Animal &
Plant Health
Agency

Year End Descriptive Epidemiology Report: Bovine TB in the Edge Area of England 2022

County: Northamptonshire

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 Northamptonshire, 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 This includes both 'Officially Tuberculosis-Free Status Withdrawn' (OTF-W) and 'Officially Tuberculosis-Free Status Suspended' (OTF-S) incidents.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

Northamptonshire has a low herd and cattle density, with most cattle situated in the western half of the county. As of 31 December 2022, Northamptonshire had 454 cattle herds. This is a reduction from 2021, when there were 475 cattle herds. The total number of cattle in Northamptonshire decreased by 3%, from 49,151 in 2021 to 47,835 in 2022.

The average herd size in 2022 was 105 cattle, with small holdings (fewer than 50 cattle) accounting for 46% of the herds. Beef animals accounted for 86% of the total cattle population in the county, as shown in Appendix 1.

There is a single livestock auction market, Thrapston, but there is also substantial cattle trade into the county from Rugby market in Warwickshire and Thame market in Oxfordshire (both Edge Area counties adjoining Northamptonshire). There were 12 registered AFUs in Northamptonshire in 2022, a decrease of 2 from 2021, as indicated in Appendix 2.

New TB incidents

The number of new TB incidents decreased in 2022 compared to 2021, from 35 to 19, as displayed in Figure 1. This was the second year in a row that there has been an overall decrease in the number of new incidents in Northamptonshire.

There were 11 OTF-W incidents, compared to 19 in 2021. The number of OTF-S incidents halved from 16 to 8 in 2022. Out of the 19 new incidents, 13 were in beef-suckler herds (6 OTF-W and 7 OTF-S) and 6 were in beef-fattener herds (5 OTF-W and one OTF-S). None of these incidents were in registered dairy herds.

The number of new TB incidents in Northamptonshire showed a steady increase from 11 new incidents in 2013 to 38 new incidents in 2020, but it has since declined in 2021 and 2022 (see Figure 1).

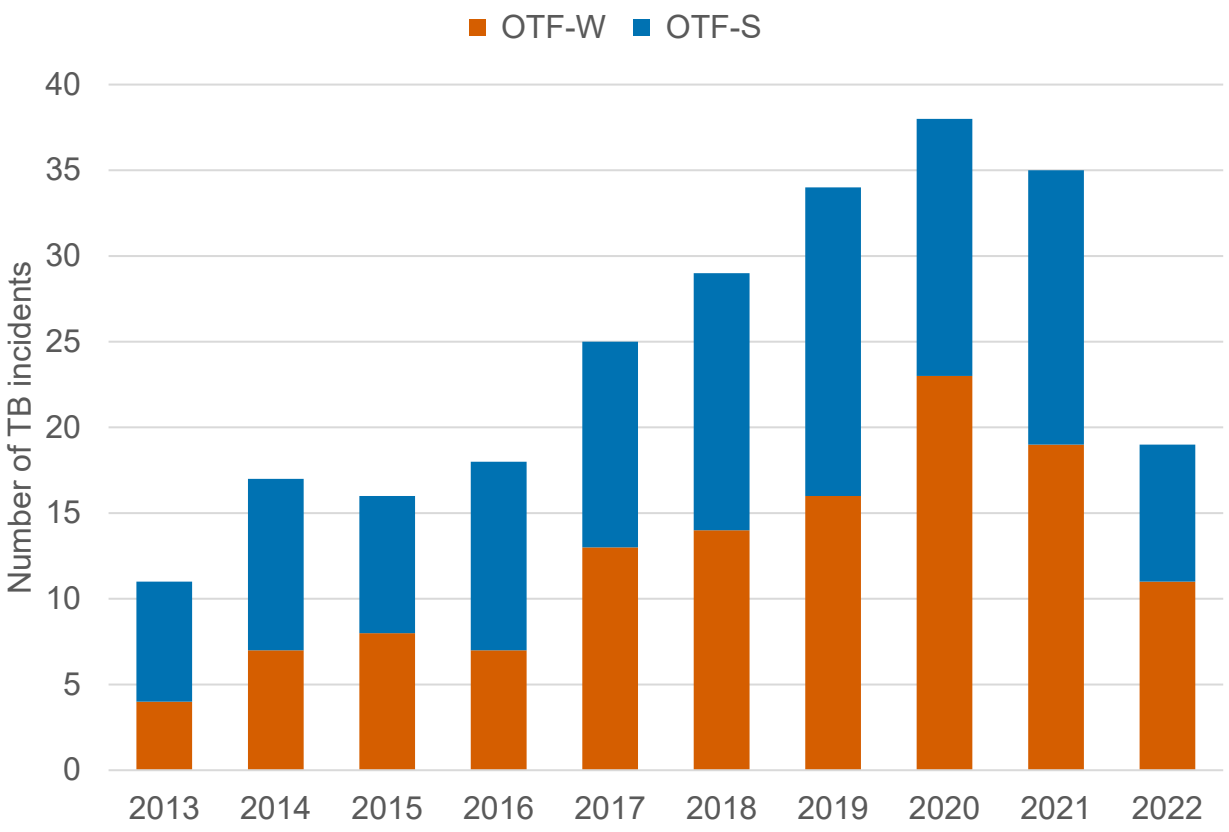

Figure 1: Annual number of new TB incidents in Northamptonshire, from 2013 to 2022.

Disclosing test types

Since 2018, the Whole Herd Test (WHT, default surveillance test code) and radial testing (RAD) have detected most of the TB incidents in Northamptonshire, as shown in Figure 2. In 2022, this was still the case, however WHT detected far fewer incidents than in 2021 (4 in 2022 vs 13 In 2021), and radial testing detected 11 incidents.

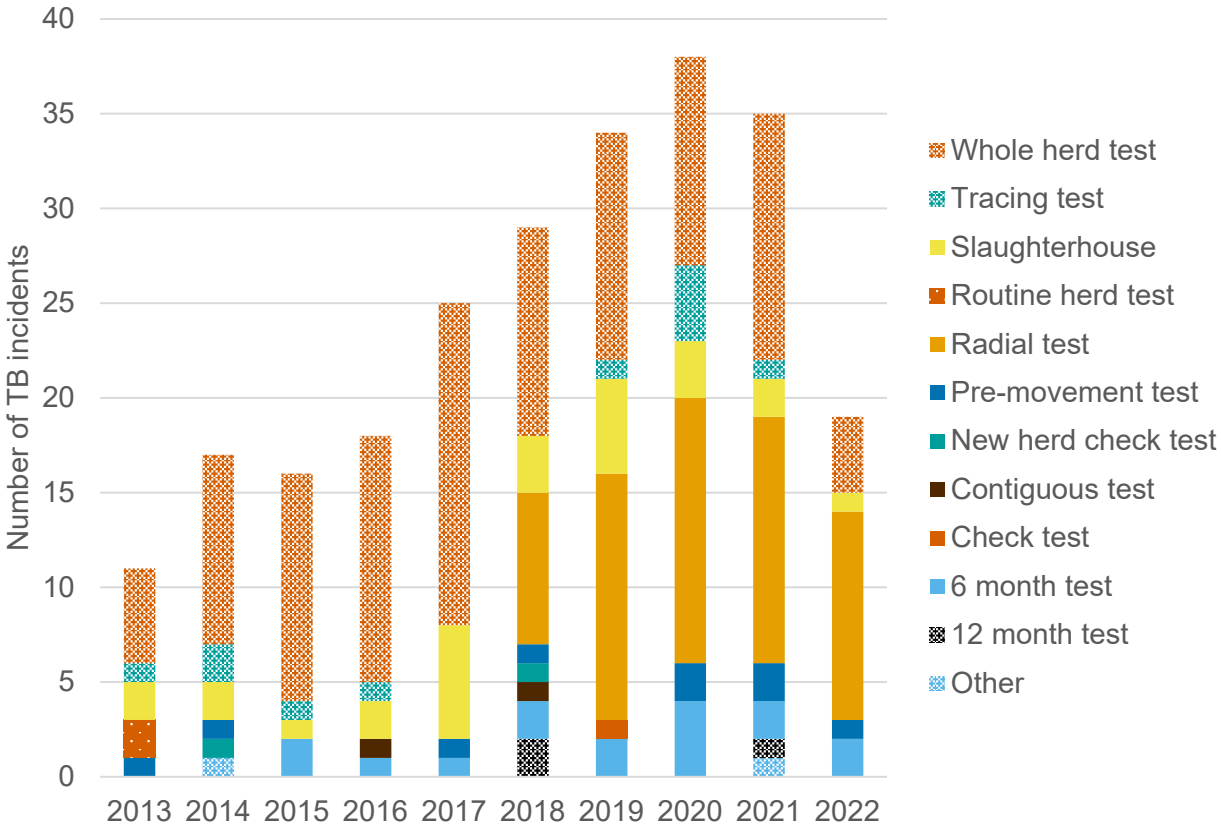

Figure 2: Number of new TB incidents (OTF-W and OTF-S) in Northamptonshire in 2022, according to the surveillance methods that detected them.

Duration of TB incidents

A total of 19 TB incidents were resolved in Northamptonshire during 2022. Of these, 6 were new TB incidents that started in 2022, and 13 had started in 2021.

The median duration for OTF-W incidents that ended in 2022 was 279 days (interquartile range (IQR) 172 to 377). Five OTF-W incidents were resolved within 240 days, and the remaining 8 were resolved between 241 to 550 days.

Most OTF-S incidents that ended in 2022 (7 out of 8) were resolved within 240 days, although one was resolved quickly: in under 100 days. The median duration was 171.5 days (IQR 163 to 180.5).

There were no TB incidents still open at the end of 2022 that had been under movement restrictions for more than 550 days.

The median duration for all incidents (both OTF-W and OTF-S) that ended in 2022 was 179 days (IQR 166 to 315). This is shorter than the duration of incidents that ended in

2021; 209.5 days (IQR 168 to 278). It is also shorter than the median duration for the whole Edge Area, 182 days (IQR 159 to 263).

For the whole Edge Area, the median duration of TB incidents that ended in 2022 was 182 days (IQR 157 to 286).

Unusual TB incidents

In 2022, 2 cattle were found with lesions in less common locations than typically found in animals infected with TB (the head or the respiratory tract), since the main route of infection is respiratory. These animals had lesions in the mesenteric lymph nodes, which would suggest a route of entry via ingestion. One holding had a disclosing reactor with a lesion in a mesenteric lymph node (a lymph node associated with the intestines). However, this lesion was negative on culture. Another holding had a reactor identified during a short interval test that also had a lesion in a mesenteric lymph node. This lesion was positive on culture and a Whole Genome Sequence (WGS) clade (B6-62) was able to be identified from the isolate. It was not possible to identify a reason for these lesions being in the mesenteric lymph nodes from the history of either of these animals.

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 at an elevated risk of infection.

There were no incidents of TB in non-bovine species in Northamptonshire in 2022.

Incidence of TB

Incidence of TB in Northamptonshire in 2022 was 4.3 new TB incidents per 100 herd-years at risk, decreasing from 7.8 in 2021 (Figure 3). This was the second consecutive year that the herd incidence rate fell, after a steady increase from 3.1 in 2015 to 8.8 in 2020. Further data in the coming years will be required to make an overall assessment on whether incidence is truly declining.

Northamptonshire had the second lowest incidence out of the 11 Edge Area counties. This rate remained below the Edge Area overall (7.6).

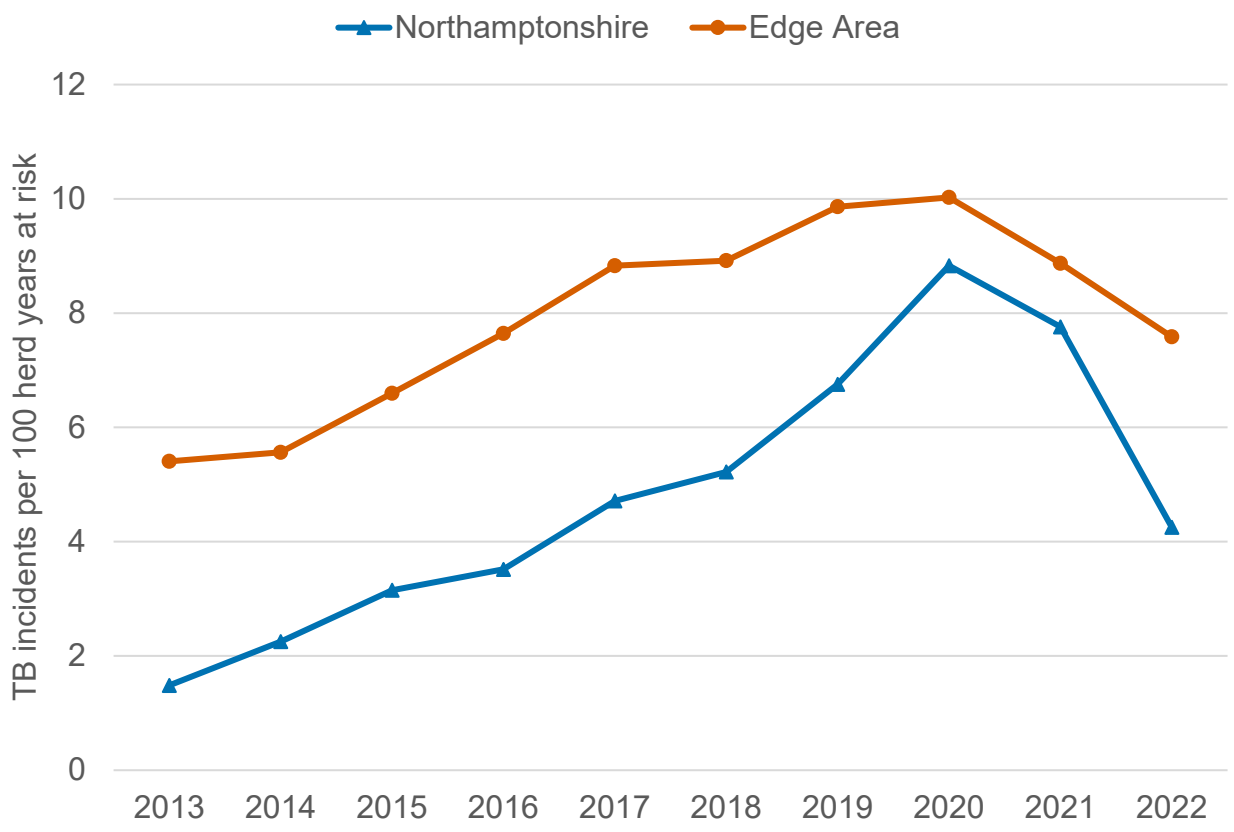

Figure 3: Annual incidence rate (per 100 herd-years at risk) for all new incidents (OTF-W and OTF-S) in Northamptonshire, from 2013 to 2022.

Prevalence of TB

The prevalence decreased slightly in 2022 (2.2%) from 2021 (2.4%), as shown in Figure 4. This was the second consecutive year that the herd prevalence fell in Northamptonshire, after being at a higher level for the preceding 3 years (ranging from 3.4% to 4.1% between 2018 and 2020). This level of prevalence is lower than the average herd prevalence for the whole of the Edge Area in 2022 (3.6%).

Prevalence is the proportion of herds under movement restrictions due to an ongoing TB incident at a fixed point in time (31 December). Thus, the reduction in prevalence could be attributed to more TB tests in 2022 being completed within the testing window, thereby reducing the duration of incidents. This is in contrast to 2020 when, due to coronavirus (COVID-19), some TB incidents were artificially extended because of overdue herd testing.

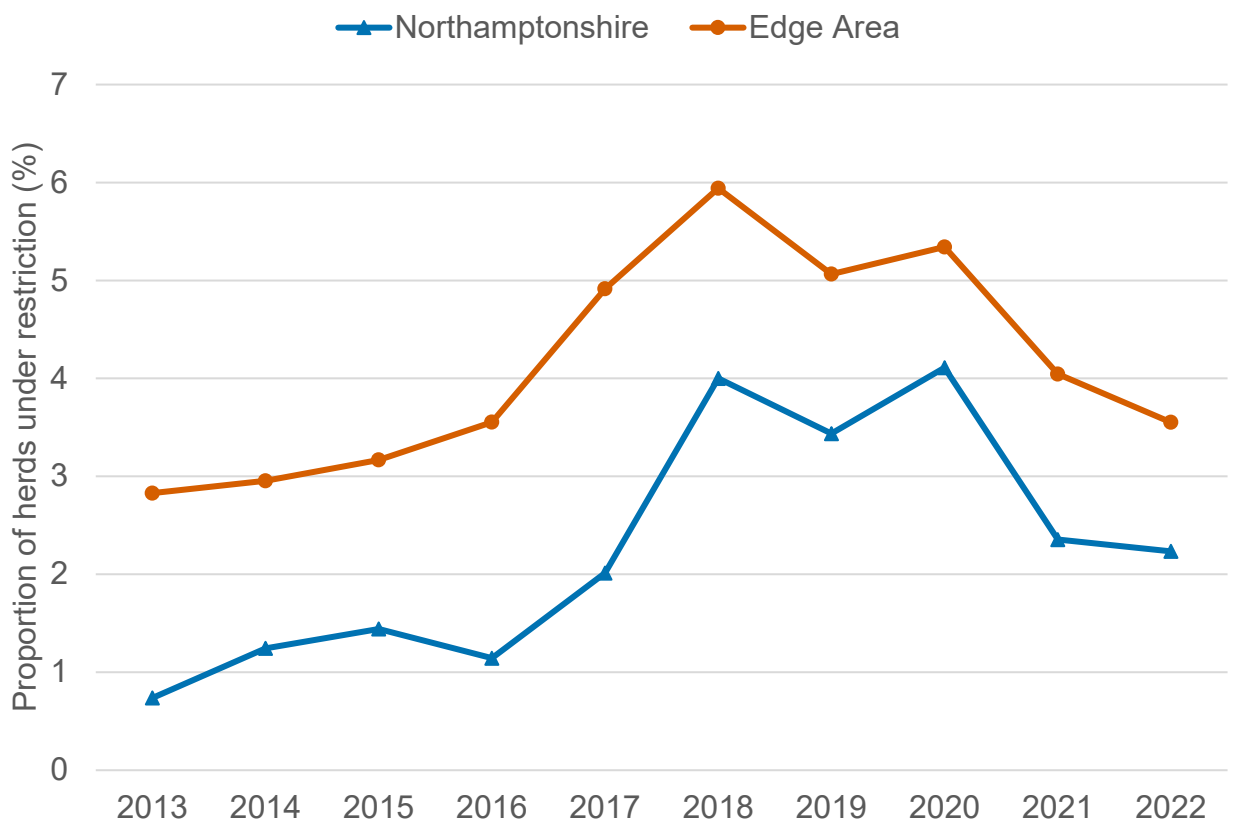

Figure 4: Annual end-of-year prevalence in Northamptonshire, from 2013 to 2022.

Re-occurring TB incidents

In Northamptonshire, 17 of the 19 new TB incidents met the criteria. Of the 8 herds with a new OTF-S TB incident in 2022, 4 (50%) had experienced another breakdown in the past 3 years. For OTF-W incidents, 6 of the 11 assessed incidents (55%) had a history of TB in the past 3 years, as shown in Figure 5.

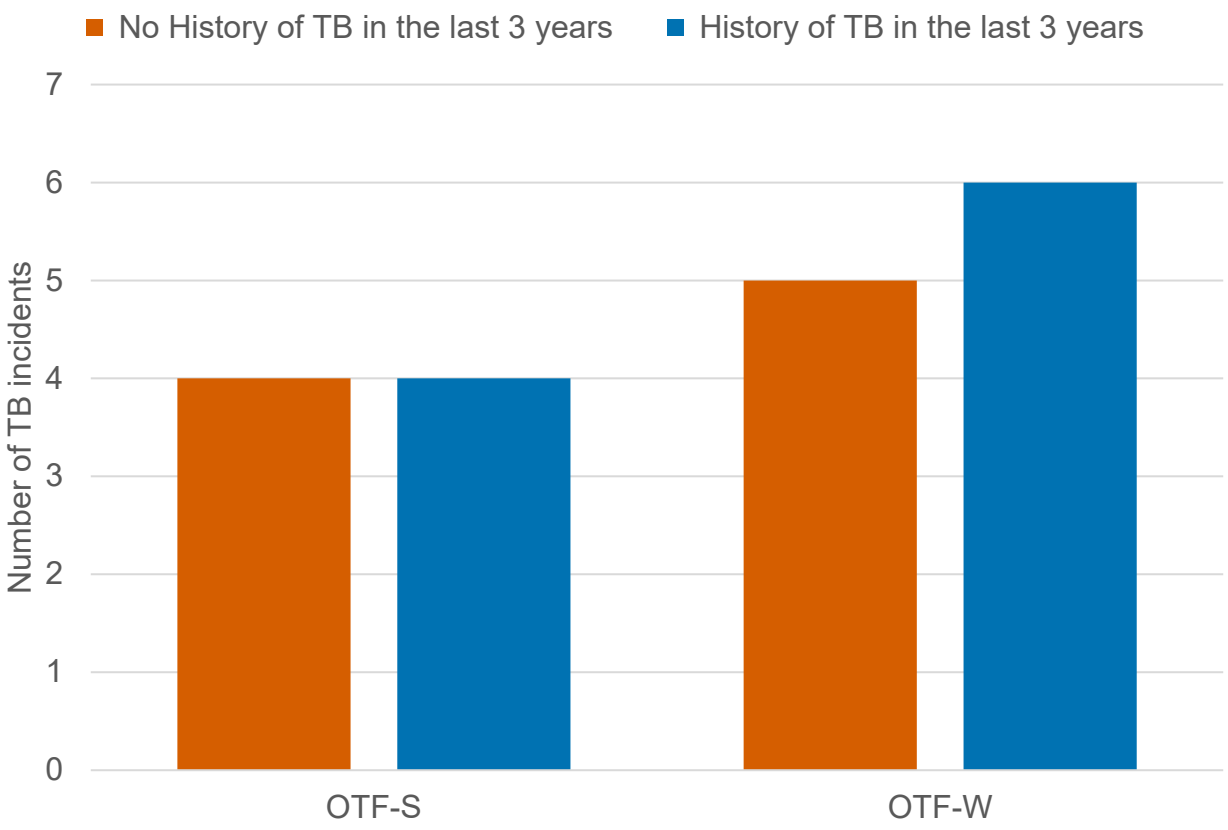

Figure 5: Number of herds with a TB incident (by OTF-W and OTF-S) in Northamptonshire in 2022, with and without a history of any TB incident in the previous 3 years.

Overall, 53% of new cases in Northamptonshire in 2022 had a history of TB within the past the past 3 years, compared to 50% in the Edge Area overall in 2022.

Geographical distribution of TB incidents

The incidence of TB (per 100 herd-years at risk) in Northamptonshire in 2022 including Finishing Units (4.5), was lower than that of its neighbouring Edge Area counties (Leicestershire 6.8, Warwickshire 12.7, Oxfordshire 15.1, Buckinghamshire 8.5), as shown in Figure 6. The incidence was higher in Northamptonshire than its neighbouring Low Risk Area counties (Bedfordshire 0, Cambridgeshire 2.5, Lincolnshire 3.4).

The distribution of cattle in Northamptonshire in 2022 was much the same as in previous years. Higher herd and cattle densities are concentrated along the Warwickshire, Leicestershire, Oxfordshire, and Buckinghamshire borders. Most incidents continued to be detected in the parts of Northamptonshire with a denser cattle population, which are also the ones close to neighbouring counties with a higher TB incidence. All but one incident in Northamptonshire in 2022 was caused by WGS clade B6-62. The homerange of B6-62 encompasses Northamptonshire, so this is to be expected. This incident was caused by clade B6-11. A further incident identified B6-62 infection concurrent with B6-85.

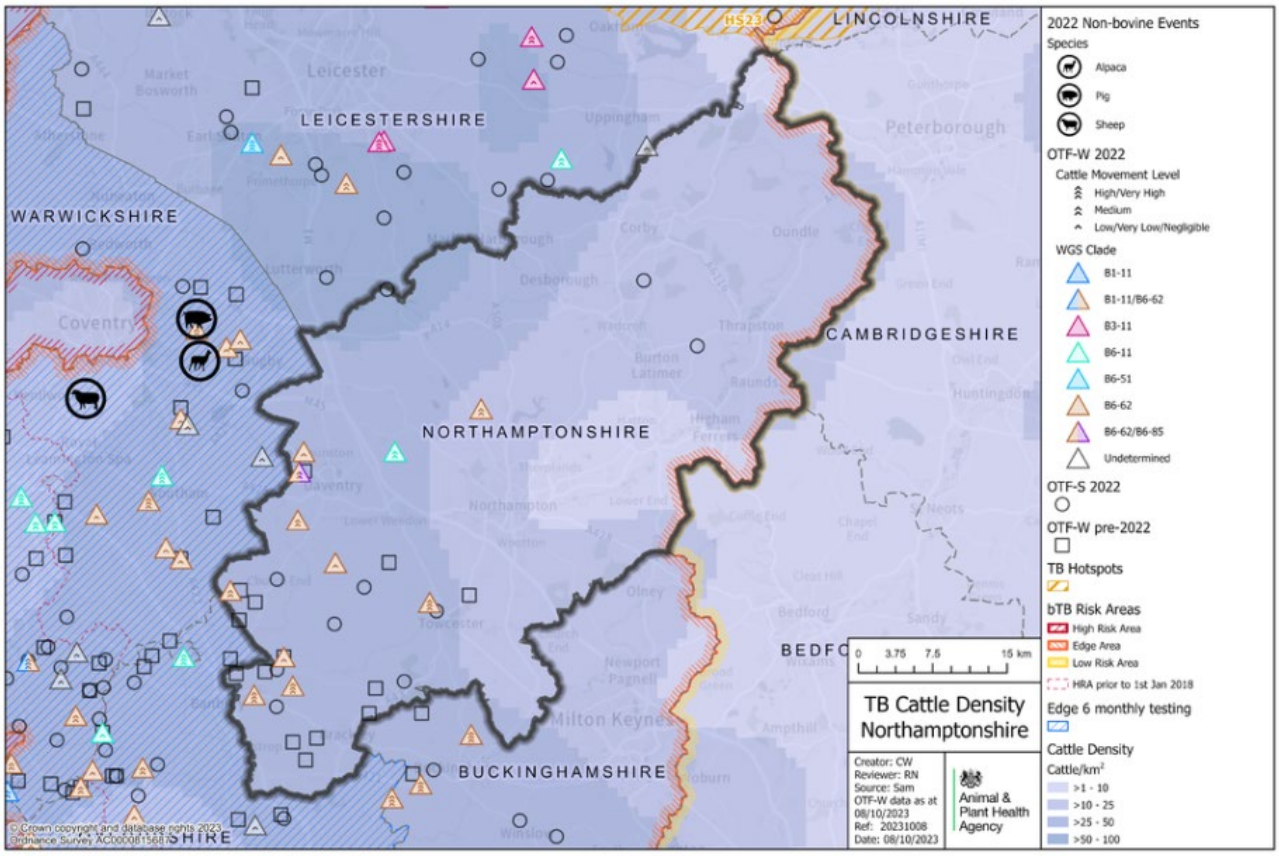

Figure 6: Location of cattle holdings in Northamptonshire with new TB incidents (OTF-W and OTF-S) in 2022 and of cattle holdings with pre-2022 OTF-W incidents still ongoing at the beginning of 2022, overlaid on a cattle density map. The movement score for each farm is symbolised with 3 chevrons for cattle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

Skin test reactors and interferon gamma test positive animals removed

In 2022, there was a total of 91 test positive animals in Northamptonshire, as shown in Figure 7. This represented an over 50% decline in the number of test-positive animals removed from herds in 2021 (220).

Of the 91 test positive animals in 2022, 71% were skin test reactors and 29% were interferon gamma (IFN-γ) test positive. Compared to the years 2018 to 2021, there was a considerable fall in the proportion of test-positive animals that were IFN-γ reactors, compared to skin test reactors.

Fewer animals were IFN-γ tested in 2022 (1,389) than in 2021 (2,935) and 2020 (2,404). This presumably accounts for the lower numbers of IFN-γ test-positive animals identified in 2022. The decrease in IFN-γ test positive animals may have been influenced by several factors. There was a change in IFN-γ testing policy introduced in July 2021, whereby only re-occurrent and persistent OTF-W incidents are automatically eligible for mandatory sampling. This includes herds which have had a new incident within 18 months of a

previous incident. Previously, all new OTF-W incidents were eligible for sampling. Furthermore, the diversion of field resource to the highly pathogenic avian influenza (AI) outbreak which occurred in 2021 and 2022, together with the reduction in incidence are likely to have influenced the reduction in the number of IFN-γ tests carried out in 2022 compared to 2021 and 2020.

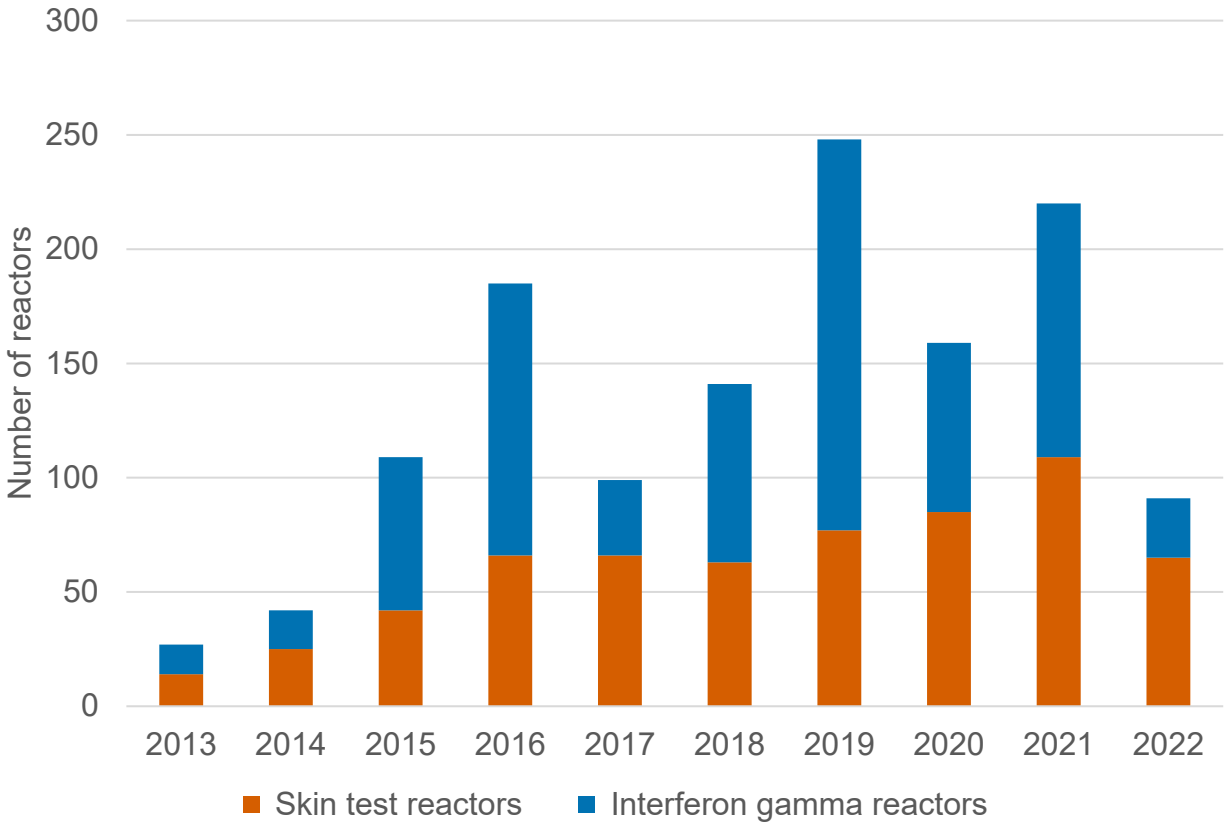

Figure 7: Number of skin test reactors (SICCT) and interferon gamma (IFN-γ) test positive cattle removed by APHA for TB control reasons in Northamptonshire, from 2013 to 2022.

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, 3 out of 19 (16%) new TB incidents in Northamptonshire received a preliminary or final APHA veterinary investigation to identify the source of infection. The results of these

investigations are reported 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 outbreaks 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 animal 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 have evidence of 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 TB incident of interest
- It is within a 9km radius of the TB 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 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.

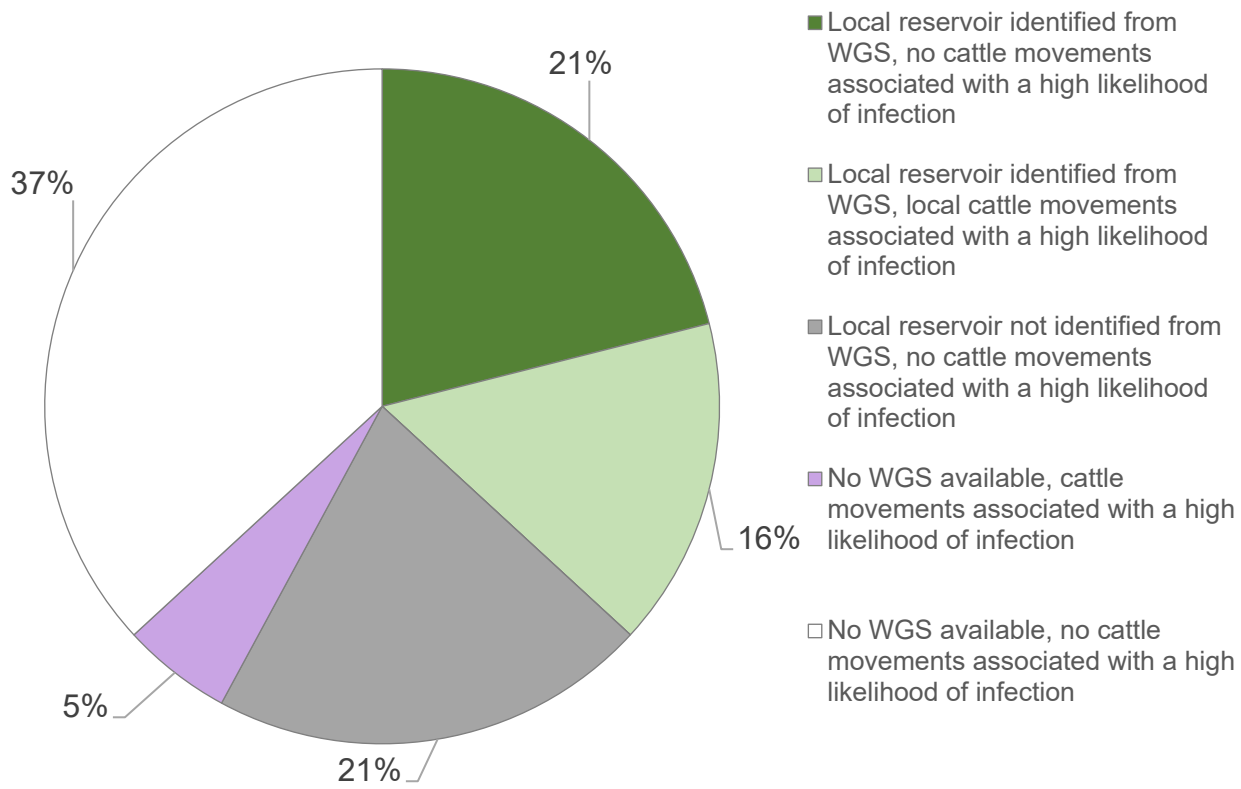

Figure 8. Risk pathway combinations identified by the WGS local reservoir indicator and cattle movement algorithm for all 19 new TB incidents in Northamptonshire in 2022

WGS data was available for 11 (58%) of all new TB incidents in Northamptonshire. The WGS Local Reservoir Indicator identified a local reservoir of infection for 7 (37%) new TB incidents in 2022. Out of these, 4 of them (21% of the total) a local reservoir identified without evidence of cattle movements associated with a high likelihood of TB infection. These are dark green symbols in Figure 9.

For these cases, 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

A further 3 (16%) new TB incidents had evidence of both a local reservoir and local cattle movements, within 25 km, associated with a high likelihood of TB infection. For these TB incidents, local cattle movements may have played a part in the spread of this local infection, in addition to the previously listed local pathways. These incidents are symbolised in light green in Figure 9.

In Northamptonshire, one TB incident (5%) had evidence of 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.

For 4 new TB incidents, 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. The source of infection is unclear in these cases (light grey symbols in Figure 9).

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 7 of the 19 (37%) TB incidents in 2022. These are shown as white dots in Figure 9, as there is insufficient evidence to determine a likely infection pathway.

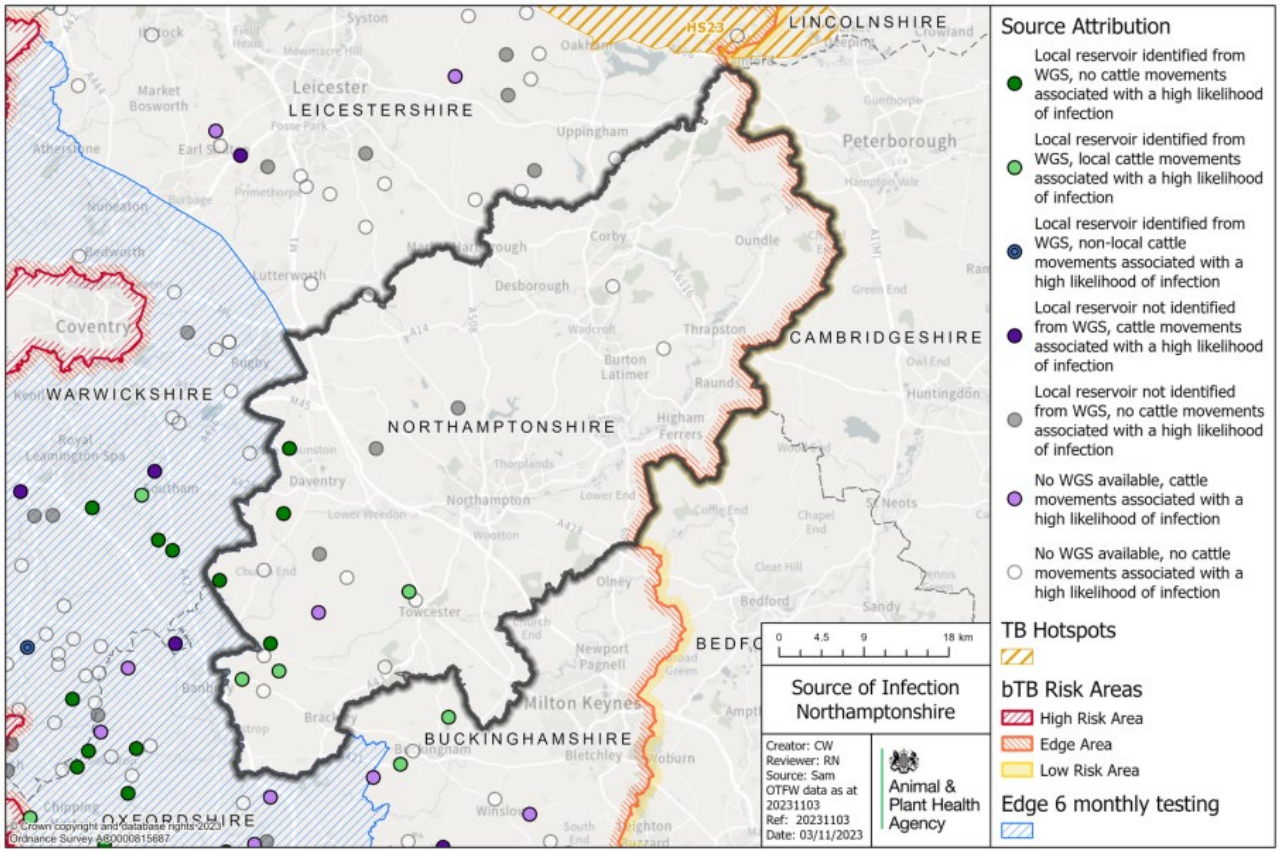

Figure 9: Map of the available evidence for risk pathways of TB infection into the herd, for all TB incidents (OTF-W and OTF-S) in Northamptonshire that started in 2022.

Additional information is provided by WGS of *M. bovis* isolates from OTF-W herds. From this data, it is apparent that TB has become endemic in the west of the county. The presence of WGS clade B6-62 (which includes genotype 10:a, reported in previous years) is expanding across the Warwickshire and Oxfordshire borders into Northamptonshire, as shown in Figure 10.

In previous years, concern was raised about an increase in incidents along the route of high-speed rail (HS2) construction. The location of most new TB incidents in 2022 was in the south-west of the county, which is the area of HS2 construction. During on-farm

investigations for incidents that started in 2022, disruption of badger setts caused by HS2 construction was identified as a possible factor influencing the spread of TB infection from wildlife. However, more evidence on the effect of HS2 construction on wildlife habitats and behaviour is required before further conclusions on a potential link can be drawn. There were no OTF-W incidents during 2022 in the Thrapston-Oundle corridor, that were of concern in 2019.

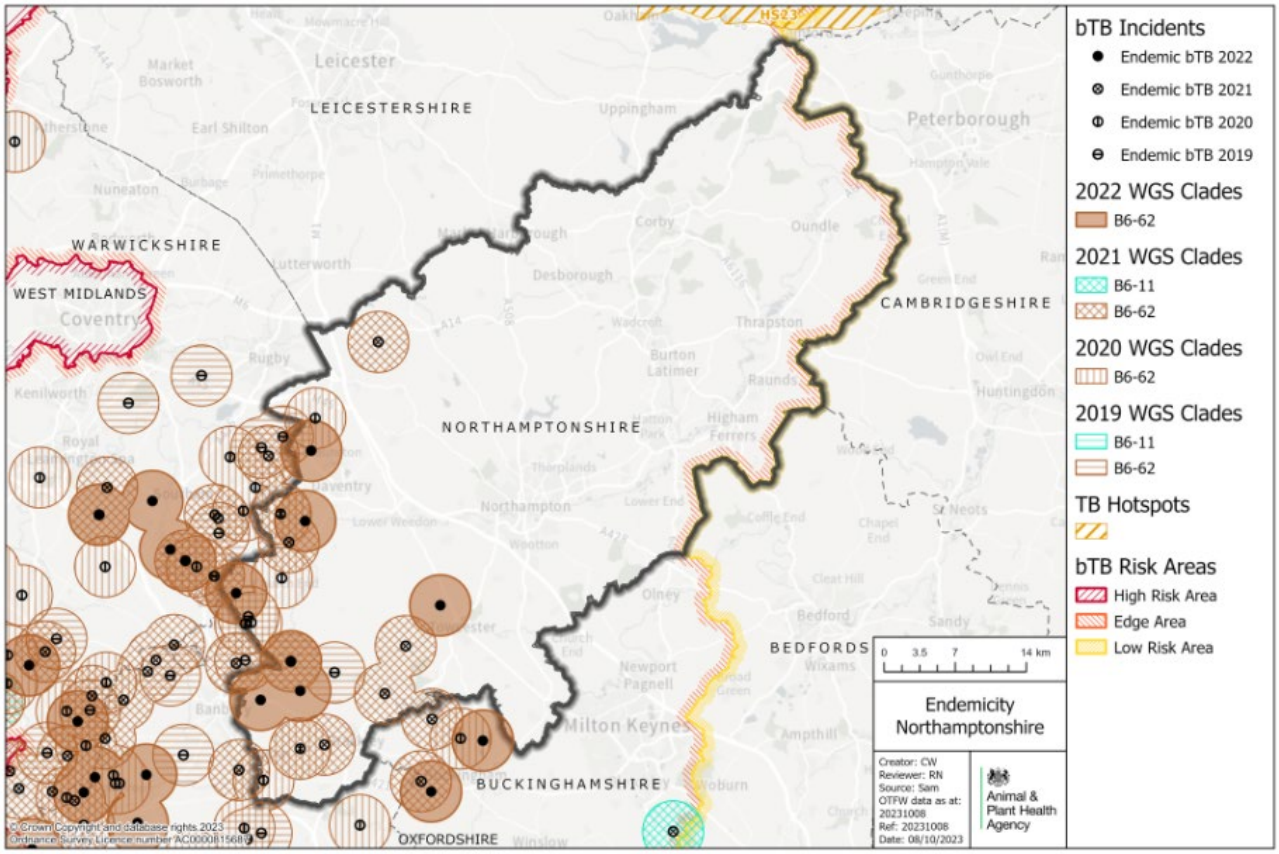

Figure 10: WGS clades of *M. bovis* detected in Northamptonshire between 2019 and 2022, where the WGS identified in the infected herd was within 3 SNPs of another TB incident in the past 4 years and 9km (OTF-W incidents only).

Forward look

The future behaviour of the TB epidemic in Northamptonshire is difficult to predict. Whilst it has been positive to see a continued reduction in TB incidents since 2020, there is evidence that TB is endemic in certain areas of the county. It is concerning that established wildlife reservoirs are suspected in the west of Northamptonshire. A total of 1,870 badgers were removed in this county, with no badger vaccination undertaken, in 2022. See Summary of 2022 badger control operations - GOV.UK (www.gov.uk).

Data from 2022 indicates that new TB incidents have been caused by spread from both local reservoir of infection and local cattle movements (within 25 km), reflecting the complex nature of the epidemiology of this disease. Disease still appears to be spreading

from the neighbouring Warwickshire and Oxfordshire counties. Therefore, a cross-county strategy continues to be necessary to tackle TB effectively.

TB control will need to continue to be multifactorial and TB eradication policy will need to continue adapting to epidemiological evidence.

Despite the reduction in the TB incidence rate in Northamptonshire this year, it seems unlikely that the county will be eligible for OTF status by 2025.

There are several measures that would help address the most common risk pathways for TB infection in Northamptonshire. These include:

- incentivising the uptake of effective biosecurity measures
- managing the TB risks posed by cattle movements to farms
- 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.

Appendix 1: cattle industry demographics

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

Size of herds	Number of herds in Northamptonshire
Undetermined	6
1 to 50	209
51 to 100	101
101 to 200	74
201 to 350	35
351 to 500	14
Greater than 500	15
Total number of herds	454
Mean herd size	105
Median herd size	58

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

Breed purpose	Number (and percentage of total) cattle in Northamptonshire
Beef	41,612 (86%)
Dairy	5,128 (10%)
Dual purpose	1,078 (2%)
Unknown	17 (0.036%)
Total	47,835

Appendix 2: Summary of headline cattle TB statistics

Table 3: Herd-level summary statistics for TB in cattle in Northamptonshire 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	598	566	551
(b) Total number of whole herd skin tests carried out at any time in the period	611	677	543
(c) Total number of OTF cattle herds having TB whole herd tests during the period for any reason	460	458	443
(d) Total number of OTF cattle herds at the end of the report period (herds not under estrictions)	540	532	513
(e) Total number of cattle herds that were not under restrictions due to an ongoing TB incident at the end of the report period	570	549	535
(f.1) Total number of new OTF-S TB incidents detected in cattle herds during the report period (including all Finishing Units)	15	16	8
(f.2) Total number of new OTF-W TB incidents detected in cattle herds during the report period (including all Finishing Units)	23	19	11
(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?	8	2	N/A
(g.2) Of the new OTF-W herd incidents, how many were triggered by skin test reactors or two-time inconclusive reactors (2xIRs) at routine herd tests?	5	8	2

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 backward-tracings, contiguous or check tests)?	14	11	8
(g.4) Of the new OTF-W herd incidents, how many were first detected through routine slaughterhouse TB surveillance?	2	2	1
(h.1) Number of new OTF-W incidents revealed by enhanced TB surveillance (radial testing) conducted around those OTF-W herds	9	7	6
(h.2) Number of new OTF-S incidents revealed by enhanced TB surveillance (radial testing) conducted around those OTF-W herds	5	6	5
(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 TB incidents in non-grazing Approved Finishing Units)	15	8	7
(j) New confirmed (positive *M. bovis* culture) incidents in non-bovine species detected during the report period (indicate host species involved)	0	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	14	14	14
(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	0	0	0

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

Animal-level statistics (cattle)	**2020**	**2021**	**2022**
(a) Total number of cattle tested in the period (animal tests)	72,267	78,449	62,350
(b.1) Reactors detected by tuberculin skin tests during the year	85	109	65
(b.2) Reactors additionally detected by IFN-γ blood tests (non-reactors to the skin test) during the year	74	111	26
(c) Reactors detected during year per incidents disclosed during year	4.2	6.3	4.8
(d) Reactors per 1,000 animal tests	2.2	2.8	1.5
(e.1) Additional animals slaughtered during the year for TB control reasons (dangerous contacts, including any first time IRs)	5	3	0
(e.2) Additional animals slaughtered during the year for TB control reasons (private slaughters)	3	7	1
(f) Slaughterhouse (SLH) cases (suspect tuberculous carcases) reported by Food Standards Agency (FSA) during routine meat inspection	6	13	8
(g) SLH cases confirmed by culture of *M. bovis*	1	6	6

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 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 2022, 3 out of 19 (16%) new TB incidents in Northamptonshire received a preliminary or final APHA veterinary investigation to identify the source of infection. The small number of investigations carried out in 2022 was mainly due to the diversion of field resource to the large AI outbreaks 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 is weighted by the degree of certainty ascribed. Any combination of definite, most likely, likely, or possible 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 its certainty. 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 available for OTF-S herds and are limited by the number of positive culture results as well as policy considerations (usually only one per incident). 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 3 incidents with a preliminary or a final veterinary assessment in Northamptonshire, in 2022.

Source of infection	Possible (1)	Likely (4)	Most likely (6)	Definite (8)	Weighted contribution
Badgers	1	0	3	0	80.1%
Cattle movements	0	0	0	0	0.0%
Contiguous	0	0	0	0	0.0%
Residual cattle infection	0	1	0	0	12.1%
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	2	0	0	0	7.8%
Other or unknown source	0	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.

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