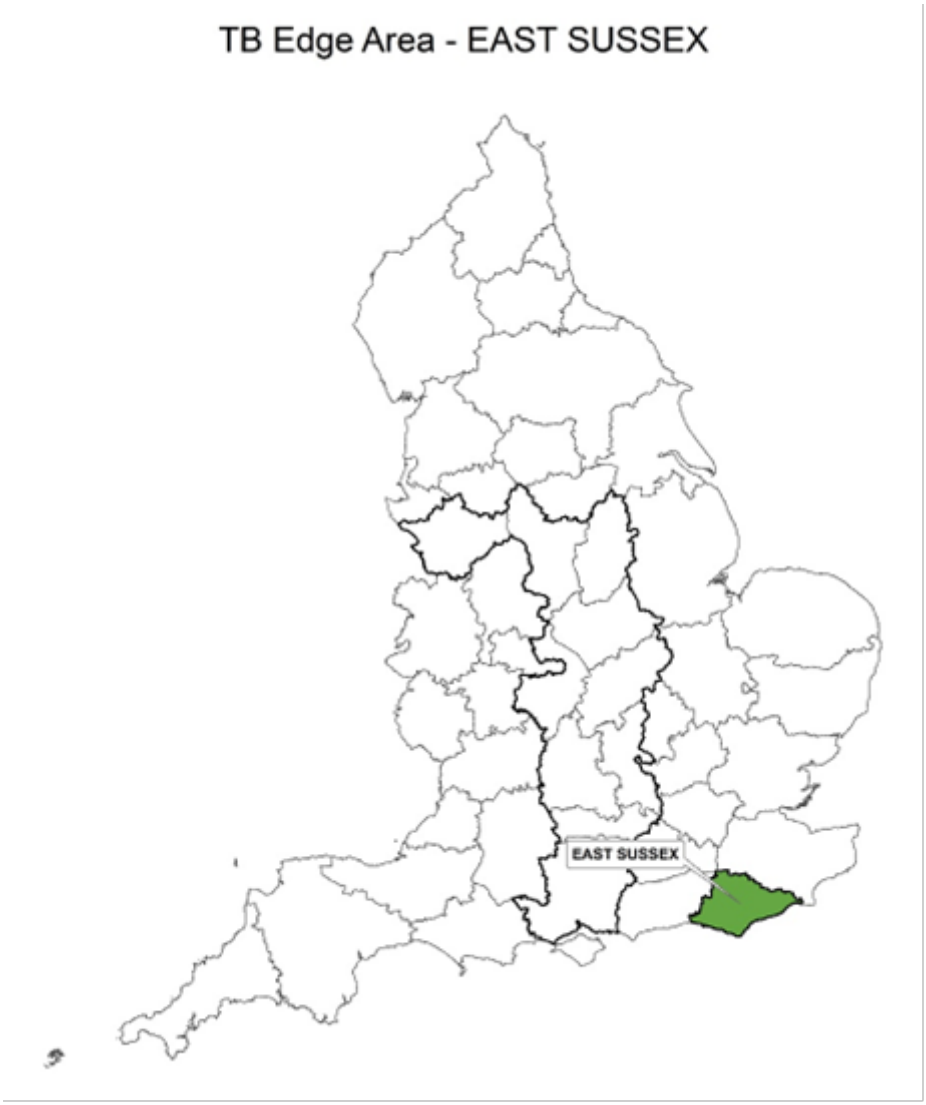
Animal &
Plant Health
Agency

# Year End Descriptive Epidemiology Report: Bovine TB in the Edge Area of England 2022 County: East Sussex



## Contents

# Introduction

The Edge Area was originally established in 2013. In 2014, the bovine tuberculosis (TB) surveillance strategy for this area was incorporated into the UK Government's Strategy to achieve Officially Bovine Tuberculosis-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 vary the approach to control 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 East Sussex, an Edge Area county, in 2022. 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 'breakdowns', this report will use the term 'incidents' throughout.

This report is intended for individuals involved in the control of TB, both locally and nationally. This includes, but it is not limited to, farmers, 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 2022.

# Types of TB incident

Unless otherwise specified, this report includes all new TB incidents detected during the reporting period (1 January to 31 December 2022). This includes both 'Officially Tuberculosis-Free Status Withdrawn' (OTF-W) and 'Officially Tuberculosis-Free Status Suspended' (OTF-S) incidents.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 positive to the Single Intradermal Comparative Cervical Tuberculin or SICCT test, in addition to either typical lesions of TB identified at post-mortem (PM) meat inspection, or at least one animal with an *M. bovis*-positive culture result from tissue samples collected from carcases during the PM inspection (or both).

OTF-S incidents are triggered by reactors to the skin test, but without subsequent detection of TB lesions or positive 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 due to differences in the information available at the time datasets are accessed.

## Cattle industry

Appendix 1 provides cattle industry demographics in East Sussex, which has a relatively low density of cattle farms. In 2022, 68% of cattle in the county were beef animals (with beef suckler herds being the predominant farm type in this category), 27% were dairy, and 3% were dual purpose. The mean number of cattle per holding was 84, similar to that of 2020 and 2021. There were only 12 herds with over 500 cattle in 2022, mostly dairy herds.

The number of herds in the region remained similar in 2022 (498) to 2021 (504).

There are 2 low-volume livestock markets providing an outlet for cattle from East Sussex: Hailsham market in East Sussex and Ashford market in the neighbouring Low Risk Area (LRA) county of Kent. Larger dairy and beef finishing herds source their cattle for restocking from further afield. This poses a risk of introducing TB infection into East Sussex from the High Risk Area (HRA) and from parts of Wales, where both cattle density and the prevalence of TB are much higher. There was one AFU without grazing in operation in East Sussex in 2022 but this ceased operation in December 2022.

East Sussex was originally divided between 2 TB risk areas. The High Risk Area (HRA) in the south and west and the Edge Area in the north and east of the county. The whole of East Sussex was fully incorporated into the Edge Area in January 2018.

All herds in East Sussex were eligible for annual testing in 2022.

## New TB incidents

Figure 1 shows there were 22 new TB incidents in East Sussex in 2022, 23% of which were OTF-W incidents and 77% OTF-S incidents. Overall, this is a 19% reduction on the number of TB incidents detected in 2021 (27 incidents). This is the lowest number of incidents reported in the county since 2016 when there were 20 incidents.

OTF-W incident numbers increased by one from 4 in 2021 to 5 in 2022, however these were all located in the original HRA portion of the county. The number of OTF-S incidents decreased from 23 in 2021 to 17 in 2022.

From 2013, the number of new TB incidents has fluctuated but with an overall gradual increasing trend, with a sudden rise in 2020 peaking at 41. However, the total number of new incidents has markedly decreased in the last 2 years with 27 new incidents in 2021 and 22 in 2022.

In 2022, all new OTF-W TB incidents were in beef herds, with 4 of the 5 in suckler herds, of which 3 occurred in large herds of over 250 cattle. Of the 12 herds in East Sussex with over 500 cattle, 6 of these became new OTF-S incidents, all of which were dairy herds, illustrating the significance of larger herd size as a risk factor for a TB incident.

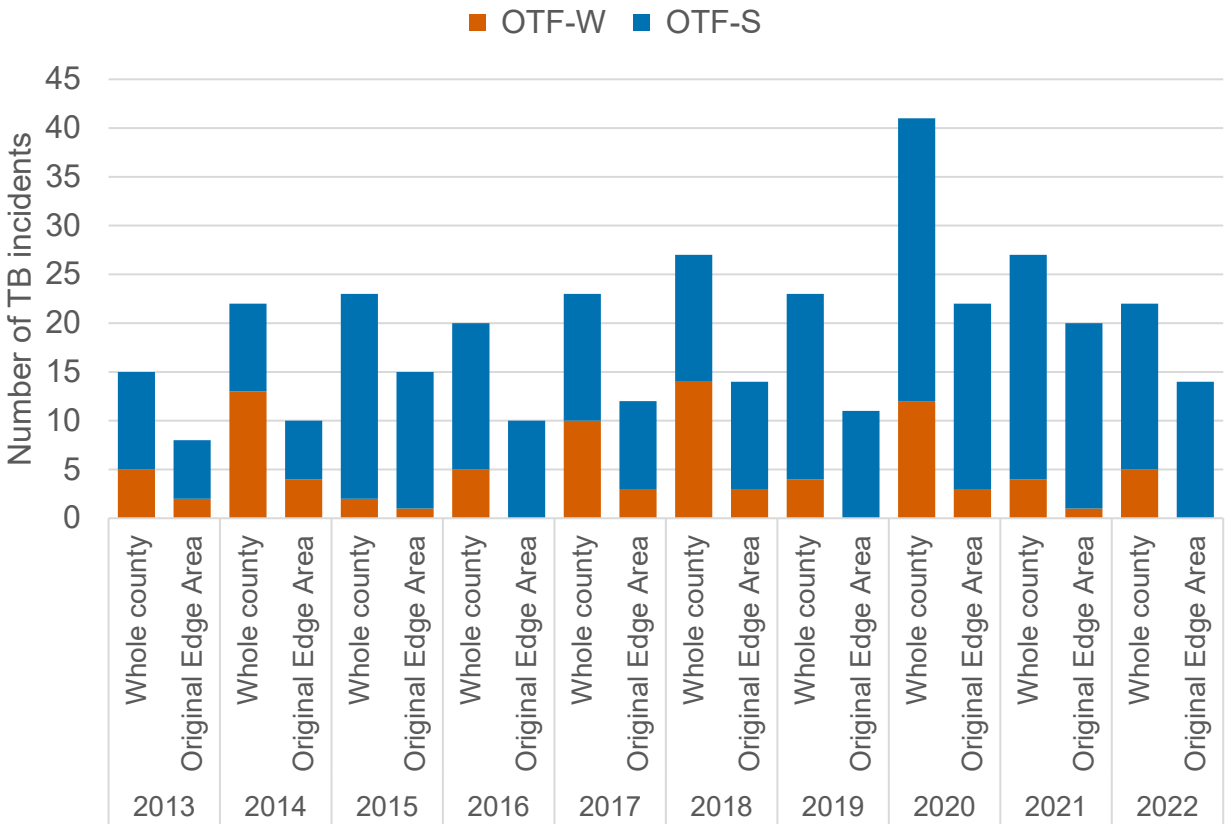



Figure 1: Annual number of new TB incidents in East Sussex, from 2013 to 2022.

## Disclosing test types

As in previous years, whole herd testing continued to detect the most incidents of TB in East Sussex in 2022 (10). This was followed by 6-monthly (6M) testing and radial testing, with each detecting 5 incidents, and 12-monthly (12M) testing detecting one incident, as shown in Figure 2. This demonstrates how active surveillance has been an essential tool in identifying the new TB incidents in East Sussex.

Risk based radial testing disclosed 4 out of the 5 new OTF-W incidents, the fifth being disclosed at a whole herd test (WHT). This illustrates the vital role that risk based testing plays in detecting TB incidents promptly.

The re-test of inconclusive reactors (IRs) triggered 41% of the OTF-S incidents in 2022 compared to 57% in 2021.

None of the TB incidents in 2022 commenced as a result of visible lesions being identified at post-mortem in passive slaughterhouse (SLH) surveillance.

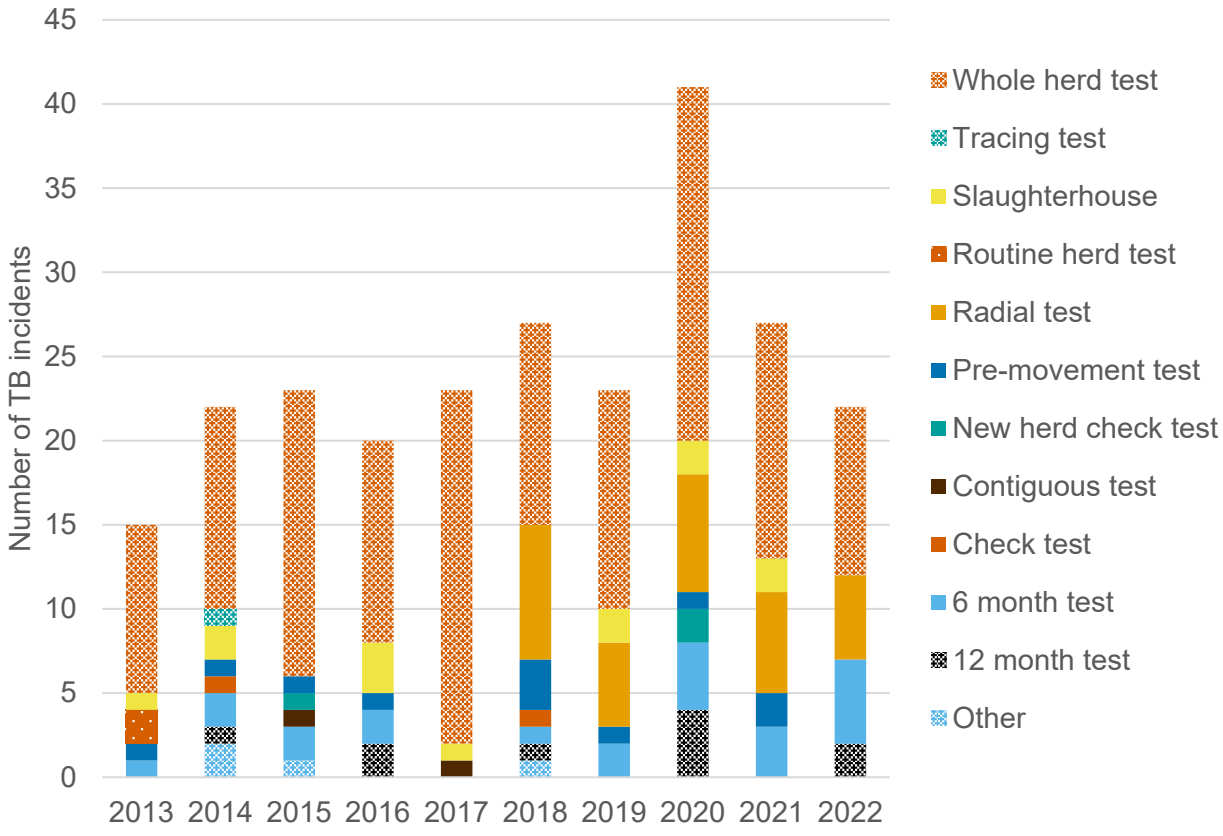



Figure 2: Number of new TB incidents (OTF-W and OTF-S) in East Sussex in 2022, according to the surveillance methods that detected them.

## Duration of TB incidents

A total of 24 TB incidents were resolved in East Sussex during 2022. Of these, 12 were new TB incidents that started in 2022, 11 started in 2021 and one was from 2020.

The median duration for OTF-W incidents that ended in 2022 was 261 days (interquartile range (IQR) 220 to 326). Two OTF-W incidents that ended in 2022 were resolved within 240 days, and 2 within 241 to 550 days.

Five OTF-S incidents were resolved quickly within 150 days. The remaining incidents (15 out of 24) were resolved within 550 days. The median duration was 175.5 days (IQR 151 to 283.5). There were no TB incidents still open at the end of 2022.

The median duration for all incidents that ended in 2022 was 186 days (IQR 153 to 298). This is shorter than the duration of incidents that ended in 2021, which was 190 days (IQR 167 to 340). For the whole Edge Area, the median duration of TB incidents that ended in 2022 was 182 days (IQR 157 to 286).

There were no persistent incidents (under movement restrictions for more than 550 days) unresolved at the end of the reporting year.

## Unusual TB incidents

The TB incident with the largest number of reactors for 2022 in East Sussex has had 23 animals removed to date, which represents over 10% of the herd. This OTF-W incident was located in the original HRA, disclosed at RAD6 (6 months post radial testing), and the local clade (B6-71) was identified. There were 14 out of 18 skin test reactors that had visible lesions (VL) at post-mortem. This herd has had previous incidents but has never had so many reactors. The reactors were homebred and the most likely source of infection was spread from infected wildlife or potential residual infection left in the herd from a previous incident. For both scenarios within herd transmission between cattle was a likely means for increasing reactor numbers.

## 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 with laboratory confirmed *M. bovis* infection, and in specific herds of camelids, goats and captive deer with an elevated risk of infection.

There were no incidents of TB reported in other non-bovine species in East Sussex in 2022.

APHA, in collaboration with the University of Nottingham, conducted a project to detect the presence and location of TB infection in badgers in Buckinghamshire, Oxfordshire, Berkshire, Hampshire and East Sussex - collectively known as the ‘Southern Edge Area’. Volunteers were recruited in each county to help with the safe and timely retrieval of badger carcases. They were delivered to the University of Nottingham, where they underwent post-mortem examination and testing for the presence of TB infection by culture. Those that tested positive were sent for further whole genome sequencing (WGS) and clade identification (genetic strain). The project aimed to collect 100 carcases of badgers found dead per county, most likely those killed in road traffic accidents (RTAs). Once 100 carcases of a sufficient quality were examined per county, collection ceased in

that county. Once county targets were achieved, all stakeholders were informed. The survey ended in April 2023 and its results will be communicated to all stakeholders once all the bacteriological cultures and WGS analysis have been completed. Its results will help develop a picture of the disease situation in the Southern Edge Area.

## Incidence of TB

As shown in Figure 3, TB incidence in 2022 decreased to the 2019 level of 4.6 TB incidents per 100 herd-years at risk. TB incidence gradually increased between 2012 and 2018, there was a small decline in 2019 but a sharp rise in 2020 from 4.6 to 8.1. However, it dropped to 6.2 in 2021 which was sustained with further decrease in 2022. With the relatively low numbers of TB incidents involved, it is difficult to predict whether this decline will continue.

East Sussex had a low incidence compared to other Edge Area counties in 2022, with 4.6 incidents per 100 herd-years at risk in 2022. Only 2 Edge Area counties had a lower incidence than East Sussex, these were Northamptonshire (4.5) and Hampshire (3.4). The overall incidence rate for the Edge Area was 7.7 incidents per 100 herd-years at risk in 2022.

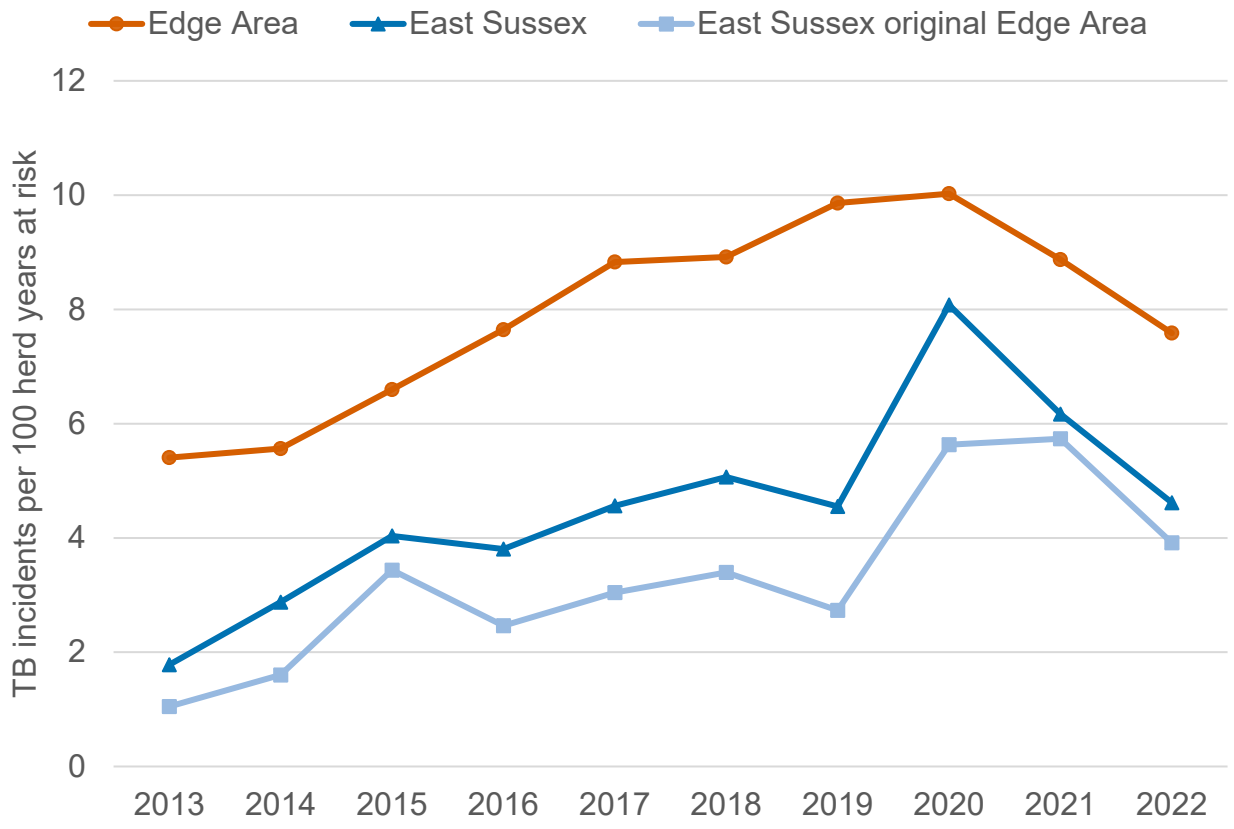



Figure 3: Annual incidence rate (per 100 herd-years at risk) for all new incidents (OTF-W and OTF-S) in East Sussex, from 2013 to 2022.

## Prevalence of TB

East Sussex has a relatively low prevalence of TB, with 1.7% of herds under movement restrictions caused by a TB incident at the end of 2022, compared to 3.6% in the Edge Area as a whole, see Figure 4. The end of year prevalence has been gradually decreasing since a peak of 3.3% in 2018, however, it is almost double the prevalence reported in 2013 (0.7%).

The 34% reduction in new TB incidents in 2021 compared to 2020 contributed to the overall reduction in prevalence observed.

End-of-year prevalence for the original Edge Area of East Sussex decreased from 2.2% in 2021 to 1.3% in 2022. This can be partly explained by the fact that in 2022 9 of the 14 (64%) OTF-S incidents were disclosed in January to April 2022 (64%), but in 2021 only 50% were disclosed in the same time period. If the incident is disclosed at the beginning of the year, it is more likely to have been resolved by end of December and therefore does not contribute to herd prevalence data which is calculated at the end of each year.

Three of the OTF-W incidents that resolved in 2022 were disclosed in 2021. Eight of the OTF-S incidents that were resolved in 2022 were disclosed in 2021. Six unresolved OTF-S incidents were all disclosed in 2022 and 4 of the 5 OTF-W incidents disclosed in 2022 were unresolved at the end of the year. Therefore, if the number of OTF-W incidents increases this tends to have a greater impact on the end of year prevalence as OTF-W incidents take longer to resolve due to the necessity for more rounds of TB tests before TB restrictions are lifted.

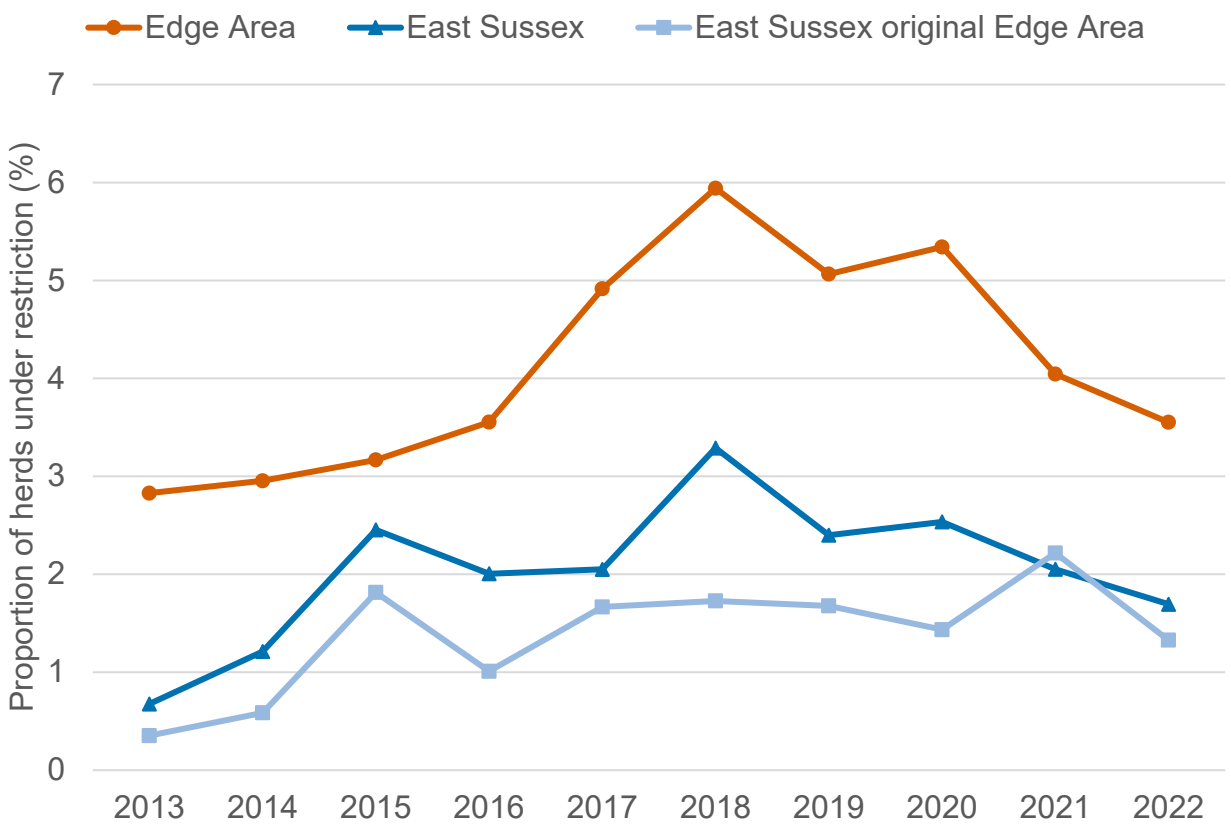



Figure 4: Annual end of year prevalence in East Sussex, from 2013 to 2022.

## Re-occurring TB incidents

In East Sussex, 16 OTF-S herds met this criteria, of which 10 (62.5%) had a history of TB (experienced another incident in the past 3 years), see Figure 5. All 5 of the OTF-W incidents that met the criteria for this assessment had a history of TB (one herd had 2 incidents of TB in 2022 and is counted once in this section).

The Edge Area as a whole had a re-occurrence of 50%, with East Sussex and Berkshire having the highest level of re-occurrence (71% and 67% respectively) of all Edge Counties and Hampshire the lowest at 27%. Of the OTF-S herds in 2022, 45% had no TB history.

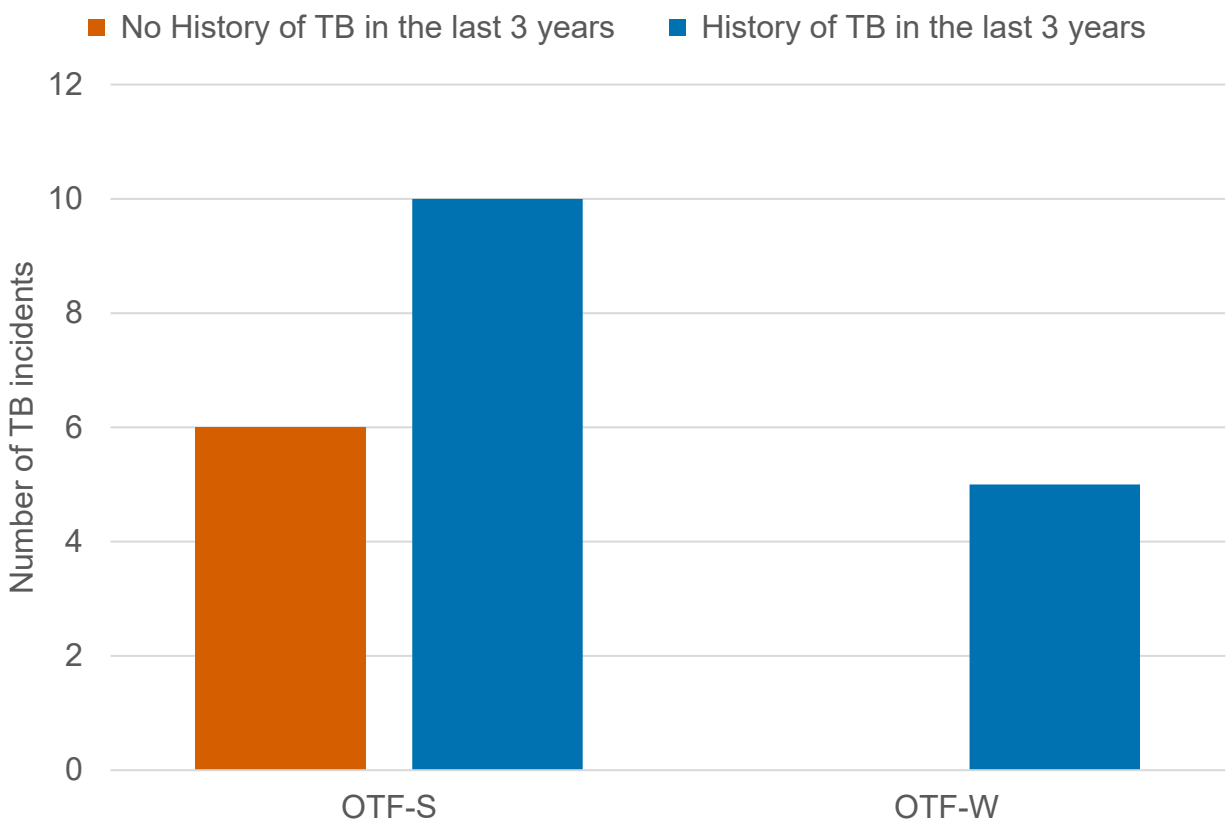



Figure 5: Number of herds with a TB incident (by OTF-W and OTF-S) in East Sussex in 2022, with and without a history of any TB incident in the previous 3 years.

## Geographical distribution of TB incidents

Figure 6 shows the distribution of new OTF-S and OTF-W TB incidents in 2022 throughout East Sussex. OTF-W incidents occurred towards the south of East Sussex, most situated south of the A27, whereas OTF-S incidents were spread throughout the county. As in previous years, the majority of OTF-W incidents were caused by WGS clade B6-71, except one that was caused by clade B6-85. This incident was linked to cattle movements from South West England where this clade is endemic. All 2022 OTF-W incidents occurred in the original HRA part of the county.

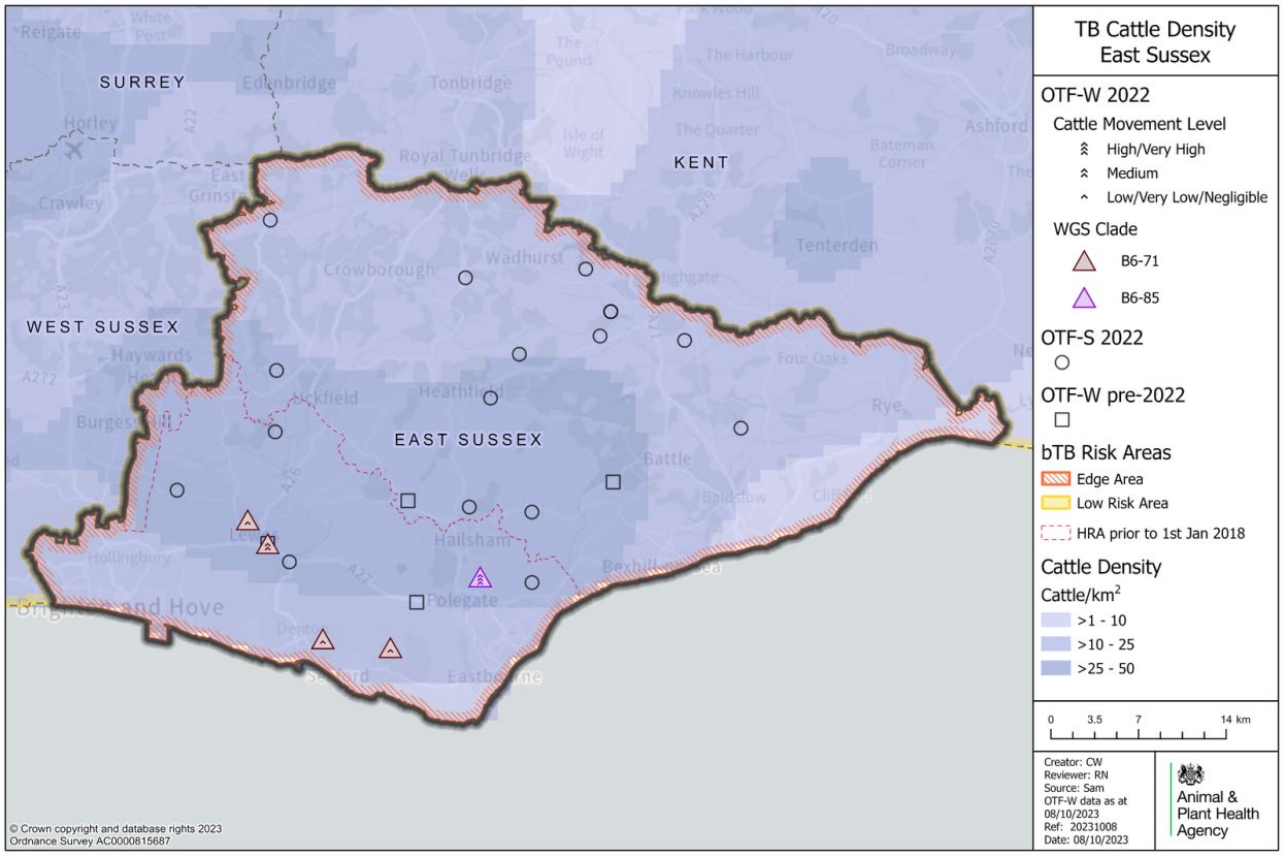



Figure 6: Location of cattle holdings in East Sussex with new TB incidents (OTF-W and OTF-S) in 2022 and cattle holdings with pre-2022 OTF-W incidents still ongoing at the beginning of 2022, overlaid on a cattle density map. The movement score for each farm is symbolised with 3 chevrons for cattle movements associated with a high likelihood of infection, 2 chevrons for a medium likelihood and one chevron for a low likelihood.

## Skin test reactors and interferon gamma test positive animals removed

Appendix 2 provides a summary of headline cattle TB statistics in East Sussex. A total of 112 cattle were removed from TB incidents in East Sussex during 2022, as shown in Figure 7. The tuberculin skin test detected 102 infected animals and 10 were detected through the interferon gamma (IFN-γ) blood test. This is an overall decrease of 46 cattle since 2021.

The proportion of skin (91%) to IFN-γ blood (9%) test reactors differed from that of 2021. This was due to a 48% decrease in the number of animals receiving IFN-γ tests in 2022 compared to 2021 (407 versus 781, respectively).

Diversion of staff resources into the highly pathogenic avian influenza (AI) outbreak resulted in a slight delay in 3 herds having IFN-γ testing in spring 2023 rather than autumn of 2022 which could account for the discrepancy between 2022 and 2021. Furthermore, policy changes in July 2021 restricted the mandatory deployment of IFN-γ tests to herds that had another TB incident within the past 18 months.

Over the last 10 years, the number of skin test reactors has increased gradually, with peaks in 2018 (146) and 2020 (128). The number of IFN-γ positive animals has decreased since 2018, with only 10 IFN-γ reactors recorded in 2022.

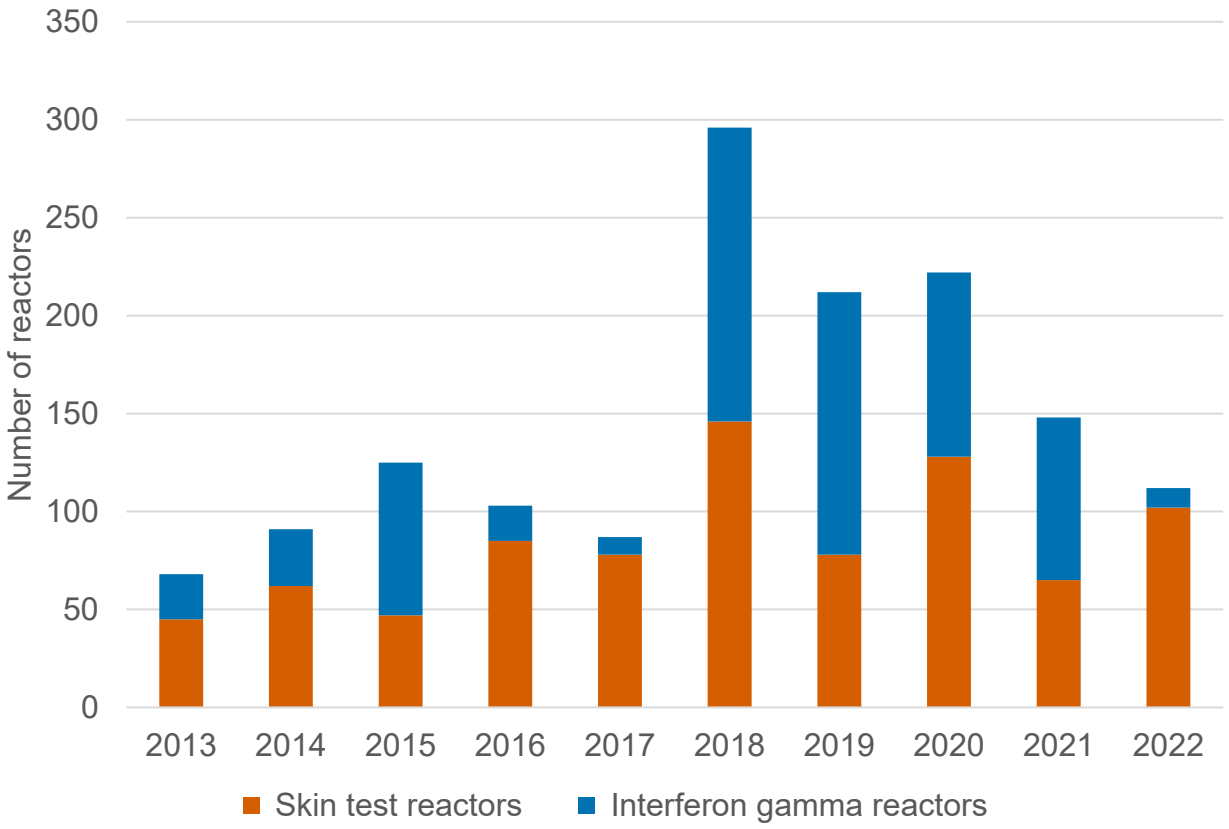



Figure 7: Number of skin test reactors (SICCT) and interferon gamma (IFN-γ) test positive cattle removed by APHA for TB control reasons in East Sussex, from 2013 to 2022.

## 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 mitigations that may reduce 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 tool can be used to inform purchasing choices, reducing the risk of introducing undetected infection when moving cattle into a herd.

In 2022, 6 out of 22 (27%) new TB incidents in East Sussex received a preliminary or final APHA veterinary investigation to identify the source of infection. The results of these investigations can be found in Appendix 3. The small number of investigations carried out

in 2022 was mainly due to the diversion of field resource to the large AI outbreak which occurred in 2021 and 2022.

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

- Cattle Movement Algorithm
- WGS Local Reservoir Indicator

The Cattle Movement Algorithm uses cattle movement data to identify individual animals that were moved into a 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 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 Reservoir 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 indicate a local reservoir of infection:

- it has a WGS with no more than 3 single nucleotide polymorphism (SNP) differences relative to the TB incident of interest
- it is within 4 years before or 6 months after the start date of the incident of interest
- it is 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 2022.

There is always a variable degree of uncertainty about the estimated true routes of TB infection into a herd. The absence of a local reservoir, 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.

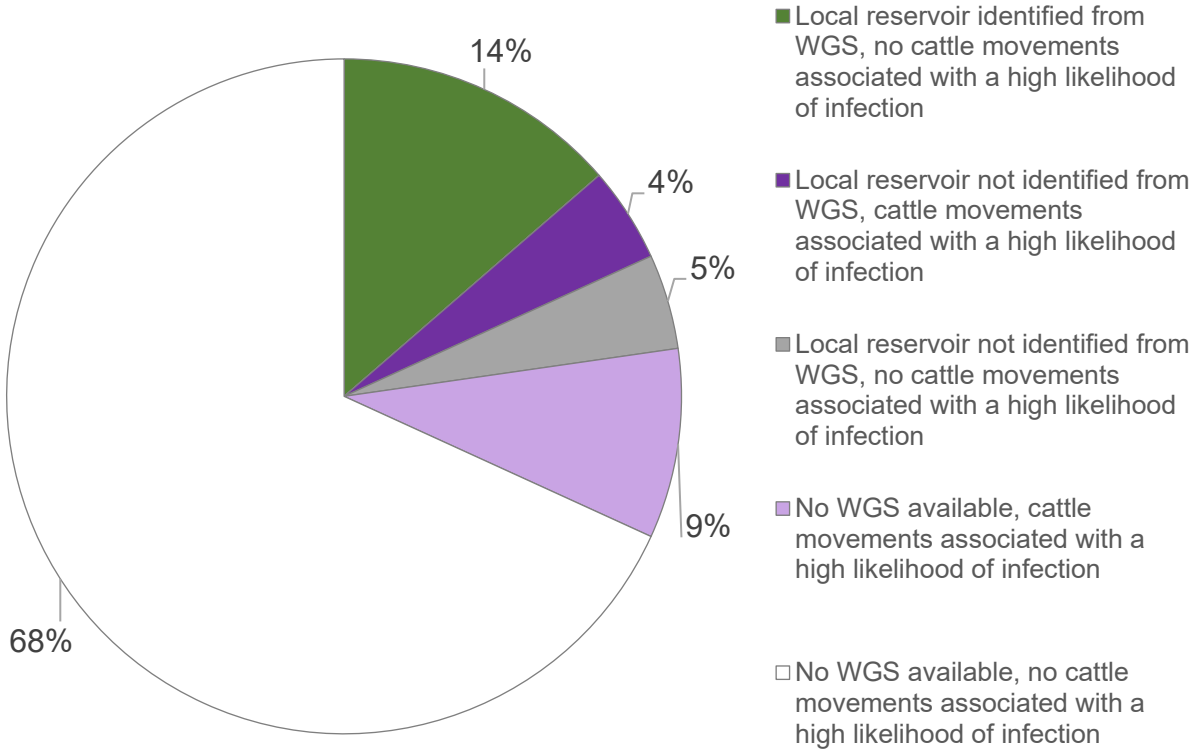



Figure 8: Risk pathway combinations identified by the WGS local reservoir indicator and cattle movement algorithm for all 22 new TB incidents in East Sussex in 2022

WGS data was available for 5 (23%) of all new TB incidents in East Sussex. The WGS Local Reservoir Indicator identified a local reservoir of infection for 3 new TB incidents in 2022.

Of the 5 TB incidents with WGS data available, 3 had a local reservoir identified without strong evidence of cattle movements (dark green symbols, Figure 9).

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.

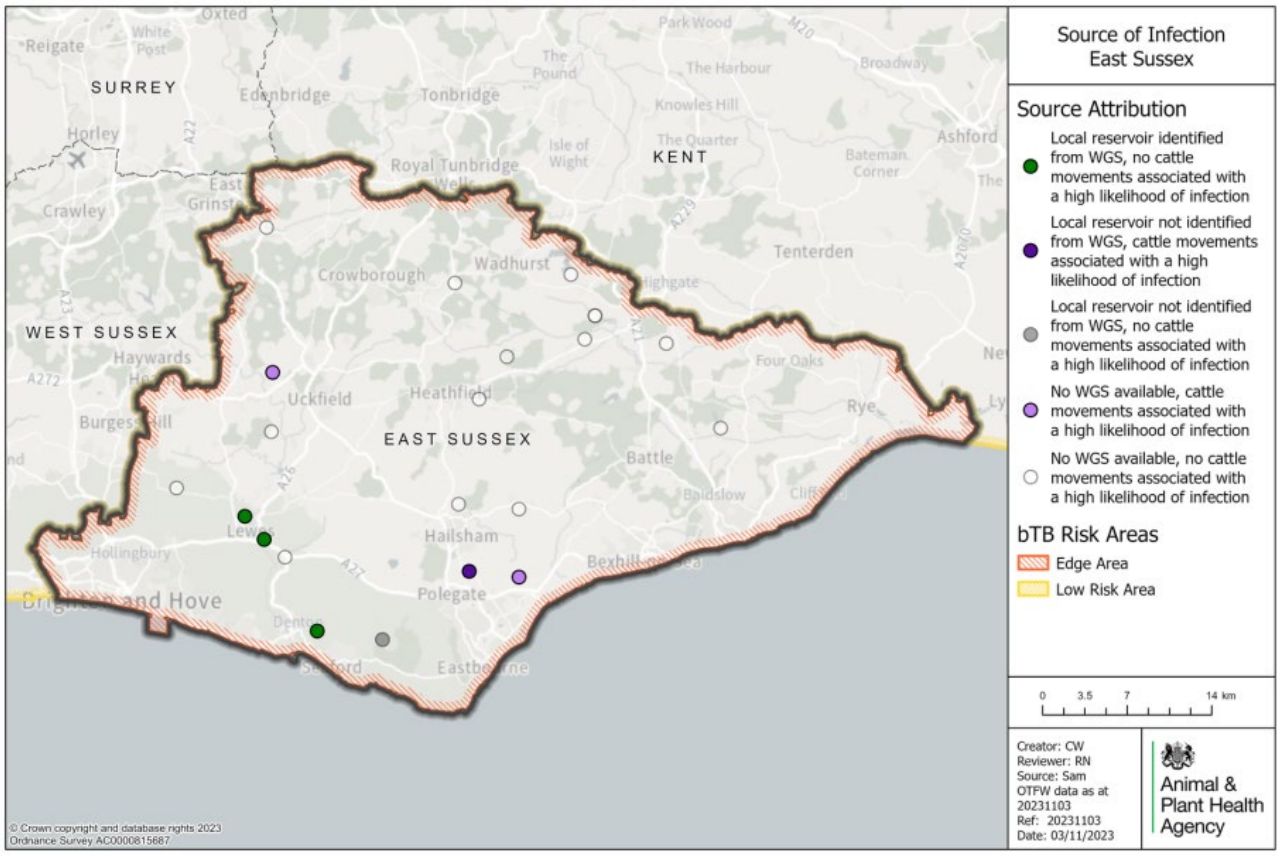



Figure 9: Map of the available evidence for risk pathways of TB infection into the herd, for all TB incidents (OTF-W and OTF-S) in Hampshire that started in 2022.

In East Sussex, one TB incident (4%) had evidence of cattle movements associated with a high or very high likelihood of TB infection and no evidence of a local reservoir, where WGS was available. For this herd it is considered more likely than not that cattle movements played a part in the introduction of infection (dark purple symbol, Figure 9).

A further 2 TB incidents (9%) had cattle movements associated with a high likelihood of TB infection, but WGS data was not available to look for a local reservoir. These are depicted in light purple in Figure 9 due to the lack of genetic evidence.

For one TB incident the WGS Local Reservoir Indicator did not find evidence of a local reservoir and there was no evidence of cattle movements associated with a high likelihood of TB infection (grey symbol). There is uncertainty about the risk pathway for this incident. WGS of the *M. bovis* isolated indicated that it was more closely related (7 SNP different) to an isolate from a nearby incident about 4 miles away compared to the isolate from a previous incident in 2020 (15 SNP different). This does not support residual infection as the most likely cause. However, this herd has had 4 OTF-W incidents in the last 6 years, all identified as local genotypes (13:a and 13:c), and WGS data was available for only one of the 11 VL animals from the 2022 incident. Therefore, this one WGS may not be representative of possible concurrent multiple risk pathways for infection occurring in this herd including residual infection and contact with infected wildlife.

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 reservoir for 15 of the 22 (68%) TB incidents. These are shown as white dots in Figure 9, as there is insufficient evidence to determine a likely infection pathway.

Figure 10 shows that new TB incidents caused by *M. bovis* clade B6-71 occurred in the south-west of East Sussex in 2022. Whole genome sequencing identified other closely related incidents in this area in 2020 and 2021.

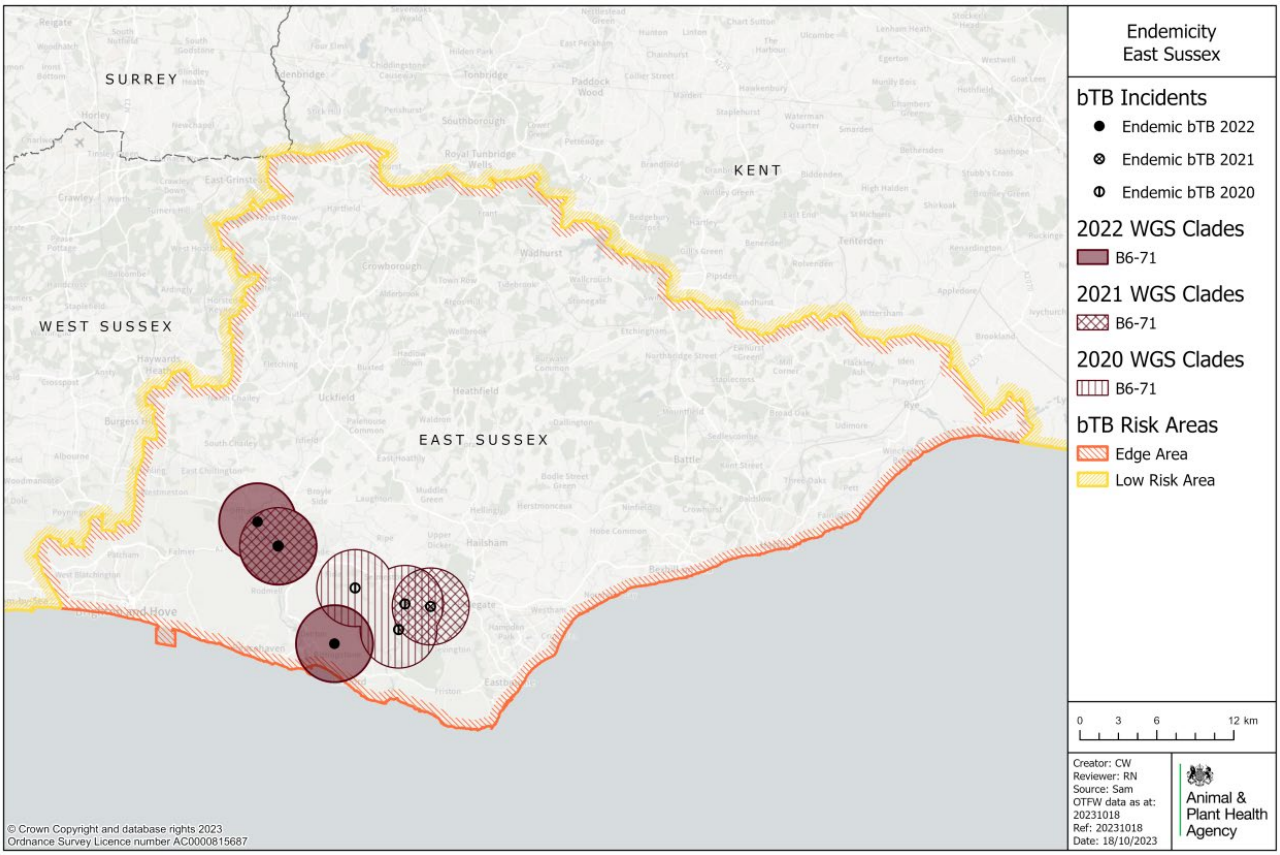



Figure 10: WGS clades of *M. bovis* detected in East Sussex between 2020 and 2022, where the WGS identified in the infected herd was within 3 SNPs of another TB incident in the past 4 years and 9km (OTF-W incidents only).

Figure 6 and 9 shows that OTF-W incidents identified in 2022 were located within the original HRA portion of the county. This suggests that the area of endemic *M. bovis* infection in wildlife has not notably expanded. However, incidents in recent years suggest that the endemic area has crossed over the A27 near Lewes. This road was previously considered a barrier to the spread of wildlife infection.

# Forward look

Although there have been reductions in incidence and prevalence rates in East Sussex over the last 2 years, there is evidence that the endemic area has now crossed the A27. This creep north of the endemic area and the high re-occurrence rate makes reaching OTF-S status by 2025 unlikely.

There are 2 projects within the county which began in 2021 focusing on TB in wildlife and its control.

APHA, in collaboration with the University of Nottingham, conducted a project to detect the presence and location of TB infection in badgers in Buckinghamshire, Oxfordshire, Berkshire, Hampshire and East Sussex - collectively known as the 'southern Edge Area'. Volunteers were recruited in each county to help with the safe and timely retrieval of badger carcases. They were delivered to the University of Nottingham, where they underwent PME and testing for the presence of TB infection by culture. Those that tested positive were sent for further WGS and clade identification (genetic strain). The project aimed to collect 100 carcases of badgers found dead per county, most likely those killed in road traffic accidents (RTAs). Once 100 carcases of a sufficient quality were examined per county, collection ceased in that county. Once county targets were achieved, all stakeholders were informed. The survey ended in April 2023 and its results will be communicated to all stakeholders once all the bacteriological cultures and WGS analysis have been completed. Its results will help develop a picture of the disease situation in the southern Edge Area.

The Vaccinating East Sussex Badgers (VESBA) project began in 2021 and has funding for 5 years. This is a large-scale badger vaccination project undertaken from within the farming community across approximately 250km$^2$ in the endemic TB area in the original HRA section of East Sussex. The findings of this over the next 5 years will help guide future control methods for deploying other vaccination schemes in the future and farmers should be encouraged to participate.

There are several measures to help address the most common risk pathways for TB infection in East Sussex. These include:

- increased uptake of badger vaccination
- improving on-farm biosecurity measures to reduce transmission, this can be achieved by simple measures such as raising of water troughs, wildlife proofing feed stores and reducing nose-to-nose contact
- taking advantage of the free advice available to cattle farmers in the Edge Area from the TB Advisory Service (TBAS) to help evaluate and improve on-farm biosecurity measures

- stronger messaging to farmers to encourage informed purchase practices of cattle, encouraging farmers to avoid purchase of cattle from herds with a history of TB, available tools such as the interactive mapping tool ibTB can be used by farmers to inform purchasing decisions
- continued deployment of mandatory IFN-y testing in OTF-W incidents to reduce risk of re-occurrence.

# Appendix 1: cattle industry demographics

Table 1: Number of cattle herds by size category in East Sussex as of 31 December 2022 (RADAR data).

| Size of herds | Number of herds in East Sussex |
|---|---|
| Undetermined | 4 |
| 1 to 50 | 288 |
| 51 to 100 | 93 |
| 101 to 200 | 65 |
| 201 to 350 | 26 |
| 351 to 500 | 10 |
| Greater than 500 | 12 |
| Total number of herds | 498 |
| Mean herd size | 84 |
| Median herd size | 38 |

Table 2: Number (and percentage of total) of animals by breed purpose in East Sussex as of 31 December 2022.

| Breed purpose | Number (and percentage of total) cattle in East Sussex |
|---|---|
| Beef | 28,831 (68%) |
| Dairy | 11,639 (27%) |
| Dual purpose | 1,420 (3%) |
| Unknown | 2 (0.005%) |
| Total | 41,892 |

# Appendix 2: summary of headline cattle TB statistics

Table 3: Herd-level summary statistics for TB in cattle in East Sussex between 2020 and 2022.

| Herd-level statistics | 2020 | 2021 | 2022 |
|---|---|---|---|
| (a) Total number of cattle herds live on Sam at the end of the reporting period | 632 | 586 | 591 |
| (b) Total number of whole herd skin tests carried out at any time in the period | 673 | 591 | 586 |
| (c) Total number of OTF cattle herds having TB whole herd tests during the period for any reason | 493 | 476 | 469 |
| (d) Total number of OTF cattle herds at the end of the report period (herds not under any type of Notice Prohibiting the Movement of Bovine Animals (TB02) restrictions) | 600 | 563 | 559 |
| (e) Total number of cattle herds that were not under restrictions due to an ongoing TB incident at the end of the report period | 615 | 573 | 581 |
| (f.1) Total number of new OTF-S TB incidents detected in cattle herds during the report period (including all Finishing Units) | 29 | 23 | 17 |
| (f.2) Total number of new OTF-W TB incidents detected in cattle herds during the report period (including all Finishing Units) | 12 | 4 | 5 |
| (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? | 3 | 1 | N/A |
| (g.2) Of the new OTF-W herd incidents, how many were triggered by skin test Reactors or 2xIRs at routine herd tests? | 2 | 0 | N/A |

| Herd-level statistics | 2020 | 2021 | 2022 |
|---|---|---|---|
| (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)? | 8 | 2 | N/A |
| (g.4) Of the new OTF-W herd incidents, how many were first detected through routine slaughterhouse TB surveillance? | 2 | 2 | 0 |
| (h.1) Number of new OTF-W incidents revealed by enhanced TB surveillance (radial testing) conducted around those OTF-W herds | 6 | 1 | 4 |
| (h.2) Number of new OTF-S incidents revealed by enhanced TB surveillance (radial testing) conducted around those OTF-W herds | 1 | 5 | 1 |
| (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, but not including non-grazing Approved Finishing Units) | 7 | 3 | 4 |
| (j) New confirmed (positive *M. bovis* culture) incidents in non-bovine species detected during the report period (indicate host species involved) | 1 meerkat | 0 | 0 |
| (k.1) Number of grazing approved finishing units active at end of the period | 0 | 0 | 0 |
| (k.2) Number of non-grazing approved finishing units active at end of the period | 1 | 1 | 1 |
| (k.3) Number of grazing exempt finishing units active at end of the period | 0 | 0 | 0 |
| (k.4) Number of non-grazing exempt finishing units active at end of the period | 1 | 1 | 1 |

Table 4: Animal-level summary statistics for TB in cattle in East Sussex between 2020 and 2022.

| **Animal-level statistics (cattle)** | **2020** | **2021** | **2022** |
|---|---|---|---|
| (a) Total number of cattle tested in the period (animal tests) | 79,543 | 65,883 | 72,833 |
| (b.1) Reactors detected by tuberculin skin tests during the year | 128 | 65 | 102 |
| (b.2) Reactors detected by additional IFN-γ blood tests (skin-test negative or IR animals) during the year | 94 | 83 | 10 |
| (c) Reactors detected during year per incidents disclosed during year | 5.4 | 5.5 | 5.1 |
| (d) Reactors per 1,000 animal tests | 2.8 | 2.2 | 1.5 |
| (e.1) Additional animals slaughtered during the year for TB control reasons (dangerous contacts, including any first time IRs) | 15 | 15 | 2 |
| (e.2) Additional animals slaughtered during the year for TB control reasons (private slaughters) | 8 | 7 | 6 |
| (f) Slaughterhouse (SLH) cases (suspect tuberculous carcases) reported by Food Standards Agency (FSA) during routine meat inspection | 9 | 3 | 1 |
| (g) SLH cases confirmed by culture of *M. bovis* | 2 | 3 | 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 here.

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 2022, 6 out of 22 (27%) new TB incidents in East Sussex received a preliminary or final APHA veterinary investigation to identify the source of infection, 2 of which occurred on-farm. The small number of investigations carried out in 2022 was mainly due to the diversion of field resource to the large AI outbreak which occurred in 2021 to 2022.

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 2022.

Table 5: Suspected sources of *M. bovis* infection for the 6 incidents with a preliminary or a final veterinary assessment in East Sussex, in 2022.

| Source of infection | Possible (1) | Likely (4) | Most likely (6) | Definite (8) | Weighted contribution |
|---|---|---|---|---|---|
| Badgers | 2 | 2 | 5 | 0 | 60.9% |

| Source of infection | Possible (1) | Likely (4) | Most likely (6) | Definite (8) | Weighted contribution |
|---|---|---|---|---|---|
| Cattle movements | 2 | 0 | 1 | 0 | 17.4% |
| Contiguous | 0 | 0 | 0 | 0 | 0% |
| Residual cattle infection | 3 | 2 | 0 | 0 | 10.7% |
| Domestic animals | 0 | 0 | 0 | 0 | 0% |
| Non-specific reactor | 0 | 0 | 0 | 0 | 0% |
| Fomites | 0 | 0 | 0 | 0 | 0% |
| Other wildlife | 0 | 0 | 0 | 0 | 0% |
| Other or unknown source | 0 | 0 | 0 | 0 | 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.

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

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