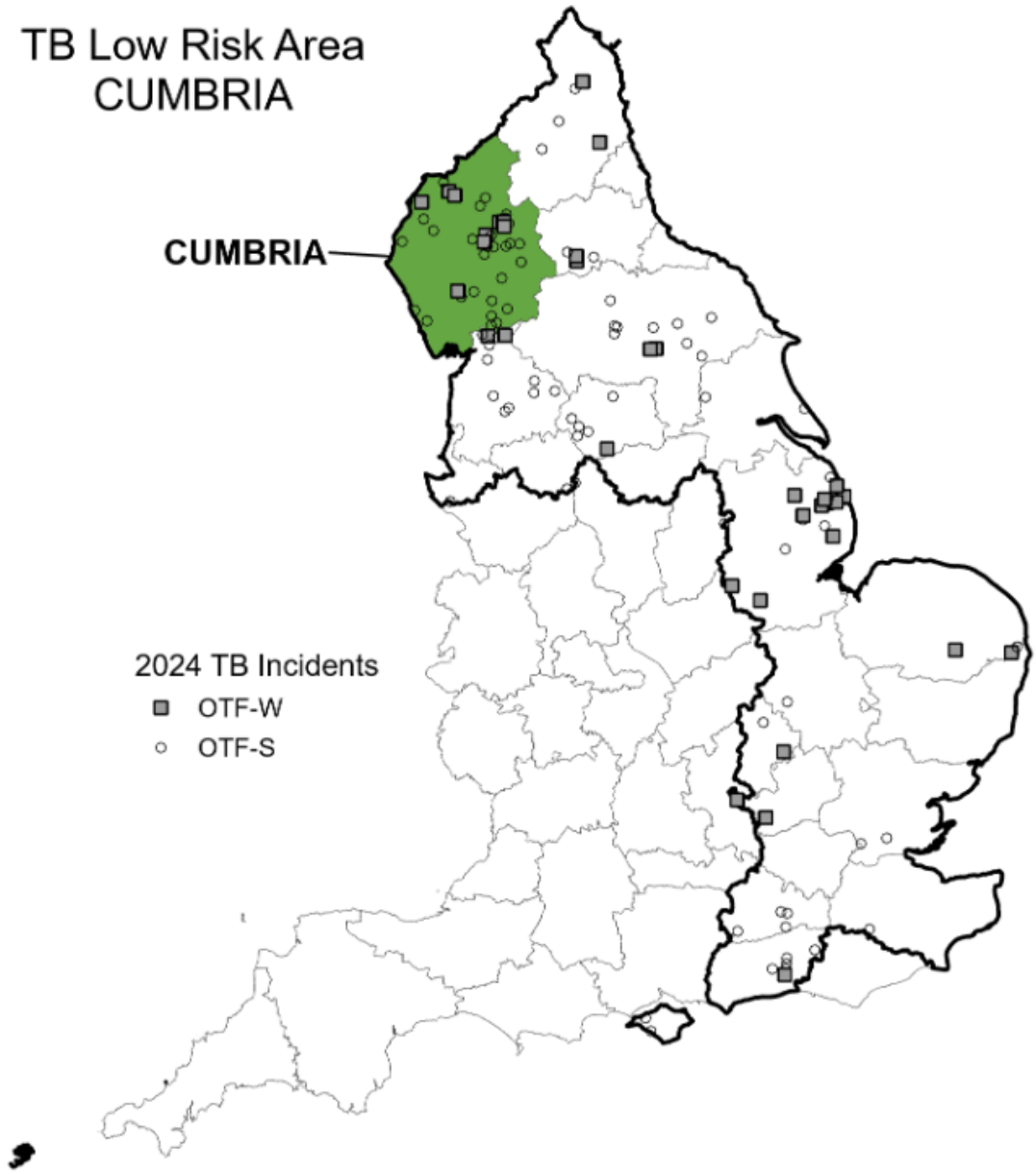
Animal &
Plant Health
Agency

Year End Descriptive Epidemiology Report: Bovine TB in the Low Risk Area of England 2024: Cumbria



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Introduction

The Low Risk Area (LRA) was established in 2013, along with the Edge and High Risk Areas of England. In 2014 the 3 bovine 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. Overall, the LRA has a very low and stable incidence of TB infected herds. The current strategy for the LRA seeks to mitigate the risk of TB incursions via cattle movements and rapidly contain and eradicate any new foci of infection through:

- mandatory pre- and post- movement testing of cattle entering the LRA from higher risk areas of the UK
- more sensitive testing of infected herds
- temporarily enhanced TB surveillance (radial and hotspot testing) in the vicinity of herds experiencing lesion and/or PCR (Polymerase Chain Reaction) test (or culture) positive incidents of TB

The aim of this combination of measures is to preserve the favourable disease status of this area of England so that its constituent counties can be declared OTF as soon as possible.

This report describes the frequency and geographical distribution of TB in 2024 in cattle herds in Cumbria, which is part of the LRA. In 2024, 32% of all new TB incidents in the LRA were detected in Cumbria.

TB in cattle and other mammals is primarily caused by infection with the bacterium Mycobacterium bovis (M. bovis), and the disease is subsequently referred to as 'TB' in this report. Although other sources may refer to TB 'breakdowns,' 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
- private veterinarians
- government
- policy makers
- 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 LRA, can be found in the explanatory supplement for the annual reports 2024.

Classification of TB incidents

Unless otherwise specified, this report includes all new TB incidents detected during the reporting period (1 January to 31 December 2024). 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 the detection in the affected 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 (IFN-γ) blood test, with typical lesions of TB identified at post-mortem (PM) meat inspection, or
- one animal (such as a skin test reactor, IFN-γ test-positive animal, or slaughterhouse case) with M. bovis-positive polymerase chain reaction (PCR) test (or bacteriological culture) results in tissue samples collected from carcases during the PM inspection

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

Cattle herds can also have their OTF status suspended without necessarily experiencing a TB incident if, for instance, a TB test becomes overdue, or pending laboratory tests of suspected cases of TB reported at routine post-mortem meat inspection during commercial slaughter of cattle.

In Cumbria there was one Licensed Finishing Unit (LFU) active during 2024. There were no new TB incidents, and no incidents which closed in LFUs in 2024. Incidents in LFUs are excluded from the numbers presented in this report due to the limited epidemiological impact of these incidents.

Cattle industry

There were 2,708 cattle herds registered in Cumbria at the end of the year, as shown in Appendix 1 and 2. Appendix 2 provides a summary of headline cattle TB statistics in Cumbria.

In 2024 Cumbria had 5 livestock markets approved by APHA to hold slaughter gatherings of cattle from OTF herds that are eligible for, but have not been subjected to, pre-movement TB testing (known as ‘TB pre-movement testing-exempt’ markets).

This county also had one LFU.

There is significant movement of cattle between Cumbria and Scotland, and from Northern Ireland and the Republic of Ireland into Cumbria.

Number of new TB incidents

In 2024, 39 new TB herd incidents were declared in the whole county, 11 OTF-W and 28 OTF-S (Figure 1). This represented an increase of 22 TB incidents (129%) compared to 2023. The number of OTF-W incidents increased slightly from 8 in 2023 to 11 in 2024, whereas there was a tripling in the number of OTF-S incidents (from 9 in 2023 to 28 in 2024).

Over the last decade the number of OTF-W incidents have varied between a peak of 16 in 2016, decreasing to 5 in 2017 before steadily increasing to 12 in 2024. On the other hand,

OTF-S incidents have fluctuated with between 16 and 24 incidents annually from 2015 to 2020. From 2021 to 2024 the trend has been more varied, from 11 OTF-S incidents in 2021, rising to 15 in 2022 before decreasing again to 8 in 2023. Overall, there was a peak of 33 total incidents in 2017, followed by a gradual decline in TB incidents to 17 incidents in 2022.

The increase in 2024 compared to 2023 was driven predominantly by the occurrence of 7 more incidents in Hotspot 29 (HS29) and 9 more incidents in the south of the county. These areas are discussed below.

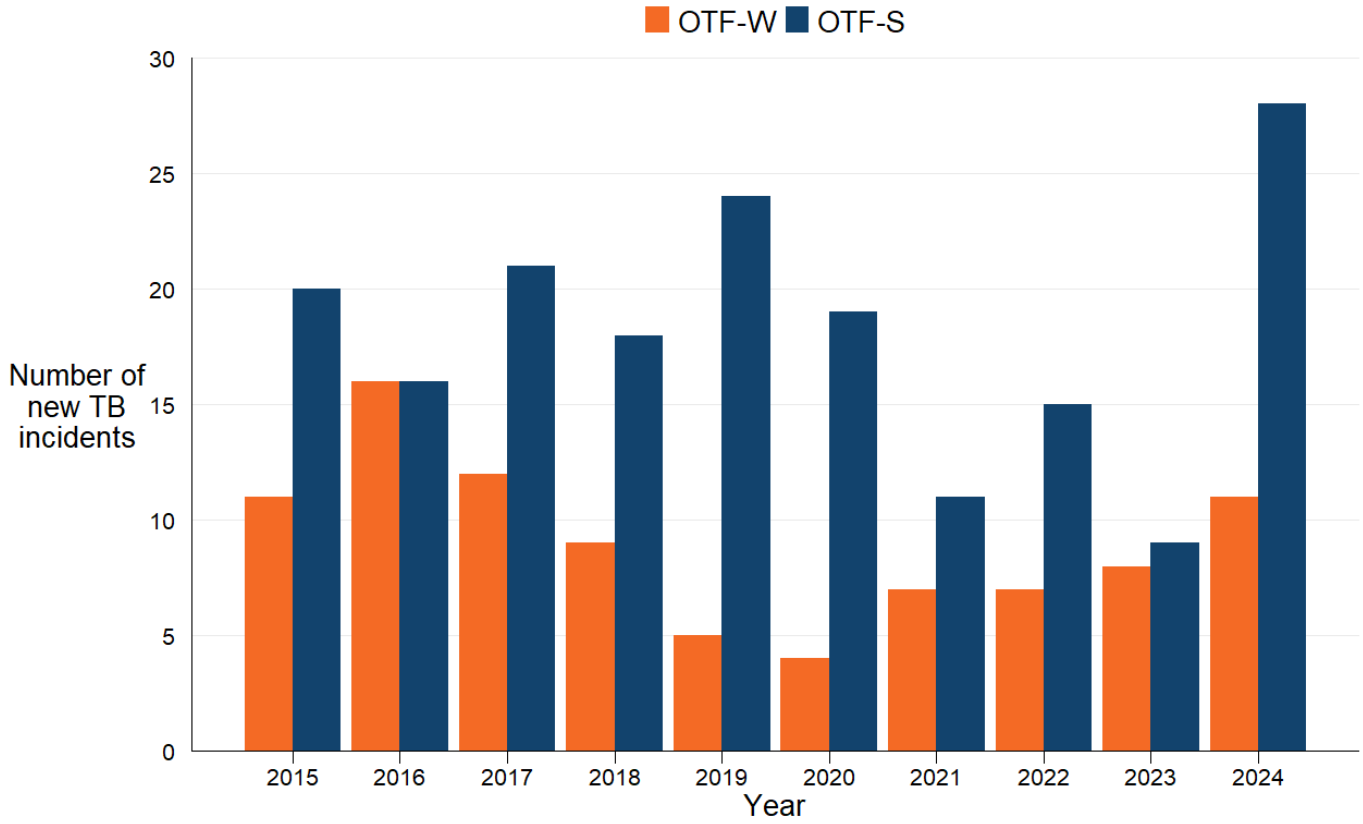

Figure 1: Annual number of new TB incidents in Cumbria, from 2015 to 2024.

Disclosing TB surveillance method

As in 2022 and 2023, most new herd incidents in 2024 were disclosed by enhanced TB surveillance testing in TB hotspots (15), followed by targeted testing of herds around holdings affected by OTF-W incidents (radial testing, 13) and routine herd tests (5, Figure 2). Check tests, herd tests conducted 12 months after the conclusion of a TB incident (12M tests), post-movement tests and trace testing each disclosed one incident, and pre-movement tests disclosed 2 incidents.

Enhanced TB surveillance testing in hotspots (referred to as ‘Hotspot testing’ in Figure 2 below) refers to an increased testing frequency to 6- or 12- monthly post-incident targeted surveillance testing (from the routine 4-yearly testing schedule), based on the epidemiological picture in the hotspot.

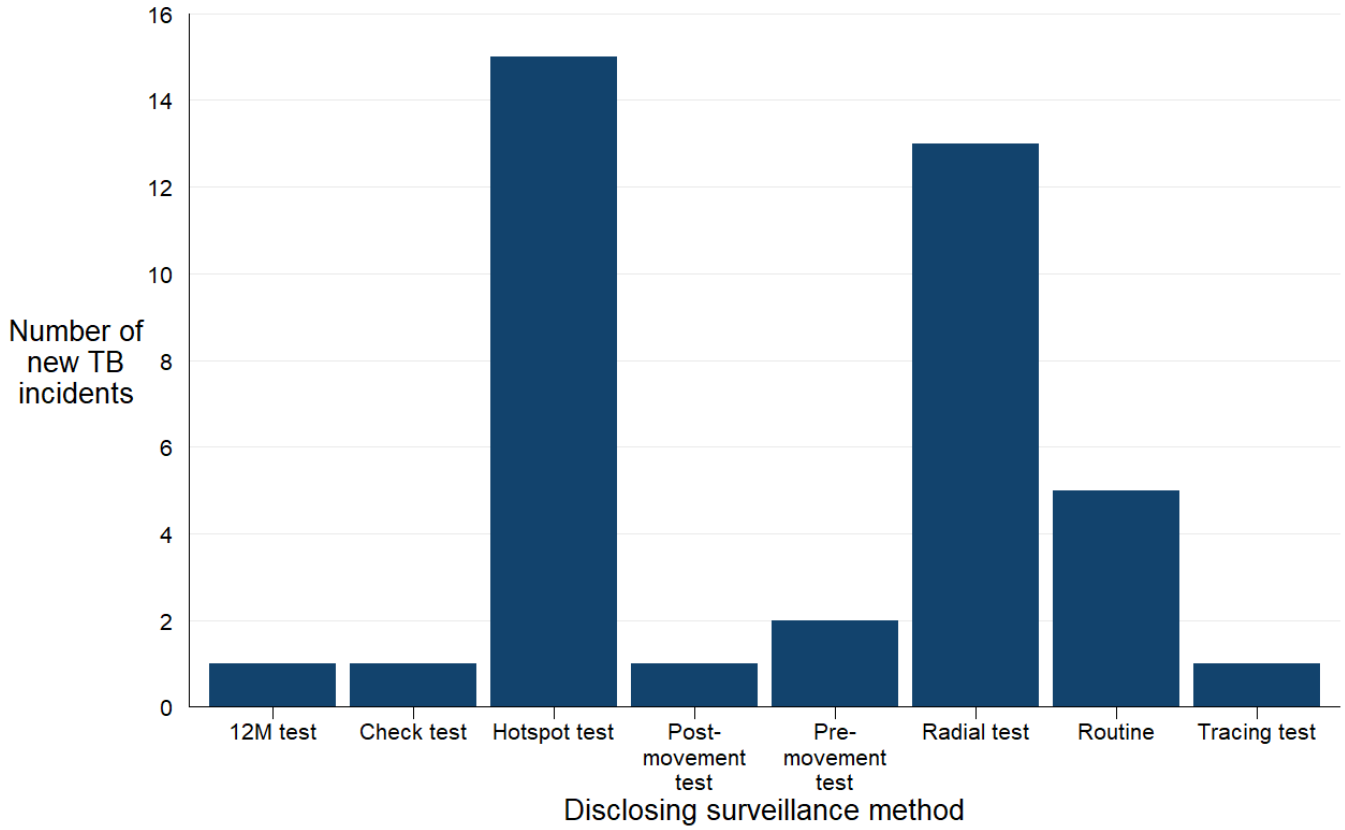

Figure 2: Number of new TB incidents (OTF-W and OTF-S) in Cumbria in 2024, according to the surveillance methods that detected them.

Duration of TB incidents

Of the 26 TB incidents that were resolved in Cumbria in 2024, 21 started in 2024 and 5 in 2023. None of those herd incidents were persistent (lasted more than 550 days) and this was consistent with 2023.

Of the 26 incidents, 6 were OTF-W. Two of those were resolved within 101 to 150 days and 2 were resolved within 151 to 240 days. The other 2 OTF-W incidents lasted between 241 and 550 days (Figure 3).

Of the 20 OTF-S incidents, 7 were quickly resolved within 100 days, one was resolved within 101 to 150 days and 10 within 151 to 240 days. Two OTF-S incidents lasted between 241 and 550 days.

There were 19 incidents ongoing at the end of 2024, including one persistent OTF-W incident. This was triple the number of incidents ongoing at the end of 2023 (6).

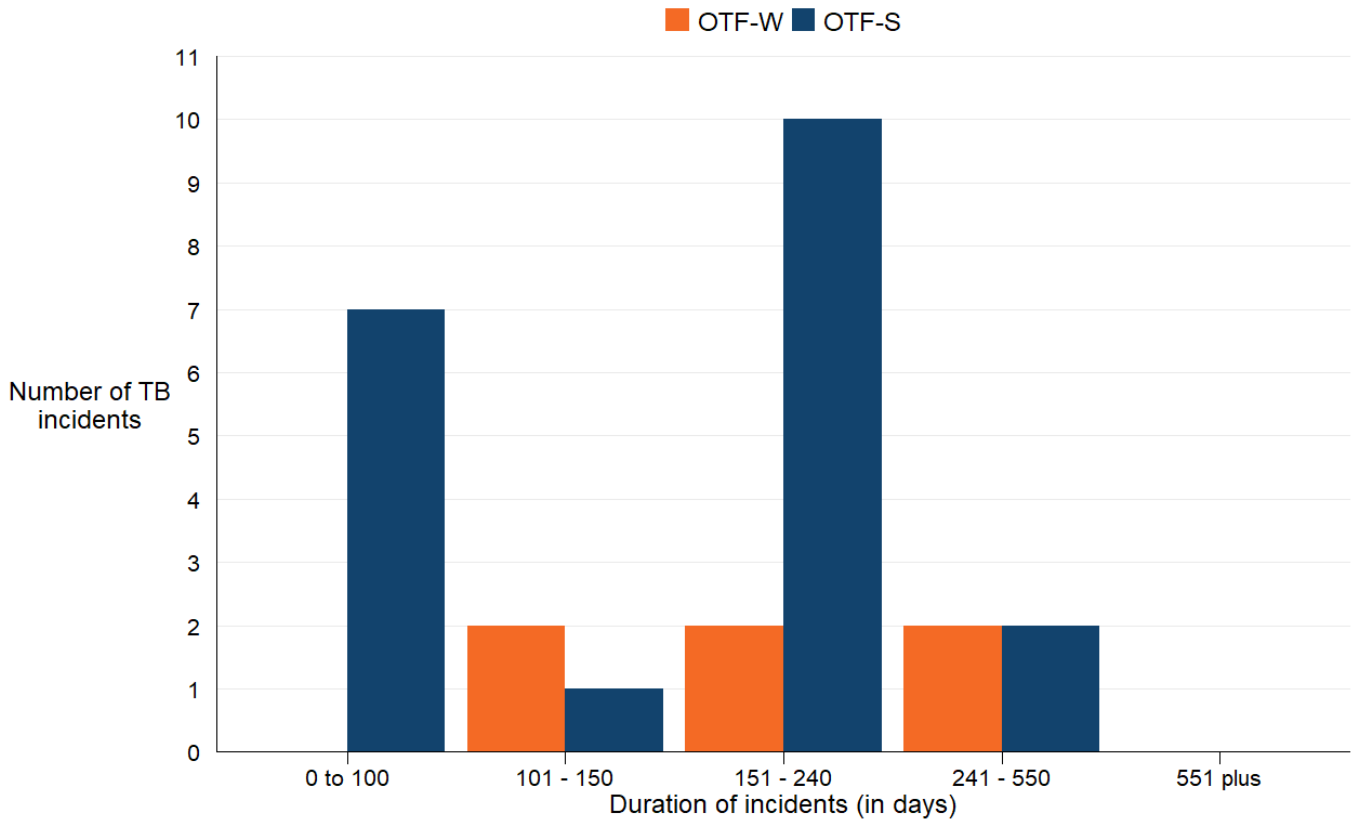

Figure 3: Duration of TB incidents (OTF-W and OTF-S) that closed in Cumbria in 2024.

Skin test reactors and interferon gamma test positive animals removed

A total of 272 cattle were compulsorily removed from TB incident herds in Cumbria during 2024, as skin test reactors (108) or IFN-γ test positive animals (164). This was a very marginal increase from 270 (128 skin test reactors and 142 IFN-γ test positives) slaughtered in 2023. In 2021 and 2022, 38 and 106 cattle were removed for TB control reasons, respectively (Figure 4). The unusually high number of cattle removed in 2023 was largely due to an explosive breakdown detected to the west of Wigton in the north-west of the county. Although this explosive breakdown continued into 2024, the number of skin and IFN-γ test reactors removed from the affected herd reduced significantly. Nevertheless, the total number of reactors removed from TB incident herds in Cumbria in 2024 was similar to 2023 due to the rise in new incidents detected compared to 2023, as noted before. Four incidents contributed significantly to the number of reactors removed in 2024:

1. Twelve (skin and IFN-γ) test reactors were removed from a second OTF-W incident in Hotspot 29 (HS29) in a dairy herd of approximately 190 cattle,
2. twenty-three (skin and IFN-γ) test reactors were removed from an OTF-W incident in a dairy herd of approximately 160 cattle, situated to the east of HS29,
3. one OTF-W incident just outside of Hotspot 21 (HS21) involving a dairy herd of approximately 850 cattle, from which 40 (skin and IFN-γ) test reactors were removed, and

4. another OTF-W incident west of Carlisle, from which 43 (skin and IFN-γ) test reactors were removed from a mixed dairy and beef herd with approximately 850 cattle.

In addition to the supplementary IFN-γ blood test, APHA also deployed discretionary IDEXX antibody testing in the ongoing explosive breakdown to the west of Wigton, which revealed a further 65 TB seropositive animals. The private veterinary surgeon for this herd subsequently applied to APHA for permission to undertake additional private Enferplex testing on 123 calves, which was granted and revealed one seropositive animal.

The Enferplex antibody test was also privately used in an incident in the south-east of Cumbria, with 8 seropositive cattle out of 14 tested.

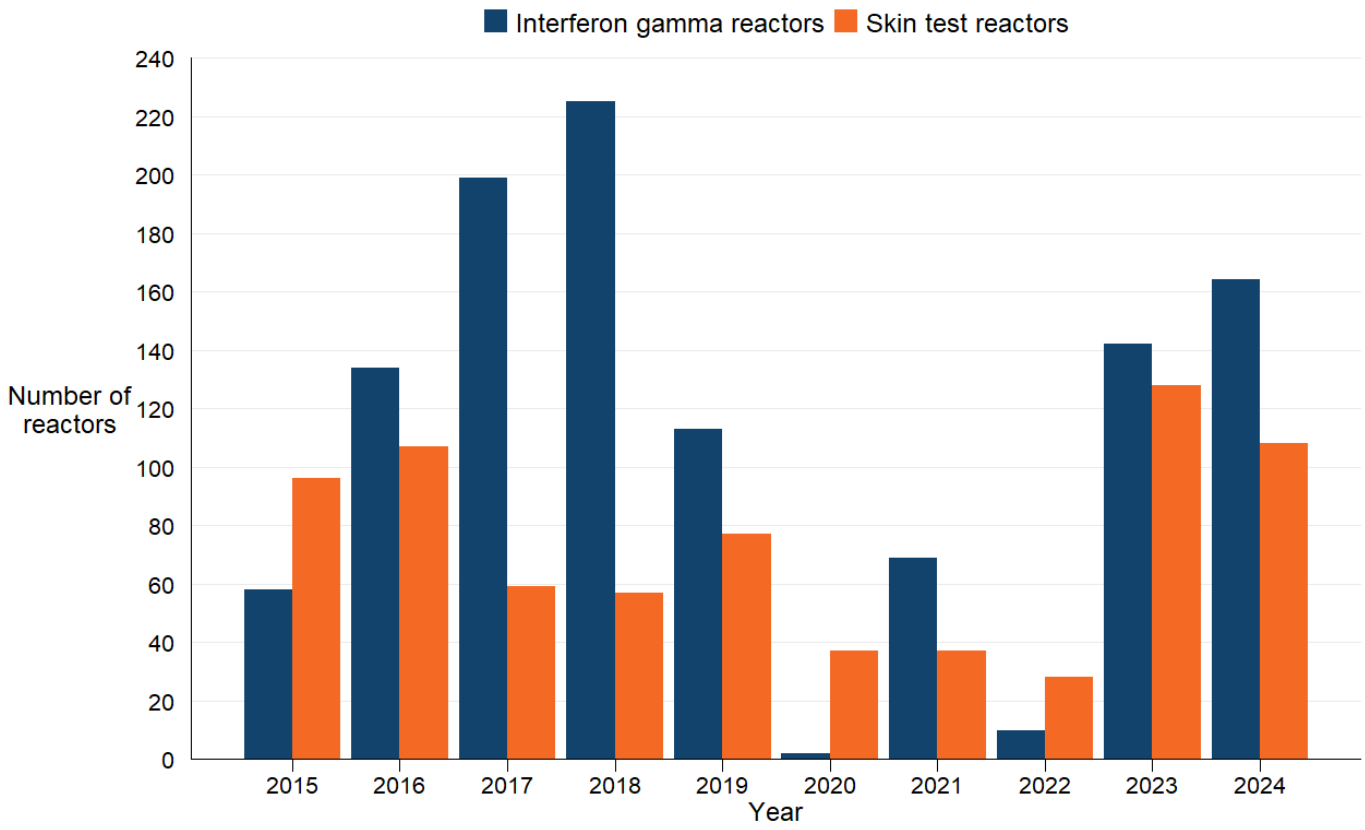

Figure 4: Number of skin test reactors and IFN-γ test positive cattle removed by APHA for TB control reasons in Cumbria, from 2015 to 2024.

Recurrent TB incidents

Three-year recurrence

Of the 11 herds in Cumbria with an OTF-W incident in 2024, 3 (27%) had experienced another TB incident in the previous 3 years (Figure 5). All 3 herds with a recurrent TB incident were located in HS29.

Of the 27 herds with a new OTF-S TB incident, 5 (19%) had experienced another TB incident in the previous 3 years. One was in HS21, the second in HS29, the third in the

overlap area of HS21/HS29, the fourth in the west of Cumbria and the fifth in the south-east of the county.

Cumbria had the second highest overall percentage of recurrent herd incidents in 2024 (21%) of all the LRA counties and subregions, followed by the North West (20%), South East (17%) and Yorkshire and Humberside (16%). The Isles of Scilly and the North East subregion had no recurrent herd incidents in 2024. Lincolnshire had the highest percentage (44%) and the overall figure across the whole of the LRA was 21%.

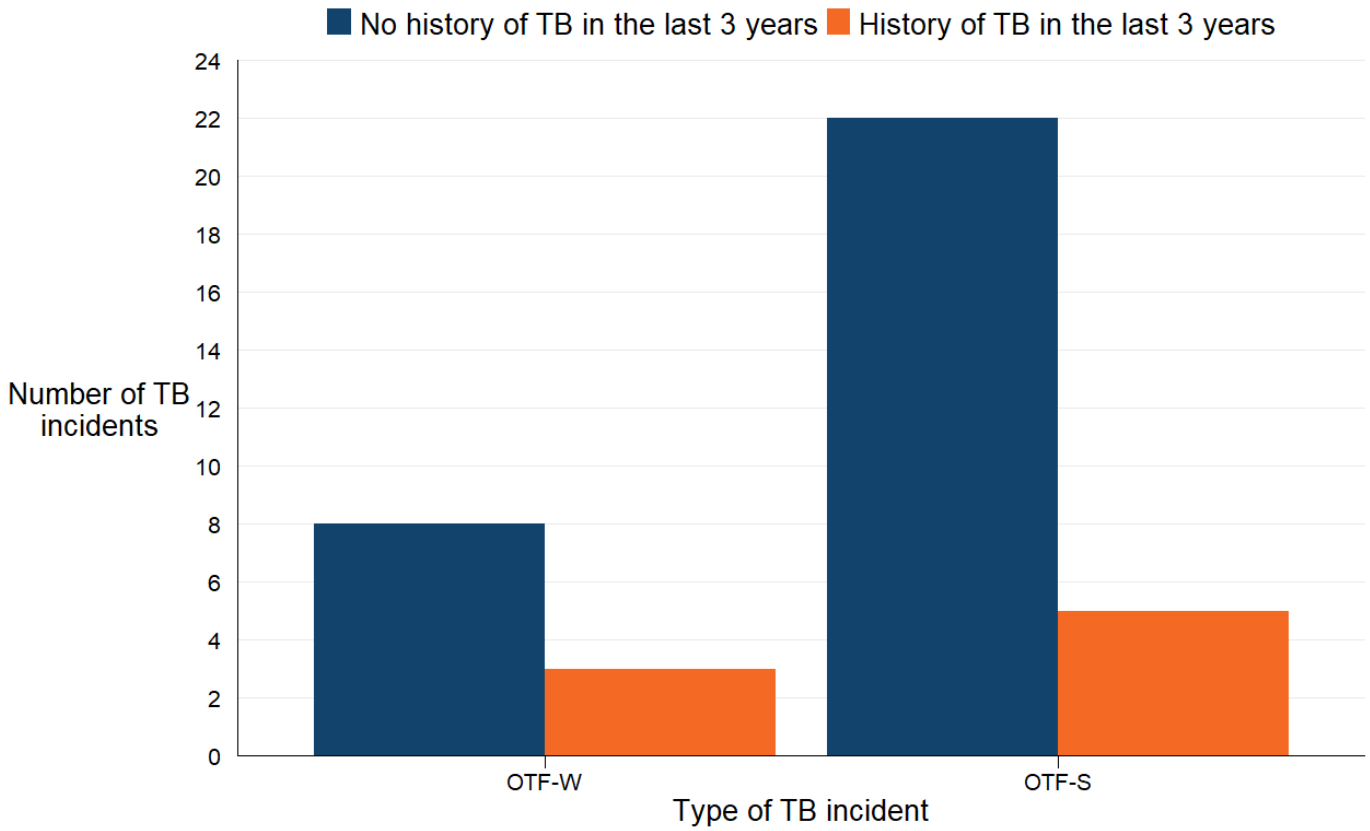

Figure 5: Number of herds with a TB incident (by OTF-W and OTF-S) in Cumbria in 2024, with and without a history of any TB incident in the previous 3 years of the disclosing test.

Unusual TB incidents

As described above, a high number of TB test reactors were removed from 4 herds with TB incidents in Cumbria in 2024.

There was one explosive OTF-W incident in a large dairy and beef herd in the west of Wigton in 2023 was still ongoing at the end of 2024. Although the number of skin and IFN-γ test reactors removed decreased significantly in 2024 compared to 2023, discretionary IDEXX antibody testing deployed by APHA identified a further 65 positive animals. Additional private Enferplex testing was also carried out on a group of 123 animals but just one positive was identified. As described previously in the 2023 Year End Epidemiology Report for Cumbria, clade B6-51 of M. bovis was isolated from animals removed from the affected herd. The whole genome sequences (WGS) of the isolates from this herd were at least 70 single nucleotide polymorphisms (SNPs) away from any other M. bovis isolates

identified in GB and are thought to be more closely related to isolates from TB-infected herds in Northern Ireland, Republic of Ireland and the Isle of Man. APHA is collaborating with DAERA and AFBI colleagues in order to investigate which herds in Ireland may have yielded closely related isolates and to inform possible routes of infection into the herd in Cumbria.

TB incidents 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, or carcases submitted to veterinary laboratories for diagnostic investigation. 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. Enhanced voluntary wildlife surveillance takes place in LRA hotspots, but not within the Edge Area. Outside of these initiatives, farmers and deer stalkers are able to submit wild deer carcases for private TB testing and the results of these findings are reported below.

In 2024, there was one TB incident in a camelid herd to the west of Penrith. A contiguous check test was carried out on this holding due its proximity to an OTF-W cattle incident. The tuberculin skin test results were negative, but Enferplex testing identified 2 TB seropositive llamas (4-antigen interpretation). PME revealed typical lesions of TB in both llamas. Tissue samples were collected and sent to the APHA national reference laboratory for mammalian TB. PCR test results from both llamas returned negative results for M. bovis but positive results for M. microti. Pending receipt of culture results, a second skin test of the herd was carried out with negative results. Subsequently, M. microti was also cultured from one of the samples, whereas M. bovis was not isolated from either of the animals. On consideration of the second clear skin test result, the positive M. micoti culture and disease investigation findings, the restrictions on the affected herd were lifted. Given the zoonotic potential of M. microti, APHA informed the UK Health Security Agency (UKHSA), and advice was provided to the herd keepers regarding risk to farm staff and members of the public.

Geographical distribution of TB incidents

Similar to 2023, most of the 11 new OTF-W incidents detected in Cumbria during 2024 were in the east and south of the county. New incidents were typically located within areas of higher cattle density (Figure 6).

Four OTF-W incidents associated with WGS clade B3-11 of M. bovis were located along the Eden Valley to the north-east of Penrith, within HS29. These were genetically closely related, implying local spread, and is consistent with current understanding of the epidemiology in this hotspot. A fifth OTF-W incident with the same clade (B3-11) was located just outside the western border of HS29. The isolates from this incident are on the same branch of the phylogenetic tree as isolates from OTF-W incidents in HS29 but are less closely related. Cattle movements between this holding and HS29 holdings were

reviewed but no clear transmission pathway via this route could be identified. This area, which is separated from HS29 by the M6, a railway and the River Eden is undergoing radial testing, the results of which will help to inform any further actions.

No OTF-W incidents occurred within HS21 in 2024, which is located to the south and east of Penrith and adjoins HS29. There was one OTF-W incident caused by clade B6-21 of M. bovis, located just outside the north-western border of HS21. This clade differs from the WGS clade originally identified in HS21 (B6-23) and has never been identified in England before. Clade B6-21 has previously been isolated from several incidents in Scotland. Investigations have shown that it is likely to have originated in Northern Ireland, although the affected herd has no known links with any of the farms in Scotland or with Northern Ireland and risk pathways are difficult to define.

No new incidents occurred within HS26 in 2024, and this hotspot was subsequently closed in July 2024.

Two OTF-W incidents were detected to the West of Carlisle in the north of Cumbria: one caused by clade B6-23 of M. bovis and the other by clade B6-86. Clade B6-23 was found in HS21 and had originated from Northern Ireland. Collaboration with the Department of Agriculture, Environment and Rural Affairs (DAERA) and the Agri-Food Biosciences Institute (AFBI) colleagues was initiated regarding the 2024 incident and investigations suggest the isolate was more closely related to those from previous incidents in Northern Ireland than to any isolates identified from incidents in HS21. It is therefore likely that this was an independent incursion, although an obvious route of introduction into the herd via imported animals has not been found. There were, however, a couple of movements of cattle onto the farm which had previously been on farms in Scotland which had been affected by OTF-S incidents. Investigations are on-going regarding the incident with clade B6-86. This clade is found predominantly in Scotland but has origins in Ireland. There have been previous incidents in north Cumbria but it is rare elsewhere in England.

Further west another incident associated with clade B6-86 was detected in a herd near Wigton. The isolate from this incident is not closely related to the other B6-86 isolate.

In the south of the county, there was one OTF-W incident identified as clade B6-83. This clade has a homerange spanning Shropshire, Herefordshire, Gloucestershire and mid/south Wales.

OTF-S incidents occurred throughout the county, with some clustering within HS21 and HS29. Five OTF-S incidents occurred to the west of Kirkby Lonsdale and near to the B6-83 OTF-W incident mentioned before. There had been an OTF-W incident in this area in 2022, but this was caused by a different clade (B3-11). New OTF-S incidents have previously occurred in the area and this cluster of incidents is an area of concern. No link with the recently closed HS26 has been identified, but work is ongoing to understand the epidemiology in this area and this will inform further actions.

Two OTF-S incidents occurred in the south-west of the county between Ravenglass and Whitbeck, which is an area that typically has a small number of OTF-S incidents each year, with the exception of 2023.

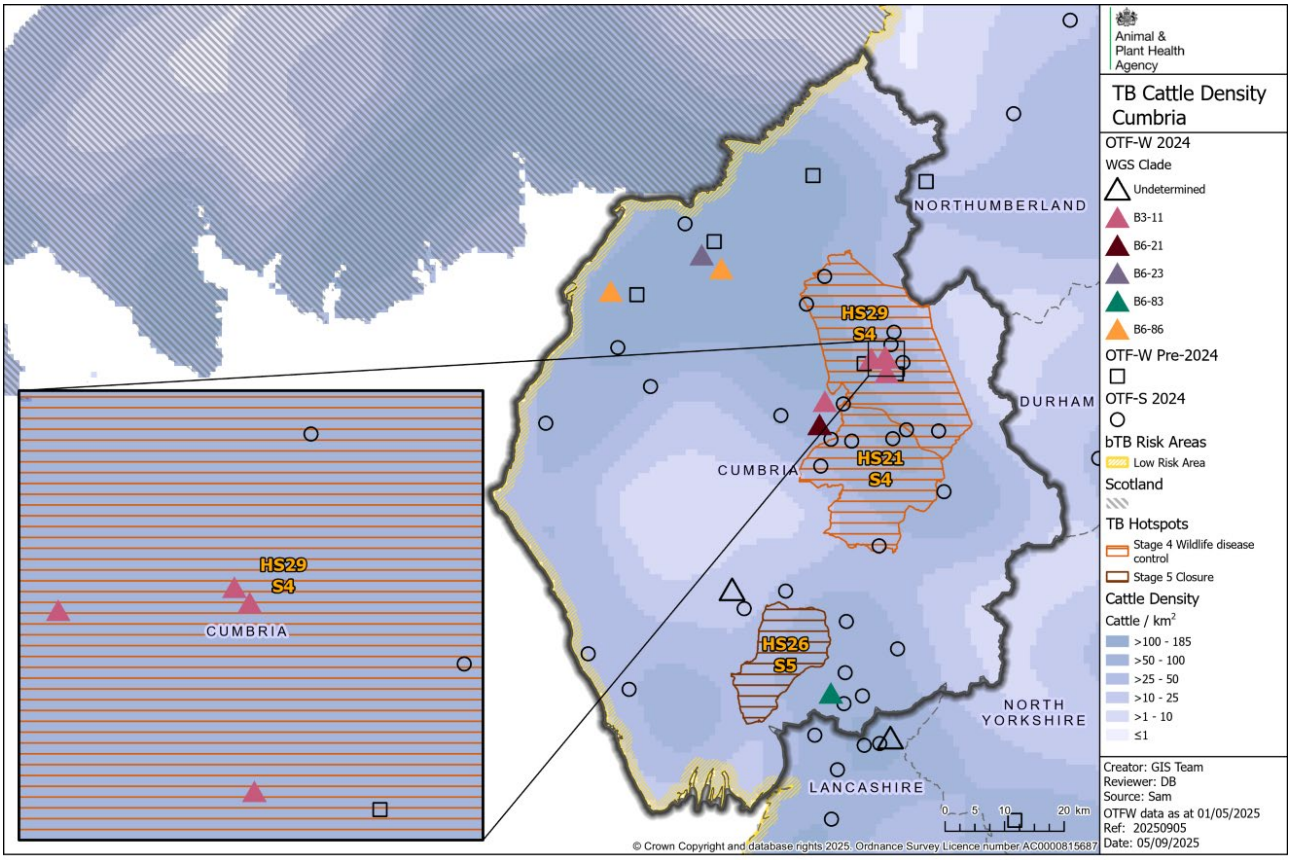

Figure 6: Location of cattle holdings in Cumbria with new TB incidents (OTF-W and OTF-S) in 2024, and cattle incident holdings with pre-2024 OTF-W incidents still ongoing at the beginning of 2024, overlaid on a cattle density map.

Figure 6 description: A map of Cumbria and adjoining areas showing the cattle density, the geographical location of cattle holdings with new TB incidents (OTF-W and OTF-S) in 2024, and cattle incident holdings with OTF-W incidents still ongoing at the beginning of 2024. Dark blue areas represent higher cattle density and light blue represent lower cattle density. New OTF-W incidents detected in 2024 are shown as triangles and colour-coded based on the WGS clade that was detected in the incident. Pink represents B3-11, brown represents clade B6-21, grey represents clade B6-23, green represents clade B6-83, and orange represents clade B6-86. Transparent triangles represent incidents where the WGS clade was undetermined, and it was not possible to obtain WGS information or it was pending. OTF-S incidents in 2024 are shown as circles. The geographical location of TB hotspots is shown with hashed lines. The colour of the hotspot, along with the suffixes S4 and S5, indicates the stage of controls in place in 2024: dark orange is stage 4 (S4 is wildlife disease control), and brown is stage 5 (S5 is closure). The location of new TB incidents is described in the main text.

As displayed in Figure 7 and Appendix 3 (Table 5), new OTF-W incidents in 2024 were attributed to a variety of sources of infection. Two incidents were attributed to the introduction of undetected, infected cattle, located in the north and south of the county. The incident in the north yielded a clade associated with Northern Ireland, as described above. For the incident to the south of the county, the clade was undetermined. Of the 4 OTF-W incidents in HS29, 3 were attributed to exposure to infected wildlife. The other incident in HS29 was attributed to infection from local cattle. These risk pathways reflect local spread

of disease, which is consistent with current understanding of the epidemiology in this hotspot.

The source of infection for 5 incidents (2 in the north-west, 2 to the west of HS29, and 1 in the south) was unknown. For one to the west of HS29, contiguous cattle contact, fomite pathways and exposure to infected wildlife are all under consideration. Potential links with HS29 are under review. For the other incident to the west of HS29, contiguous cattle contact, cattle movements from the LRA and fomite pathways are all under consideration. This incident was among those associated with a clade originating in Northern Ireland, which had been implicated in multiple incidents in Scotland. However, no direct epidemiological links to either country have been identified to date. For the incident in the north-west which yielded clade B6-86, investigations are on-going. For the other incident of unknown origin in the north-west, contiguous cattle contact, cattle movements from Scotland and exposure to infected wildlife are all being considered. Again, this incident was identified as a clade associated with Northern Ireland, however direct links have not been identified. There are potential links with holdings in Scotland. For the OTF-W incident in the south, cattle movements and fomite pathways are under consideration. For the incident in the south of the county, contiguous cattle contact, cattle movements from the LRA and exposure to infected badgers are all under consideration.

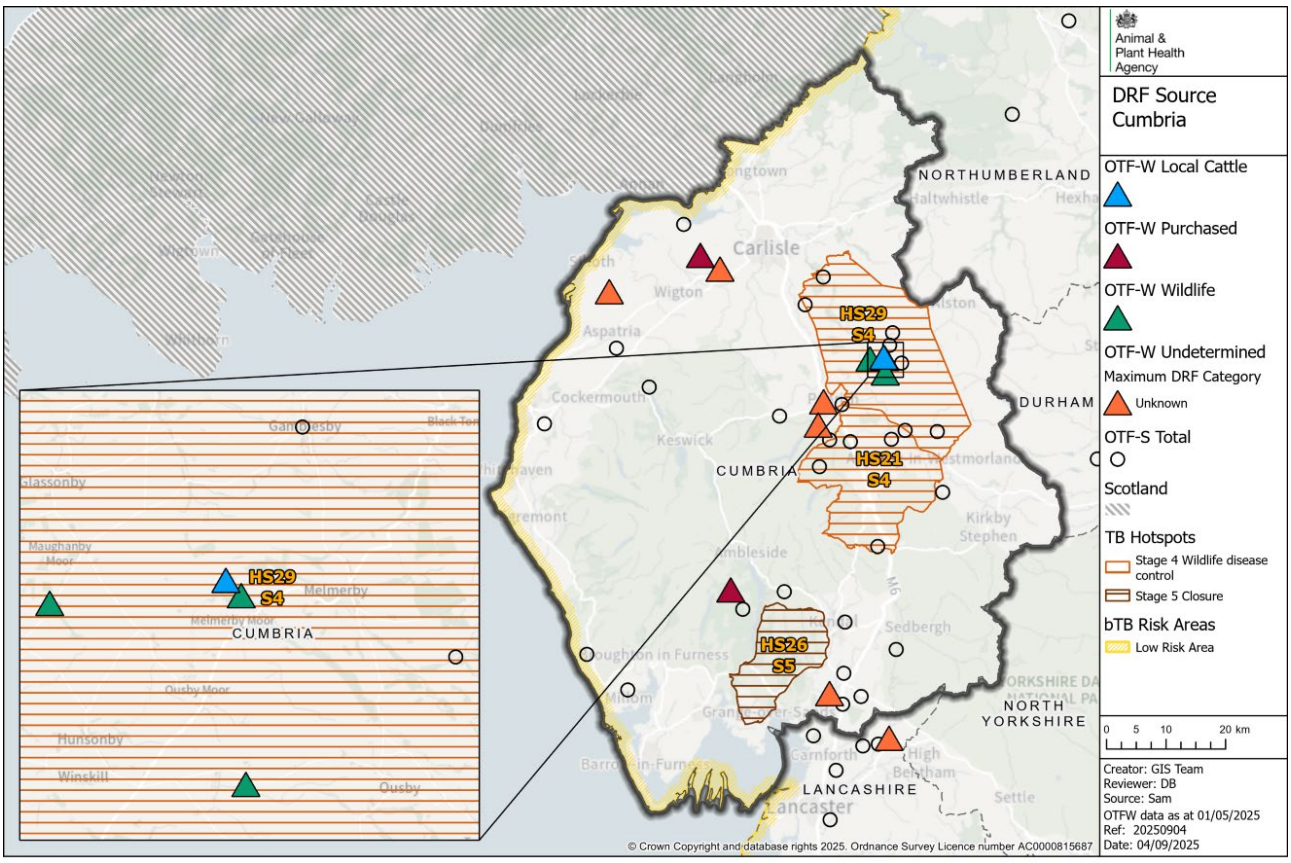

Figure 7: Map of the source of infection pathway recorded with the highest level of certainty, for OTF-W incidents, and the location of OTF-S incidents in Cumbria which started in 2024. Local cattle refer to residual infection and contiguous cattle risk pathways.

Purchased refers to cattle movement risk pathways. Wildlife refers to both badger and other wildlife risk pathways.

Figure 7 description: A map of Cumbria and adjoining areas showing the geographical location of cattle holdings with new OTF-W incidents in 2024 and the most likely source of infection. OTF-W incidents are shown as triangles in different colours which represent the source of infection with the highest level of certainty. Blue represents local cattle, brown represents purchased cattle, green represents wildlife, and orange represents unknown. Unknown sources of infection reference where there is insufficient evidence to attribute the source of infection to a particular risk pathway, alternatively multiple risk pathways may be plausible, and the investigating veterinary officer may be unable to discern the most likely source. Local cattle refer to residual infection and contiguous cattle risk pathways. Purchased refers to cattle movement risk pathways. Wildlife refers to both badger and other wildlife risk pathways. Undetermined refers to incidents where a likely source of infection could not be ascertained. New OTF-S incidents in 2024 are shown as circles. The geographical location of TB hotspots is shown with hashed lines. The colour of the hotspot, along with the suffixes S4 and S5, indicates the stage of controls in place in 2024: dark orange is stage 4 (S4 is wildlife disease control), and brown is stage 5 (S5 is closure).

Figure 8 displays the hotspot areas and radial surveillance zones around OTF-W incidents that were active, pending, completed or not instigated in Cumbria during 2024, as well as radial zones active or completed in 2020-2023. In 2024, new active radial zones were located in various locations around the county, corresponding with the occurrence of new OTF-W incidents. Notably, there were 2 new radial zones to the west of HS29, one of which corresponds to an area currently under investigation for potential epidemiological links to HS29.

Consistent with patterns observed in 2023, a small number of new OTF-W incidents began in 2024 towards the west of the county. This led to 3 new active radial zones being set up in the north-west of the county, as shown in Figure 8. Two of these 3 new radial zones were triggered by incidents yielding clade B6-86 and one was triggered by an incident yielding B6-23. It is important to note that 2 of the 2024 radial zones overlap with zones established in 2023. However, these 2023 incidents had different WGS clades, which were also different to any of the clades that triggered the 2024 radial zones. The OTF-W incidents in the north-west of Cumbria therefore do not provide evidence of local transmission of M. bovis infection.

Additionally, one new active radial zone was established to the north-west of HS26, and another in the southern edge of the county. The one to the south was adjacent to a 2022 radial zone but this had been triggered by an incident with a different clade.

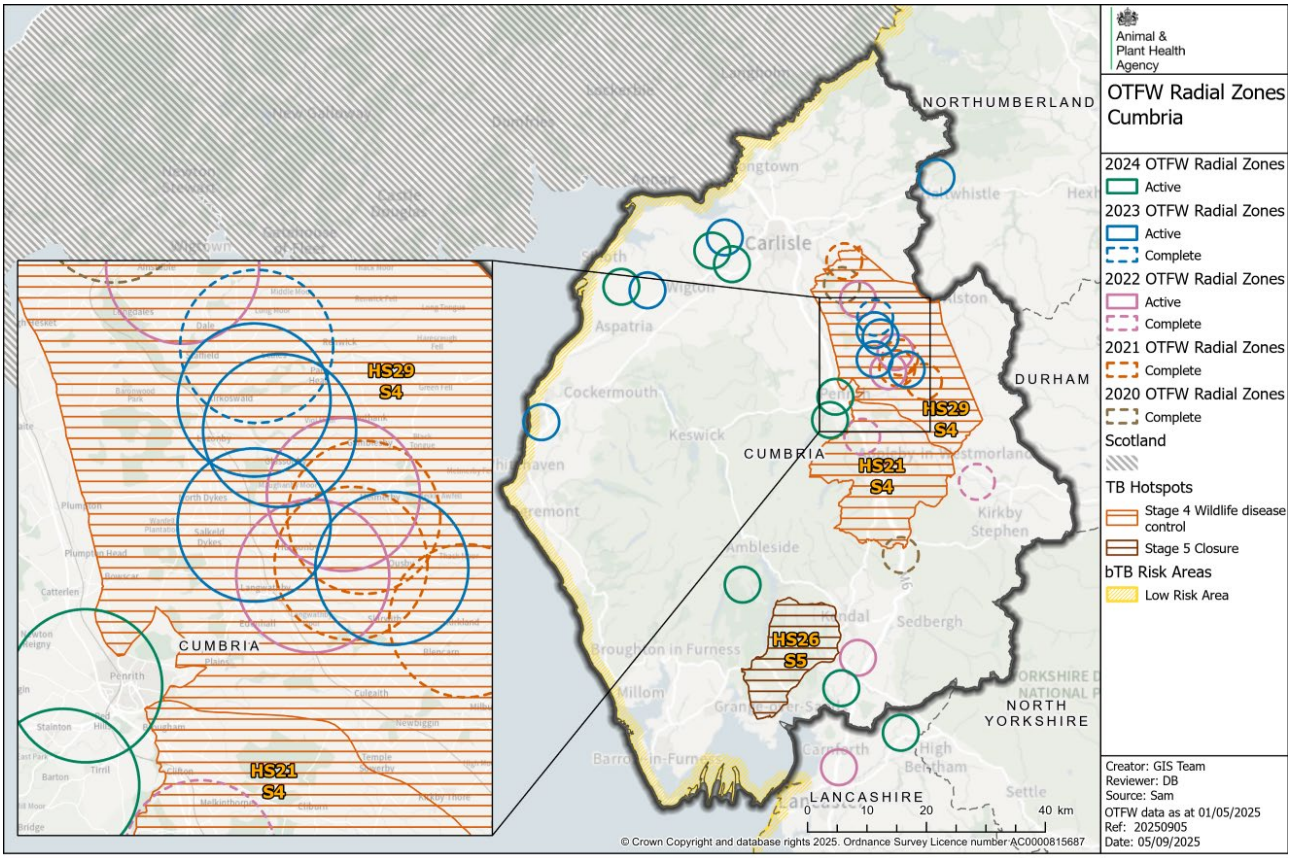

Figure 8: Hotspot areas and radial surveillance zones around OTF-W incidents that were active, completed or not instigated in Cumbria during 2024, by year of initiation.

Figure 8 description: A map of Cumbria and adjoining areas showing the geographical location of hotspots and radial surveillance zones around OTF-W incidents in 2024. The active radial zones are shown as solid line circles, completed radial zones are shown as dotted line circles. The colour of the circles represents the year in which the radial zone was instigated: 2024 is green, 2023 is blue, 2022 is pink, 2021 is orange, and 2020 is brown. The geographical location of TB hotspots is shown with hashed lines. The colour of the hotspot, along with the suffixes S4 and S5, indicates the stage of controls in place in 2024: dark orange is stage 4 (S4 is wildlife disease control), and brown is stage 5 (S5 is closed).

TB hotspots

There were 3 hotspots active in Cumbria at the start of 2024: Hotspot 21 (HS21), Hotspot 26 (HS26) and Hotspot 29 (HS29). HS26 was closed later in July 2024. M. bovis infection has been isolated from wildlife in both HS21 and HS29. APHA is continuing to test 'found-dead' badgers and deer carcases reported through the Defra Rural Service Helpline (03000 200 301). A web report form is also being used for this purpose.

The total number of incidents in each of the TB hotspots described in this report does not include suspected slaughterhouse cases of TB that proved negative on PCR testing and/or bacteriological culture. The number of incidents presented in this section may not reflect those shown on the maps in these reports. Incidents shown on the maps are located at the

centre of their County Parish Holding number (CPH). Incidents reported in this section include any holdings with land inside of the hotspot boundary.

In this report the number of incidents per year in each Hotspot has been gathered using field veterinarian data. Previously, spatial Geographic Information System (GIS) data was used to inform whether a holding was inside of a designated Hotspot. This change may create discrepancies between the number of incidents per year reported here, compared to previous reports.

Hotspots were previously referred to as 'potential' or 'confirmed,' depending upon identification, or not, of infection in wildlife populations. This has now changed, and hotspots are managed in 'stages' covering cattle, and where relevant, wildlife.

Further details on TB hotspots in the Low Risk Area of England can be found following the link.

Hotspot 21

HS21 was established in 2016 following detection of a cluster of cattle TB incidents associated with clade B6-23 (formerly genotype 17:z) of M. bovis. Infection in local wildlife was identified in the spring of 2017 after the same clade was isolated from 3 'found-dead' badger carcases as part of wildlife surveillance carried out in hotspots. At the end of 2024, HS21 was in management stage 4 (wildlife disease control), with no new cattle TB incidents identified as clade B6-23 since 2018.

There were 6 new OTF-S incidents detected within HS21 in 2024, 2 more than in 2023.

There were 6 OTF-W incidents in both 2016 and 2017, and 3 in 2018. Since the beginning of 2019, there have only been 4 OTF-W incidents in this hotspot. Three of these were in 2020, of which 2 were culture negative and one identified as clade B3-11, which was attributed to purchased infected cattle. The fourth OTF-W incident, which began in 2022, was also culture negative. In 2022, one OTF-W incident with the same clade (B6-23) was declared in a cattle holding located to the east of HS21. The transmission pathways were uncertain, but there had been a few cattle movements onto the affected farm from within HS21.

Since 2017, there has been an overall decline in the annual numbers of new incidents detected in HS21, although a slight increase was observed in 2024 compared to the previous 3 reporting years (Figure 9). The number of OTF-S incidents increased from 3 in both 2016 and 2017, and 2 in 2018, to 6 in 2019. There were 4 OTF-S incidents detected for the subsequent 4 years before increasing to 6 in 2024.

As discussed above, one OTF-W incident was detected to the West of Carlisle in 2024, caused by clade B6-23. The origin of the incident remains unknown, but further epidemiological investigation including WGS evidence has suggested that it is more likely to have been the result of a separate incursion from Northern Ireland, as opposed to epidemiological links with other incidents in HS21. This incident was still ongoing at the end of 2024.

Since 2017, herds in HS21 were subject to 6-monthly testing. In 2020, cattle herds in the outer section of the hotspot became eligible to move to annual (instead of 6-monthly) TB surveillance testing, subject to certain eligibility criteria. In 2021 and 2022, the area within HS21 where this applied was extended to include more farms. Since October 2023, all

farms in HS21 have been eligible to move to annual testing, subject to certain eligibility criteria.

Badger disease control measures have been in place since 2018. Initially these were carried out over the whole wildlife intervention area (Area 32 - Cumbria). Subsequently, a phased move to badger vaccination began in 2020, to reflect the absence of infected badgers identified by PME in parts of the area. Badgers were vaccinated across the whole area in 2022 and 2023. In 2024 the vaccination area reduced to include only the area abutting HS29. This reduction was implemented due to the continued absence of cattle or badger infections attributable to clade B6-23. Surveillance of found-dead badgers and wild deer is still being carried out in this hotspot.

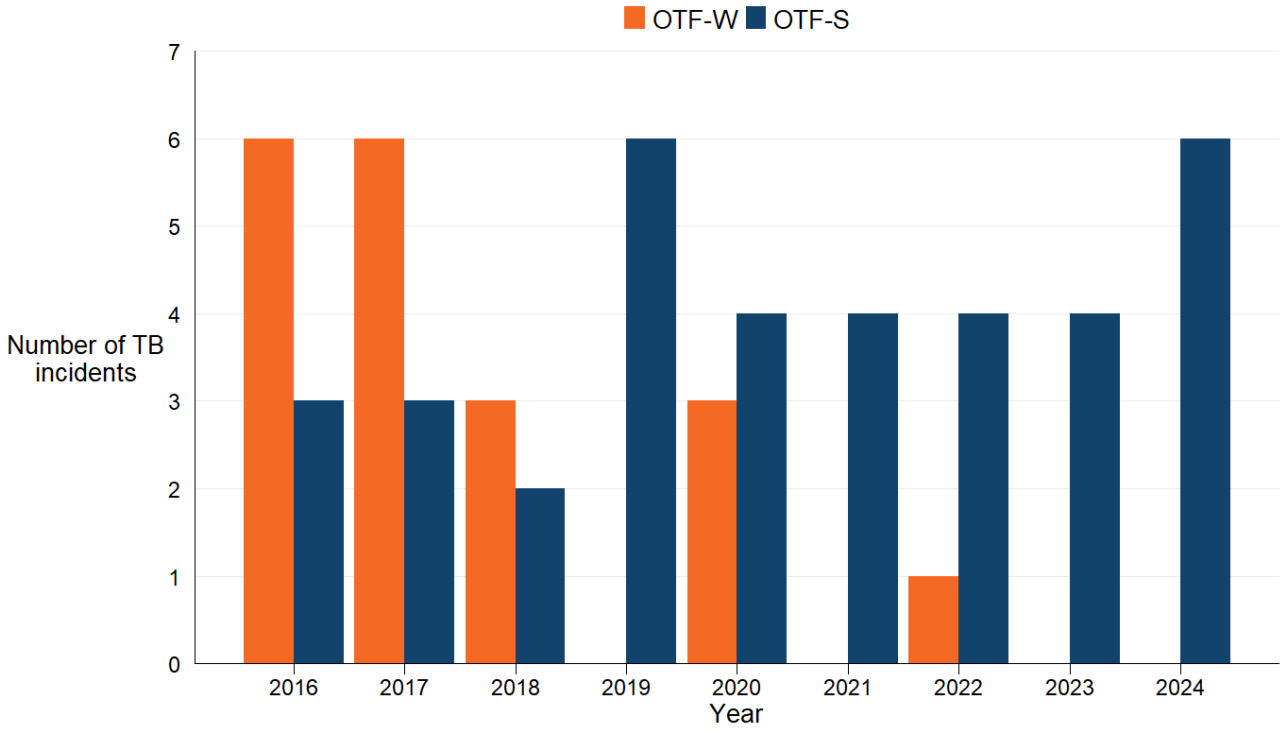

Figure 9: Annual number of new TB incidents detected in HS21, from 2016 to 2024.

Hotspot 26

HS26 was established in 2019, following a cluster of TB incidents in South Cumbria near Cartmel Fell, between Kendal and Windermere. The 3 OTF-W incidents triggering HS26 were all associated with clade B3-11 (formerly genotype 25:a) of M. bovis. There have been no new incidents in HS26 since 2021 (Figure 10), when 1 OTF-S incident was disclosed. Previously, there were 6 OTF-S and 2 OTF-W incidents in 2019, and 3 OTF-S incidents in 2020.

No enhanced TB control measures have been applied to cattle herds in HS26 apart from the radial testing zones triggered around the OTF-W incidents from 2019.

Wildlife surveillance was implemented in the area in August 2019. However, only 7 submissions were suitable for PME and M. bovis was not identified from any of them.

HS26 was closed in July 2024.

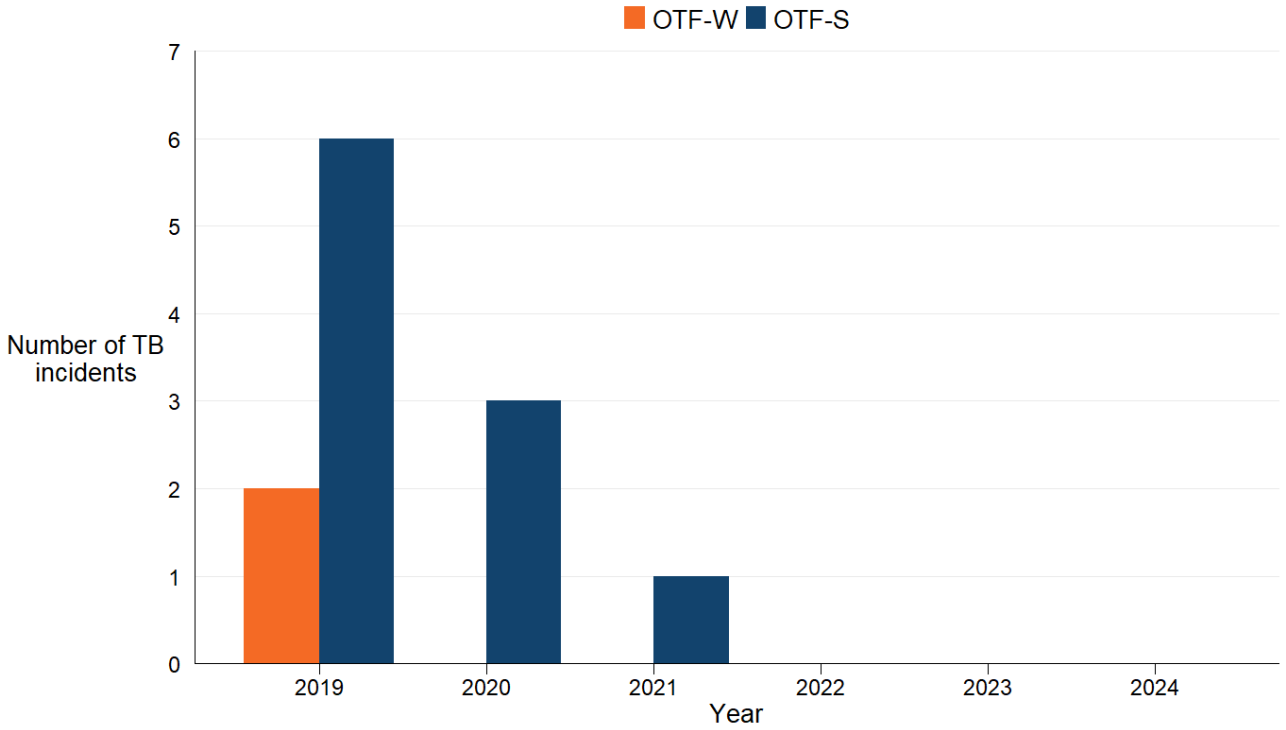

Figure 10: Annual number of new TB incidents in HS26, from 2019 to 2024.

Hotspot 29

HS29 was established in 2023 due to an increase in OTF-W incidents along the Eden Valley in 2021. Clade B3-11 was detected from the 4 incidents and application of WGS and phylogenetic analysis showed that they were closely genetically related to each other. Geographical and phylogenetic evidence combined provided strong evidence of local spread. Herds in HS29 were subject to enhanced surveillance, moving onto 6-monthly testing in Autumn 2023.

Isolates from 3 new OTF-W incidents in 2022 were also identified as clade B3-11 which were closely related to each other and incidents in the area from 2021. In 2023 there were a further 5 OTF-W incidents with isolates identified as clade B3-11.

There were 13 new TB incidents in HS29 in 2024, 4 OTF-W (all B3-11) and 9 OTF-S, which is an increase from 6 incidents in 2023 (5 OTF-W and 1 OTF-S), as shown in Figure 11. This increase is likely due to the increased testing frequency in HS29 from Autumn 2023. The B3-11 isolates from the 4 OTF-W incidents were all found to be closely genetically related to each other and isolates from within HS29 in previous years. Exposure to infected wildlife (can include badgers and/or deer) was the most likely source of infection for 3 of the 4 OTF-W incidents, with the final considered to be related to exposure to local infected cattle.

Since 2016, there have been 23 OTF-W incidents and 36 OTF-S incidents. The number of OTF-W incidents has steadily increased, with one OTF-W incident each year between 2016 and 2018, none in 2019, 2 in 2022, and between 5 and 4 from 2021 onwards.

The number of OTF-S incidents has fluctuated each year. There was one OTF-S incident in both 2020 and 2023, 2 in 2018, 3 in both 2016 and 2021, 4 in 2019, 6 in 2022, and 7 in 2017.

At the end of 2024, only 7 OTF-S were resolved; the rest of the incidents (4 OTF-W and 2 OTF-S) were ongoing.

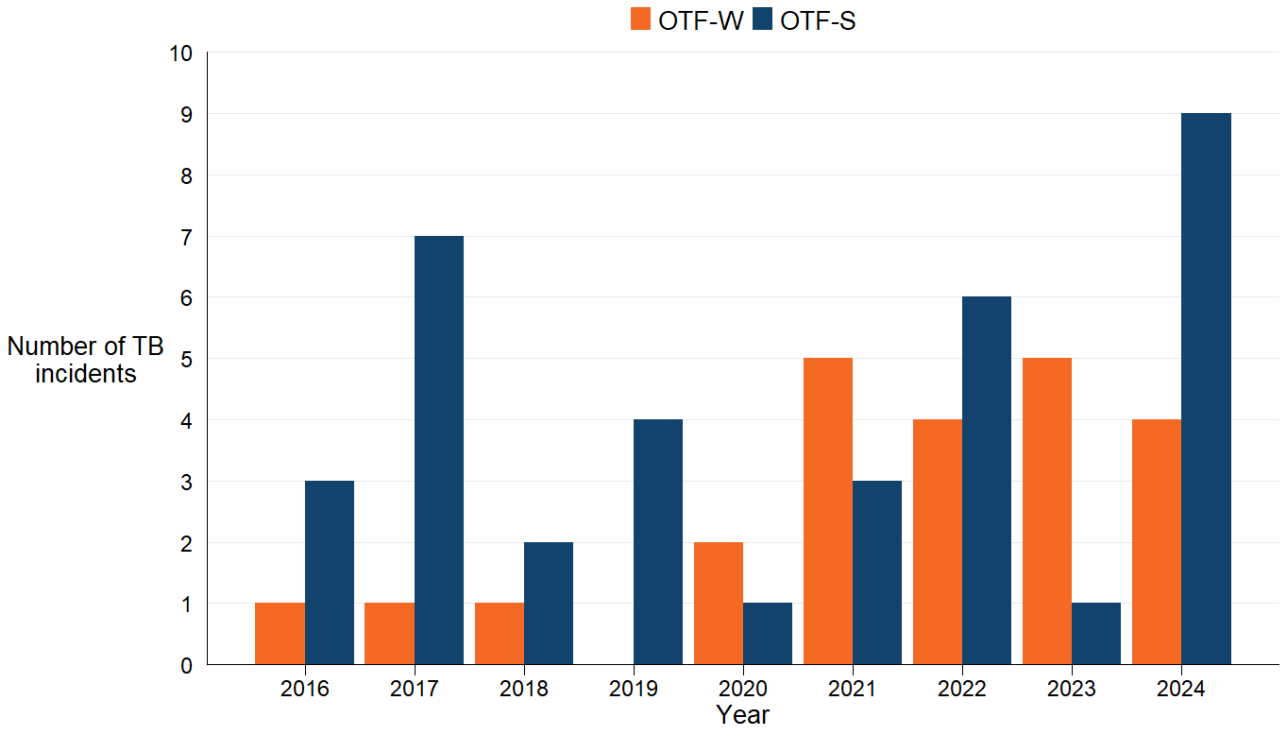

Figure 11: Annual number of new TB incidents in HS29, from 2016 to 2024.

Any discrepancies compared to figures published prior to 2023 are caused by an extension of the northern boundary of HS29, and the inclusion of incidents in the area where HS29 overlaps HS21 to encompass epidemiologically linked incidents. Incidents in this overlap area had previously been recorded under HS21 only, but going forwards, all incidents in the overlap area will be recorded for both HS21 and HS29. In 2024 there were 2 OTF-S incidents that were within the overlap area of HS21 and HS29.

Enhanced TB cattle control measures were introduced in 2023. All cattle herds are subject to 6-monthly surveillance testing and compulsory pre-movement testing. The third round of testing has been completed and the fourth was already underway at the time of writing this report. Further enhanced TB control measures include the application of whole herd movement restrictions when only inconclusive reactors (IRs) have been disclosed at a TB test.

Wildlife surveillance commenced in the area at the beginning of 2023. At the time of writing this report, a total of 57 badger carcases had been submitted since 2023. Out of 42 suitable for PME, 6 badger carcases yielded M. bovis isolates, 34 were negative and 2 were pending. A total of 9 deer carcases were submitted, of which 8 were suitable for PME and all were negative. Of those, 3 found-dead deer and 22 found-dead badger carcases as a result of road traffic accidents were submitted in 2024. All deer carcases were examined and all were culture negative. Of the 22 found-dead badger carcases, 18 were

suitable for PME. Four badger carcases have yielded M. bovis isolates which were closely related to isolates from cattle incidents in HS29.

Wildlife control measures, in the form of badger culling, were implemented in this hotspot in September 2024, moving the hotspot into management stage 4 (wildlife disease control).

Main risk pathways and key drivers for TB infection

Evidence collected during APHA veterinary investigations into the source of infection within herds was used to inform this understanding. In 2024, all 39 (100%) new TB incidents in Cumbria received a preliminary or final APHA veterinary investigation to identify the source of infection.

It can be challenging to retrospectively establish the route of infection for a TB incident herd. Ideally this investigation includes a thorough on-farm investigation and scrutiny of routinely collected data, such as cattle movement records, and the results of WGS where available. Up to 3 hazards and risk pathways were selected for each incident investigated. Each of these potential sources were given a score that reflects the likelihood of that pathway being the true one, based on the available evidence.

Details of the protocol used for these investigations, and the subsequent methodology used to calculate the weighted contribution of the different suspected sources of M. bovis infection can be found in the explanatory supplement for the annual reports 2024.

The key drivers of the occurrence of TB in cattle in Cumbria during 2024 were considered to be:

- movements of undetected infected cattle
- exposure to infected badgers
- contiguous cattle infection

In contrast to 2023, the most likely infection pathway for cattle herds in 2024 was the movement of undetected, infected cattle into (and within) the county, accounting for a weighted contribution of 24.9% (Appendix 3). Of particular concern is the identification of 3 WGS clades of M. bovis (B6-23, B6-21 and B6-86), all of which have origins in Ireland and have no home range in England.

Notably, 2 of these, B6-21 and B6-86, have been isolated from incidents in Scotland. Although the B6-23 isolate associated with the 2024 incident is more closely related to isolates from Northern Ireland than to isolates from HS21, it is important to note that this hotspot was originally established to control disease spread in Cumbria following the introduction of cattle infected with this clade over 10 years ago.

Furthermore, the explosive incident which started in 2023 in the north-west of the county (and continued into 2024) was also caused by a clade that originates in Ireland.

Direct imports onto these farms have not been identified, however undisclosed infection on transit holdings, including those in Scotland, cannot be ruled out.

Potential exposure to infected badgers had a weighted contribution of 20.3%. This is a marked reduction compared to 2023 (44.1%), but consistent with 2021 (20%). This risk pathway is predominantly being driven by the epidemiological situation in HS29, where infected badgers have been found to carry closely related isolates to those identified in cattle. In 2024, there were 4 OTF-W incidents in this hotspot, of which 3 were attributed to exposure to infected badgers, compared to all 5 OTF-W incidents in 2023 attributed to this risk pathway. The fourth OTF-W incident in 2024 was attributed to local cattle (residual infection). As wildlife control measures continue to be implemented, this pathway may become increasingly significant.

Contiguous cattle infection had a weighted contribution of 9.1%, which was an increase compared to the previous year (8.3%). Exposure to undetected infected contiguous cattle has been identified in certain incidents where cattle movements have not been found to be playing a role and where there is no known infection in wildlife. This pathway may also be involved in the route of transmission of clades originating from Ireland in herds with no direct imports.

Other infected wildlife (mostly wild deer) had a lower weighted contribution compared to previous years, decreasing to 4.4% in 2024 compared to 12.0 % in 2023 and 15% in 2022.

Other or unknown sources had a higher weighted contribution of 25.0% in 2024 compared to 13.2% in 2023. This category is added to those incidents in which there was high uncertainty around the selected pathways as alluded to earlier in the report (view the explanatory supplement to the annual reports 2024 for methodology).

All pathways and their weighted contributions are given in Table 5, Appendix 3.

Forward look

Cumbria currently has 2 open (or active) TB hotspots (HS21 and HS29) where evidence has been found to suggest wildlife involvement in the epidemiology of cattle TB incidents. In HS21, the policy of combined enhanced TB control measures in cattle and wildlife has been successful in reducing the incidence of disease, although there was a slight increase in OTF-S incidents in 2024 (6 compared to 4 in 2023). Work is ongoing to understand the occurrence of these OTF-S incidents in the absence of any culture-positive incidents of clade B6-23 since 2018. In HS29, on the other hand, enhanced TB control measures for cattle have been implemented since 2023, and for wildlife (badgers) since 2024. It is important that these measures are continued in order eradicate M. bovis infection in this area. In both areas, biosecurity measures to reduce the possibility of direct and indirect contact between neighbouring cattle and between cattle and wildlife, are key to continued disease control.

Moving forward, existing and new clusters of TB incidents identified require continued investigation and monitoring so that additional measures can be implemented if appropriate. The area to the west of HS29, the area in the south of the county and the area to the north-west are 3 such examples.

More broadly, purchasing undetected, infected cattle continues to present a significant risk to herds in Cumbria. Introductions of cattle without due regard to the TB history of the herd of origin may result in single incidents or, as alluded to above, in infection being

transmitted from cattle into local wildlife, and hence the establishment of new TB hotspots. Farmers in Cumbria, in addition to complying with the TB movement testing regulations, need to ensure that they take an informed approach to sourcing cattle. This could include following advice from their private veterinarians and using the ibTB interactive map. Consideration should be given to supplementing mandatory pre- (and post-) movement skin tests of incoming animals with private IFN-γ testing, particularly those purchased from higher risk areas of England and Wales. The identification of WGS clades of M. bovis endemic to Ireland highlight the particular risk posed by cattle from this part of the UK, and the potential role of transit holdings in Scotland. More work is needed to understand this risk pathway.

Appendix 1: cattle industry demographics

Table 1: Number of cattle herds by size category in Cumbria as of 31 December 2024 (RADAR data on number of holdings in the report year)

Size of herds	Number of herds
Undetermined	36
1 to 50	981
51 to 100	484
101 to 200	534
201 to 350	344
351 to 500	160
Greater than 501	169
Total number of herds	2,708
Mean herd size	157
Median herd size	83

Table 2: Number (and percentage of total) of animals by breed purpose in Cumbria as of 31 December 2024 (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
Beef	209,168 (49%)
Dairy	198,210 (46%)
Dual purpose	18,699 (4%)
Unknown	27 (0.006%)
Total	426,104

Appendix 2: summary of headline cattle TB statistics

Table 3: Herd-level summary statistics for TB in cattle in Cumbria between 2022 and 2024 (SAM data)

Herd-level statistics	2022	2023	2024
(a) Total number of cattle herds live on Sam at the end of the reporting period	3,278	3,144	3,152
(b) Total number of cattle herds subject to annual TB testing (or more frequent) at the end of the reporting period (any reason)	495	523	799
(c) Total number of whole herd skin tests carried out at any time in the period	1,066	1,299	1,677
(d) Total number of OTF cattle herds having TB whole-herd tests during the period for any reason	883	1,073	1,158
(e) Total number of OTF cattle herds at the end of the report period (herds not under any type of TB movement restrictions	3,232	3,118	3,090
(f) Total number of cattle herds that were not under restrictions due to an ongoing TB incident at the end of the report period	3,266	3,137	3,132
(g.1) Total number of new OTF-S TB incidents detected in cattle herds during the report period	15	9	28
(g.2) Total number of new OTF-W TB incidents detected in cattle herds during the report period	7	8	11
(g.3) Total number of new TB incidents (OTF-W and OTF-S) detected in cattle herds during the report period	22	17	39
(h.1) Of the new OTF-W herd incidents, how many occurred in a holding affected by another OTF-W incident in the previous 3 years?	4	2	2

Herd-level statistics	2022	2023	2024
(h.2) Of the new OTF-W herd incidents, how many could be considered secondary to a primary incident based on current evidence?	0	5	2
(h.3) Of the new OTF-W herd incidents, how many were triggered by skin test reactors or twice-inconclusive reactors (2xIRs) at routine herd tests?	1	1	1
(h.4) 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, check tests)?	4	6	10
(h.5) Of the new OTF-W herd incidents, how many were first detected through routine slaughterhouse TB surveillance?	2	1	0
(i.1) Number of new OTF-S incidents revealed by enhanced TB surveillance (radial testing) conducted around those OTF-W herds	4	2	8
(i.2) Number of new OTF-W incidents revealed by enhanced TB surveillance (radial testing) conducted around those OTF-W herds	3	4	5
(j) 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)	6	5	10
(k) Number of OTF-W herds still open at the end of the period that were on a finishing unit	1	1	1
(l) New laboratory-confirmed incidents of M. bovis infection in non-bovine domestic species or captive deer detected during the report period (indicate host species involved)	0	0	0

Table 4: Animal-level summary statistics for TB in cattle in Cumbria between 2022 and 2024

Animal-level statistics (cattle)	2022	2023	2024
(a) Total number of cattle tested with tuberculin skin tests or additional IFN-γ blood tests in the period (animal tests)	185,134	224,910	337,389
(b.1) Reactors detected by tuberculin skin tests during the year	28	128	108
(b.2) Reactors detected by additional IFN-γ blood tests (skin-test negative or IR animals) during the year	10	142	164
(c) Reactors detected during year per incidents disclosed during year	1.73	15.88	6.97
(d) Reactors per 1,000 animal tests	0.21	1.20	0.81
(e.1) Additional animals slaughtered during the year for TB control reasons (dangerous contacts, including any first time IRs)	1	8	15
(e.2) Additional animals slaughtered during the year for TB control reasons (private slaughters)	2	0	2
(f) Slaughterhouse (SLH) cases (tuberculous carcases) reported by the Food Standards Agency (FSA) during routine meat inspection	7	7	9
(g) SLH cases confirmed by M. bovis PCR testing or bacteriological culture	2	1	0

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 cases reported are submitted for culture analysis. All cases 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 2024, all 39 (100%) new TB incidents in Cumbria received a preliminary or final APHA veterinary investigation to identify the source of infection.

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 2024.

Table 5: Suspected sources of M. bovis infection for the 39 incidents with a preliminary or a final veterinary assessment in Cumbria, in 2024

Source of infection	Possible (1)	Likely (4)	Most likely (6)	Definite (8)	Weighted contribution
Badgers	13	9	0	0	20.3%
Cattle movements	13	7	2	0	24.9%
Contiguous	17	1	0	0	9.1%
Residual cattle infection	5	2	0	0	5.0%
Domestic animals	0	0	0	0	0.0%
Non-specific reactor	3	1	0	0	3.1%
Fomites	19	0	0	0	8.3%
Other wildlife	10	0	0	0	4.4%
Other or unknown source	0	0	0	0	25.0%

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

Data Protection:

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

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