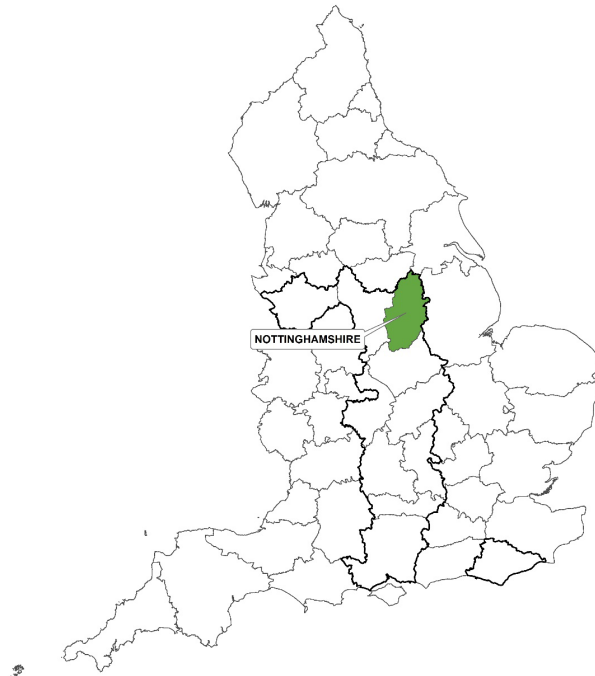




Animal &
Plant Health
Agency

Year-end descriptive epidemiology report: Bovine TB in the Edge Area of England County: Nottinghamshire Year-end report for: 2020

TB Edge Area - NOTTINGHAMSHIRE



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Executive summary

Reporting area

Nottinghamshire is part of the Edge Area that was 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. This end of year report describes bovine TB in Nottinghamshire.

Local cattle industry

There were no significant changes in 2020. There is a predominance of small herds of up to 50 cattle in the county, the majority of which are beef cattle. A significant arable industry is supportive of units finishing beef stock.

New TB incidents

The annual number of new incidents disclosed has been declining since a peak of 23 in 2016. In 2020, there were 13 new TB incidents, compared to 14 in 2019, and 17 in 2018. Of the 13 new incidents in 2020, five were Officially Bovine Tuberculosis Free Status Withdrawn (OTF-W), while eight were Officially Bovine Tuberculosis Free Status Suspended (OTF-S).

Risk pathways for TB infection

The weighted contribution of movements of undetected infected cattle represented 20% of reported suspected source pathways of incidents in 2020, while wildlife-related infection represented 13%. The majority of incidents however, especially OTF-S, were associated with high uncertainty, resulting in 62% undetermined overall. These weightings were similar to those of 2019.

Details of the methodology used to calculate the weighted contribution of the different suspected sources of *M. bovis* infection for all new incidents can be found in the main body of the report and in the [Explanatory Supplement](#) to the 2020 bovine TB epidemiology reports.

Disclosing tests

In 2020, incidents were detected by just three methods: 69% by routine whole herd testing, 23% by passive slaughterhouse detection, and 8% by radial testing. This was very similar to 2019.

As in 2019, the slaughterhouse cases contributed three out of the five OTF-W cases.

Reactor numbers

In 2020, 32 cattle were compulsorily slaughtered for TB control purposes, which was about 60% lower in comparison to 2019 (77). Of these, nine (compared to 36 in 2019) animals were detected by interferon gamma (IFN- γ) blood tests and 23 (compared to 41 in 2019) by skin test.

Several measures for TB suggest early detection of disease and low probability of spread within herds in Nottinghamshire; relatively low number of test reactors per incident (2.5 in 2020; 5.5 in 2019), short duration of incidents, and low annual end of year prevalence.

Risks to the reporting area

Cattle movements mostly from the High Risk Area (HRA) were the greatest risk for importing TB into the county. However, two areas of potential endemicity in the south of the county, close to the border with Leicestershire, pose long term risks. One involved a developing cluster of genotype 10:a, and the other in the south-east, an extension of Hotspot 23 (HS23) that mostly involved neighbouring counties of Leicestershire and Lincolnshire.

Risks posed by the reporting area

The TB risk from Nottinghamshire to adjacent counties appeared to be low, but possible areas of endemic infection close to the border with Leicestershire raised the risk of exporting infected cattle from these parts of the county.

The risk remained of importing TB into fattening units from HRA farms, and consequent local spread that could progress to surrounding counties.

Although, three incidents detected by slaughterhouse surveillance suggests that cattle testing did not detect all infections early, the risk of importation and spread was at least partly mitigated by current TB testing disclosing infection promptly and an increasing number of Approved Finishing Units in the county which compartmentalise infection.

Forward look

The level of TB in Nottinghamshire remained low, with purchases of undetected infected animals from the HRA for fattening the main cause of infection. However, infected wildlife in some parts close to endemic areas in neighbouring counties may have contributed as sources.

The TB situation in Nottinghamshire appears stable currently, with 2020 surveillance data indicating a slight improvement from the previous two years. The objective to reduce OTF-W herd incidence to less than 1% by 2025 appears achievable if this positive trend is maintained, but it will depend on a better understanding of current disease levels in wildlife, and any necessary associated control in nearby endemic areas.

Introduction

This report describes the level of bovine tuberculosis in cattle herds in Nottinghamshire in 2020. Bovine tuberculosis is caused by the organism *Mycobacterium bovis* (*M. bovis*) and will subsequently be referred to as TB.

This report explores the frequency and geographical distribution of TB in cattle herds. It examines what is likely to be driving TB in this area, and the risks the disease in this county may pose to neighbouring cattle.

Although other sources may refer to TB 'breakdown(s)', this report will use the term 'incident(s)' throughout. This report is intended for individuals involved in the control of TB, both in the local area and nationally. This includes, but is not limited to: farmers, veterinarians, policy makers and the scientific community.

In 2014, the UK government published its 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 vary the approach to control accordingly. To this end three management areas were established (see Appendix 1).

Nottinghamshire forms part of the Edge Area. Control efforts are seeking to slow down and reverse geographic spread, and to reduce the incidence rate. The aim is to obtain OTF status for the Edge Area as soon as possible.

Changes to the Edge Area

On 1 January 2018 the Edge Area boundary was expanded westwards to absorb the former HRA parts of the five previously split counties. Cheshire, Derbyshire, Warwickshire, Oxfordshire, and East Sussex all moved fully into the Edge Area.

Furthermore, the routine TB testing frequency of herds in the counties in the west of the Edge Area adjoining the HRA (or parts thereof) was increased from annual to six-monthly. The respective descriptive TB epidemiology reports for those five counties of the Edge Area will focus on the whole county and key differences between the old and new parts will be highlighted where relevant.

Changes due to COVID-19

During 2020, public health measures adopted by the government to contain the COVID-19 pandemic impacted the ability to carry out some TB testing due to social distancing and self-isolation guidelines, affecting both veterinarians and farmers.

In particular, from 23 March 2020, routine or targeted TB skin tests were not mandatory for cattle under 180 days old where, in the official veterinarian's judgement, the young stock could not be tested safely in line with social distancing guidelines. The temporary amendment allowing calves under 180 days old to be excluded from TB testing did not apply to short

interval tests in TB incident herds (required to restore a herds OTF status) or pre- and post-movement testing.

Routine TB skin tests are required within a pre-defined window of time to maintain a herds OTF status. From 23 March 2020, for tests that were allocated until 30 June 2020, the Animal and Plant Health Agency (APHA) permitted an extension to the TB skin testing windows on a case by case basis, where testing had not been completed due to valid reasons associated with COVID-19. The testing window for short interval tests was also extended by up to 30 days, where tests were unable to be completed due to COVID-19.

Furthermore, on-farm epidemiological assessments carried out to establish the route of infection for a TB incident herd were carried out remotely, by telephone, for the majority of 2020.

Cattle industry

Herd types

The predominant cattle farm type in Nottinghamshire were small herds of up to 50 cattle (53% of all herds) as shown in Figure 1.

There was a predominance of beef cattle (66% of total cattle in Nottinghamshire), including both suckler and finishing herds.

There is a significant arable industry in this county which is supportive of units which choose to finish homebred or purchased stock. Some suckler herds still choose to sell their calves as stores through the local markets.

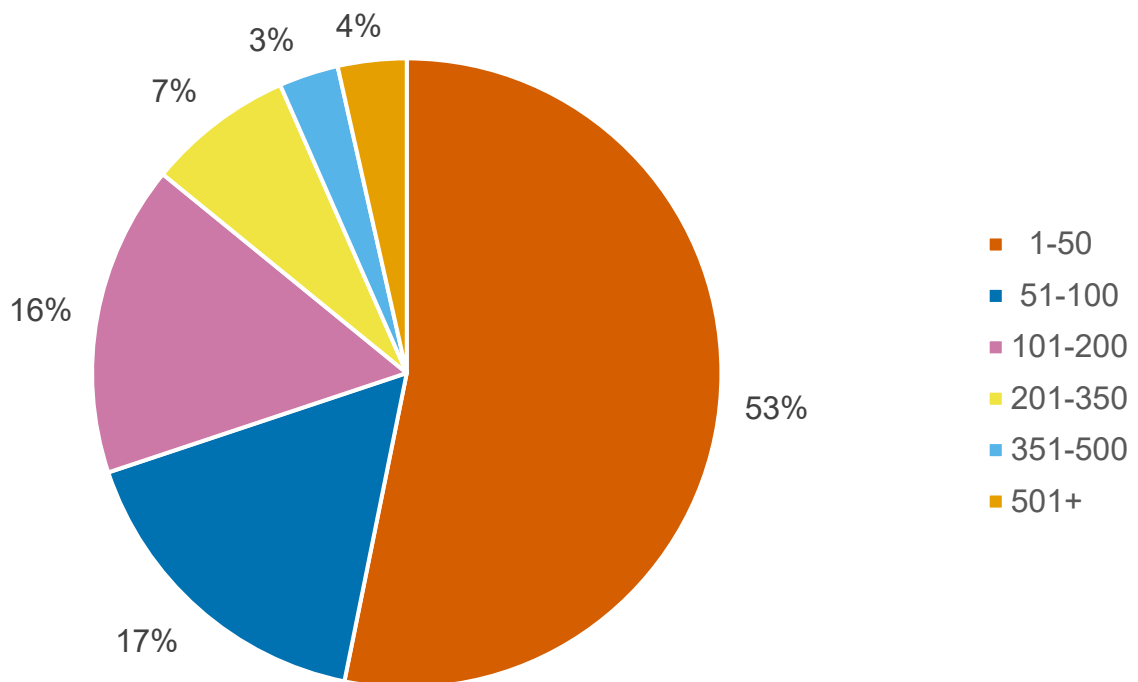


Figure 1: Proportion of cattle holdings in Nottinghamshire, by herd size in 2020 (n=425). Note herds with an undetermined size are not shown.

Markets and abattoirs

In 2020 there was one important livestock market in Nottinghamshire, Newark Livestock Market, which held a weekly sale every Saturday and an Approved Slaughter Gathering (for clear-testing TB restricted cattle).

Approved Finishing Units

In 2020, there were a total of ten Approved Finishing Units (AFU) and one Exempt Finishing Unit (EFU) in Nottinghamshire, all non-grazing. One new AFU was approved in 2020.

Common land

There is one area of common land in Nottinghamshire (Sutton Holmes) where six cattle herds graze. It was included in radial testing (RAD) procedures following an OTF-W incident in the area. All the RAD tests were completed in this area and were negative.

Descriptive epidemiology of TB

Temporal TB trends

Three analytical measures are used to describe the level of TB infection in these reports.

1. The number of new herd incidents that were disclosed in each year (Figure 2).
2. The annual herd incidence rate, reported as the number of new incidents per 100 herd-years at risk (100 HYR) (Figure 3). This is the number of new TB incidents detected in the year, divided by the time those herds were at risk of contracting TB. The 100 HYR incidence rate is used in this report as it accounts for different intervals between herd tests that other incidence measures do not (such as new TB incidents per number of herds or tests).
3. The annual end of year herd prevalence (Figure 4). This is the number of herds under restriction due to a TB incident, divided by the number of active herds at the same point in time. Prevalence provides a snapshot of the burden of TB on the local cattle industry.

All three measures include Officially Tuberculosis Free Status Withdrawn (OTF-W) incidents, and Officially Tuberculosis Free Status Suspended (OTF-S) incidents.

OTF-W incidents are those in which at least one animal was identified with typical lesions of TB at post-mortem (PM) inspection, and/or positive for *M. bovis* on culture from tissue samples.

OTF-S incidents are those with one or more reactors to the Single Intradermal Comparative Cervical Tuberculin (SICCT) skin test, but without full confirmation of *M. bovis* infection by PM inspection or bacterial culture.

TB incidents in non-grazing AFUs are not included in the prevalence and incidence calculations (excluding figure 5) in this report due to the limited epidemiological impact of these cases.

Furthermore, herds restricted because of an overdue test rather than a TB incident are also excluded from calculations. Hence measures of incidence and prevalence in this report may be lower than those reported in the official TB statistics.

In 2013, the method of setting surveillance TB testing intervals changed from parish to county basis and all cattle herds in Nottinghamshire were placed on annual surveillance testing. This surveillance testing regime has been in place since 2013 and represented an overall increase in testing.

The annual number of new incidents has been declining since the peak of 2016 (Figure 2). In 2020, there were 13 incidents, which represents a small reduction compared to 2019 (14) and 2018 (17).

Annual incidence rates (incidents per 100 herd-years at risk, Figure 3) have mirrored the trend for annual number of incidents (figure 2). The 2020 incidence rate of 3.0 was slightly lower than the average annual incidence rate of 3.5 calculated for the time period since 2013.

The end of year prevalence in 2020 (0.99%) was the lowest since 2013, but the same as for 2019 (Figure 4).

Considering all the trends for total new TB incidents disclosed, incidence rates and prevalence (Figure 2, Figure 3, and Figure 4), the level of TB in Nottinghamshire in 2020 remained relatively stable.

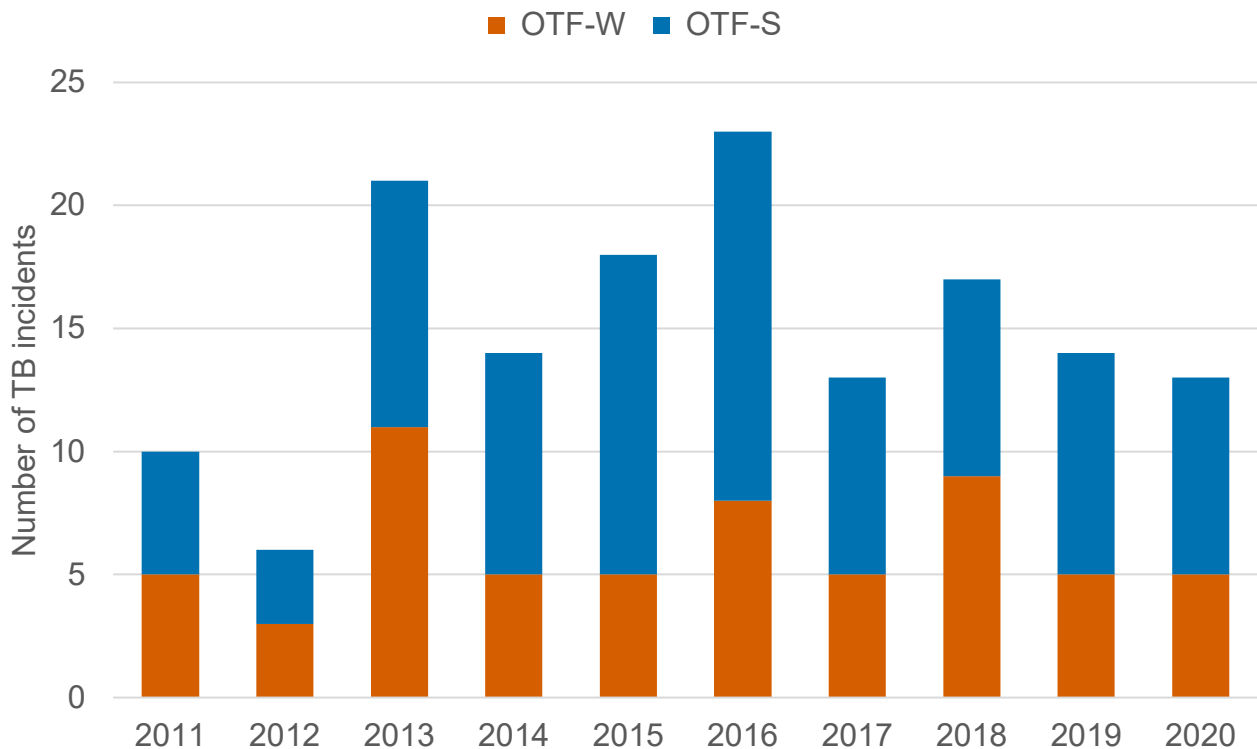


Figure 2: Annual number of new TB incidents in Nottinghamshire, from 2011 to 2020.

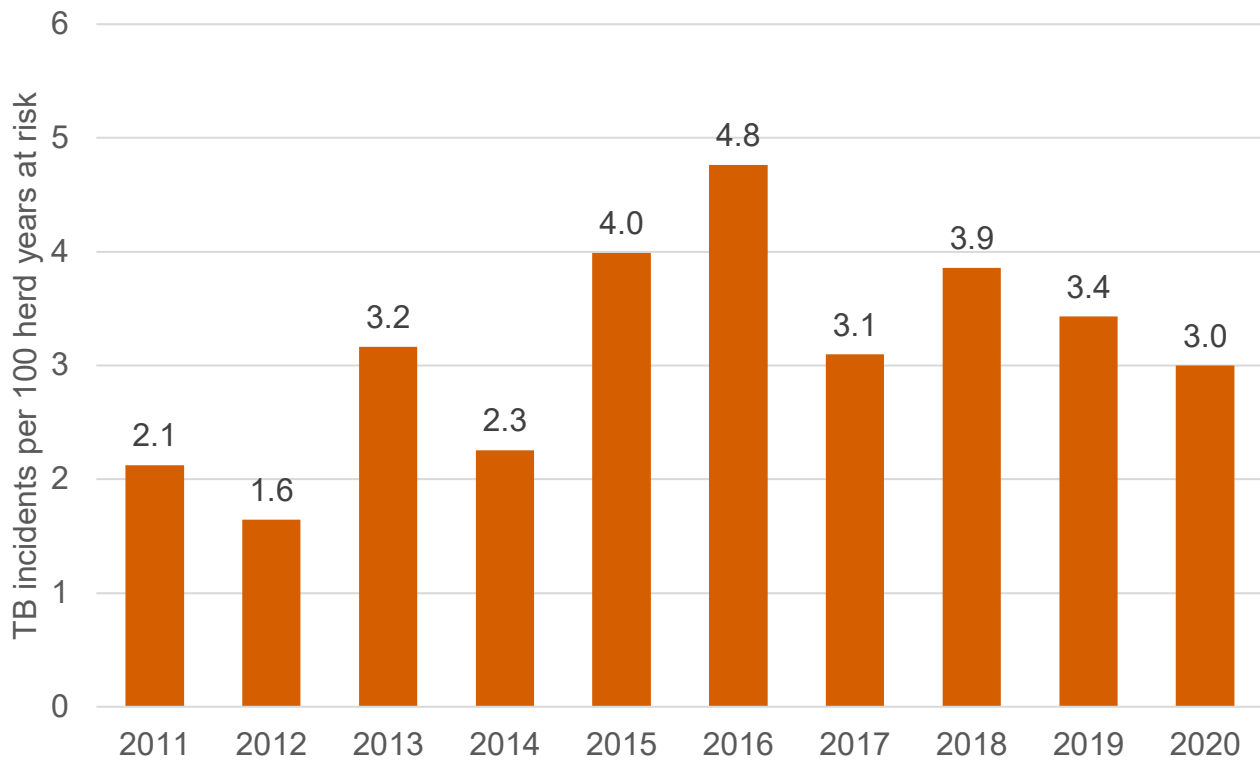


Figure 3: Annual incidence rate (per 100 herd-years at risk) for all new incidents (OTF-W and OTF-S) in Nottinghamshire, from 2011 to 2020.

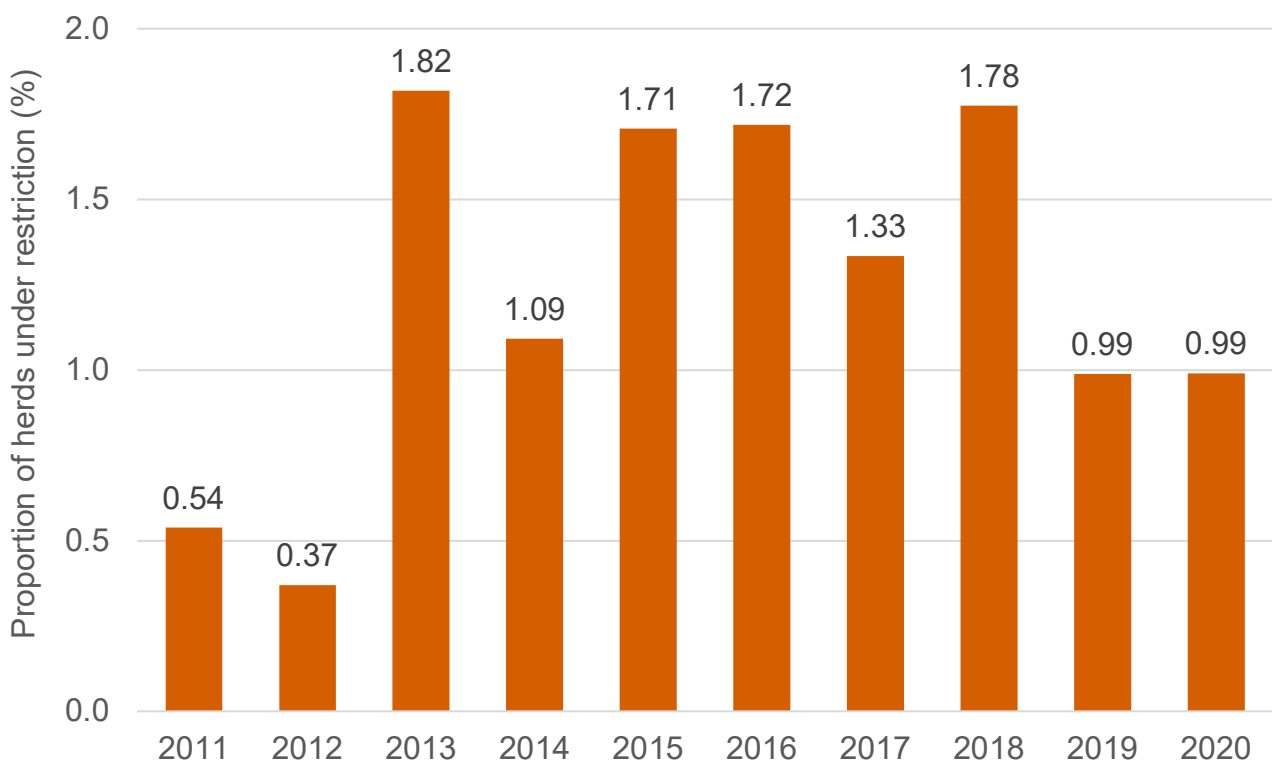


Figure 4: Annual end of year prevalence in Nottinghamshire, from 2011 to 2020.

Geographical distribution of TB incidents

When considering all herds (including AFUs), the incidence rate in Nottinghamshire in 2020 (3.3 incidents per 100 herd-years at risk) was the lowest of all the Edge Area counties (Figure 5). Therefore, Nottinghamshire is much lower than the average incidence rate for all Edge Area counties of 10.1, which was slightly higher compared to that of 2019 (9.9).

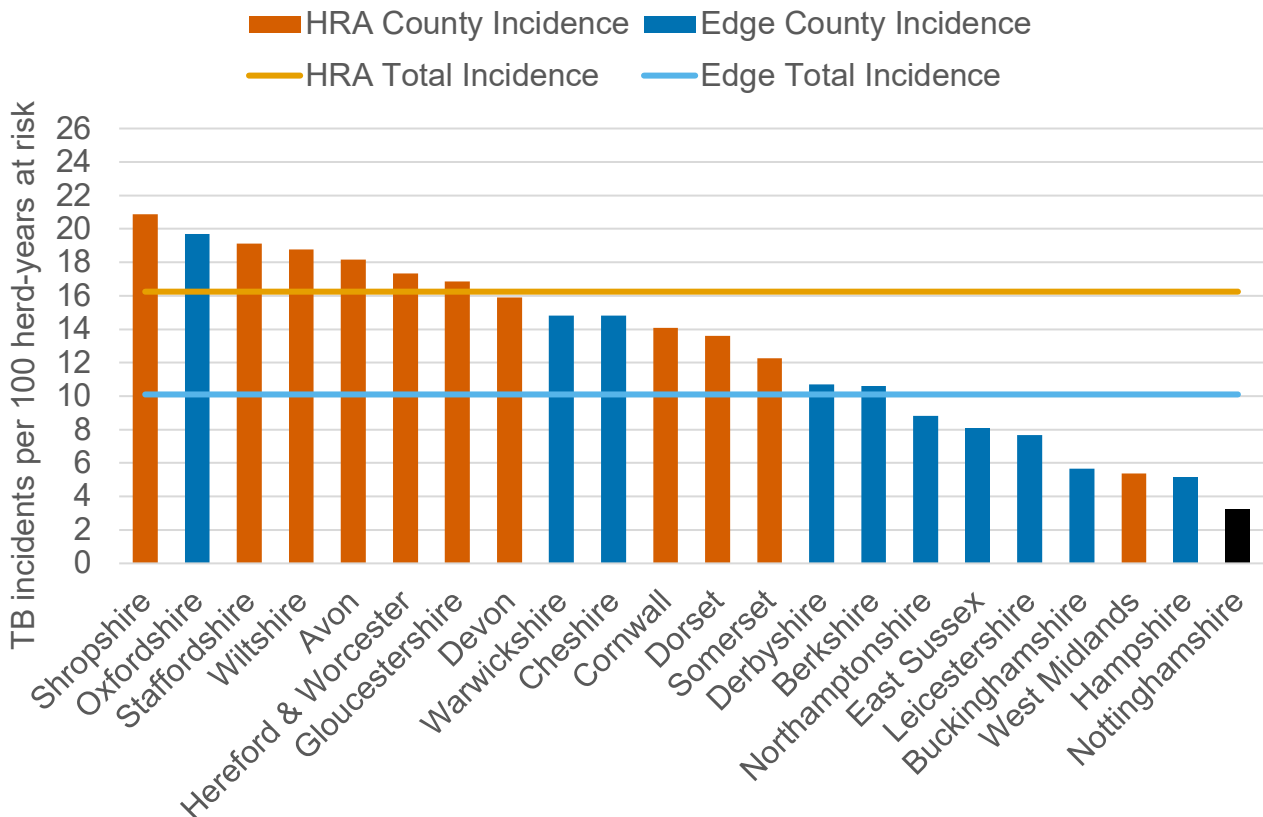


Figure 5: Incidence rate (per 100 herd-years at risk) for all new incidents (OTF-W and OTF-S including finishing units) in 2020, by HRA and Edge Area county, highlighting the county of Nottinghamshire.

Nottinghamshire is located in the north-east of the Edge Area, bordering two Edge Area counties, Derbyshire and Leicestershire, and the Low Risk Area (LRA) counties of Lincolnshire, South Yorkshire, and Humberside.

The geographical distribution of TB incidents in Nottinghamshire was similar to that of 2019, and previous years, tending towards areas of higher cattle herd densities, especially in the south of the county (Figure 6).

There were two incidents in 2020 with genotype 10:a in the south of the county close to the border with Leicestershire. Previous 10:a incidents in the same area suggest the presence of a cluster of potentially related incidents which will continue to be monitored and investigated.

There were three OTF-W incidents of spoligotype 25 (Figure 6). Veterinary investigations found that one was likely to have been related to the purchases of infected cattle, while the source of infection for the other two were unclear.

Figure 7 shows no incidents where a wildlife source was concluded with a high degree of certainty (over 75%) were located in Nottinghamshire in 2019 or 2020. This map shows an area in the north-east of Leicestershire with a cluster of OTF-W incidents with genotype 25:a, which appeared to have been related to endemic disease and part of HS23.

There was no evidence of spread of endemic disease from this cluster into Nottinghamshire in 2020.

TB Hotspot 23 (genotype 25:a, WGS clade B3-11) was identified in a contiguous area of west Lincolnshire and north-east Leicestershire in 2018. Cattle, and susceptible non-bovine farmed species (deer, goats, camelids) have been subject to enhanced TB surveillance and control measures since then.

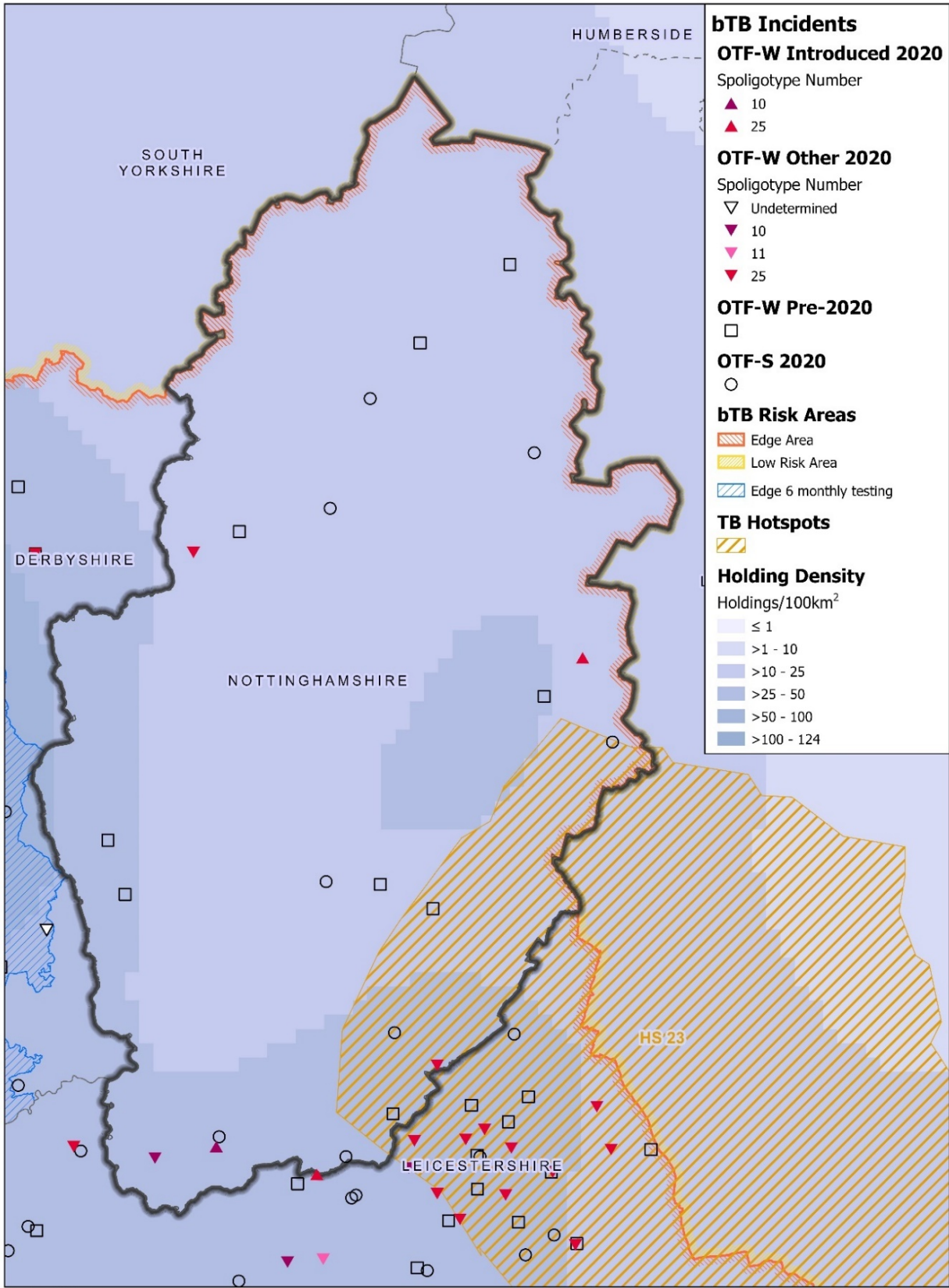
Wildlife have been monitored for TB by laboratory analysis of any deer and badger carcasses found dead in the area and reported to APHA.

Following the identification of *M. bovis* infection in badger carcasses, the original hotspot boundary was reviewed in June 2020 and its area was extended further into Leicestershire and Lincolnshire and included part of south-east Nottinghamshire (Figure 6a).

The extended hotspot became effective from September 2020 and the licensed control of badgers in Leicestershire and Lincolnshire started.

During 2020, 29 badgers and five deer were reported to APHA as part of TB surveillance in found-dead wildlife in HS23. Of these, 18 badgers and one deer were suitable for collection by APHA staff. Two of the badgers collected were not suitable for post-mortem examination, resulting in 16 badgers and one deer being examined.

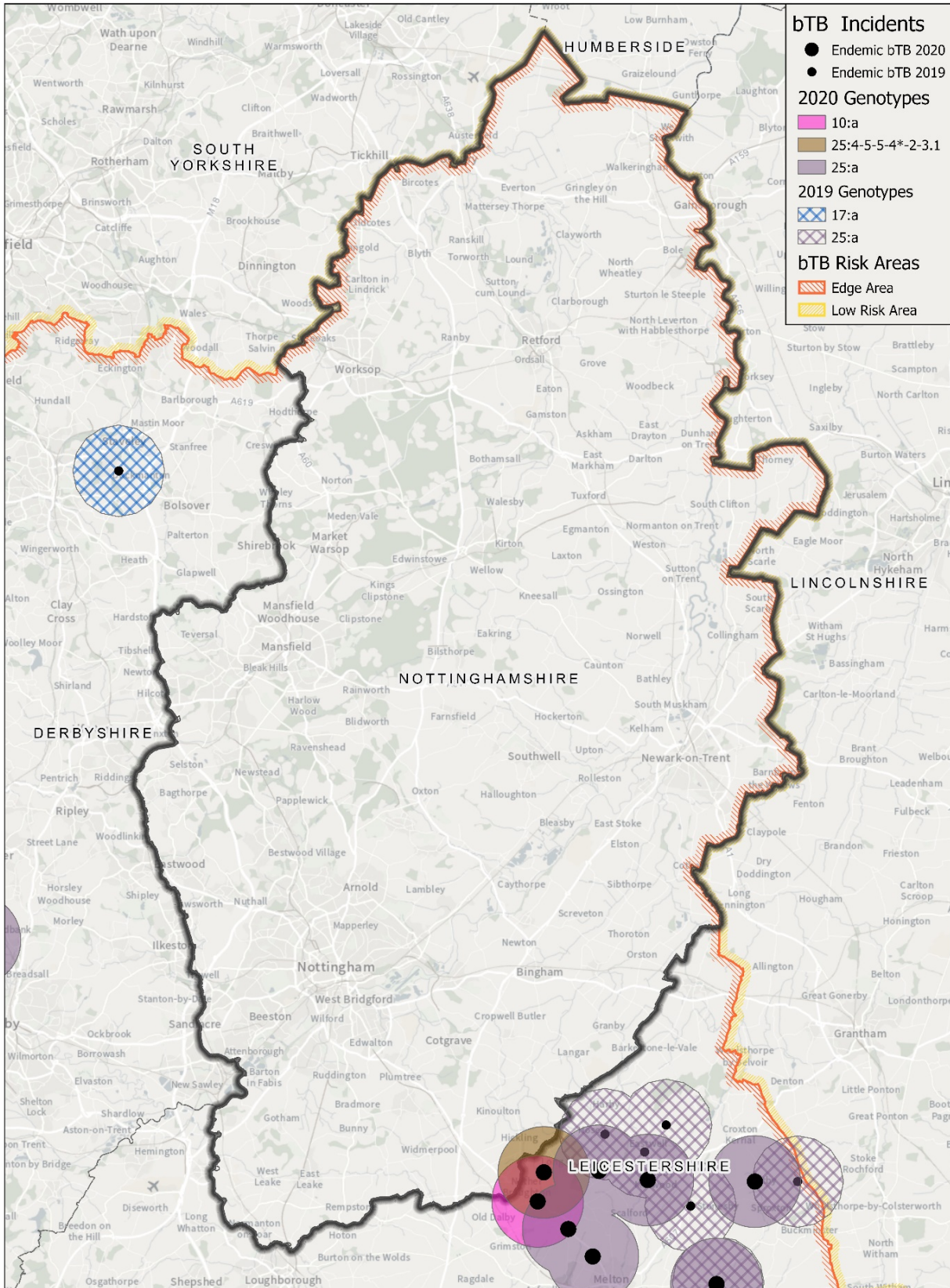
Of these, five badgers had visible lesions consistent with TB. Bacteriological culture of the lesions was undertaken with one sample being confirmed as culture positive for *M. bovis*. Further information can be found at the following location which covers a slightly longer time period: [An update on wildlife TB surveillance in Low Risk Area Hotspots](#).



Creator: GIS Team
Source: Sam
OTFW data as at 15th of April 2021
Ref: 20210701
Date: 01/07/2021

OTFW data as at 15th of April 2021

0 3 6 12 Kilometers
© Crown copyright and database rights 2013
Ordnance Survey 100051110
Animal & Plant Health Agency



Creator: GIS Team
 Source: Sam
 OTFW data as at 15th of April 2021
 Ref: 20210614
 Date: 14/06/2021

Endemicity - Nottinghamshire

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 Ordnance Survey 100051110



Other characteristics of TB incidents

Incidents by herd type

The distribution of incidents by cattle herd size (Figure 8) suggests larger herds are more likely to be affected by TB. Most incidents (9 out of 13, 70%) were in herds with more than 100 cattle, while 70% of herds in Nottinghamshire were smaller than this (Figure 1).

The distribution of incidents by herd type indicated a predominance in beef suckler cattle herds, 6 out of 13 (46%). In 2019 there were more incidents in beef fattening units (8 out of 14 incidents).

This may indicate a change in importance of different risk pathways with local factors affecting beef sucklers more than fatteners, which are reliant on cattle purchases from non-local farms.

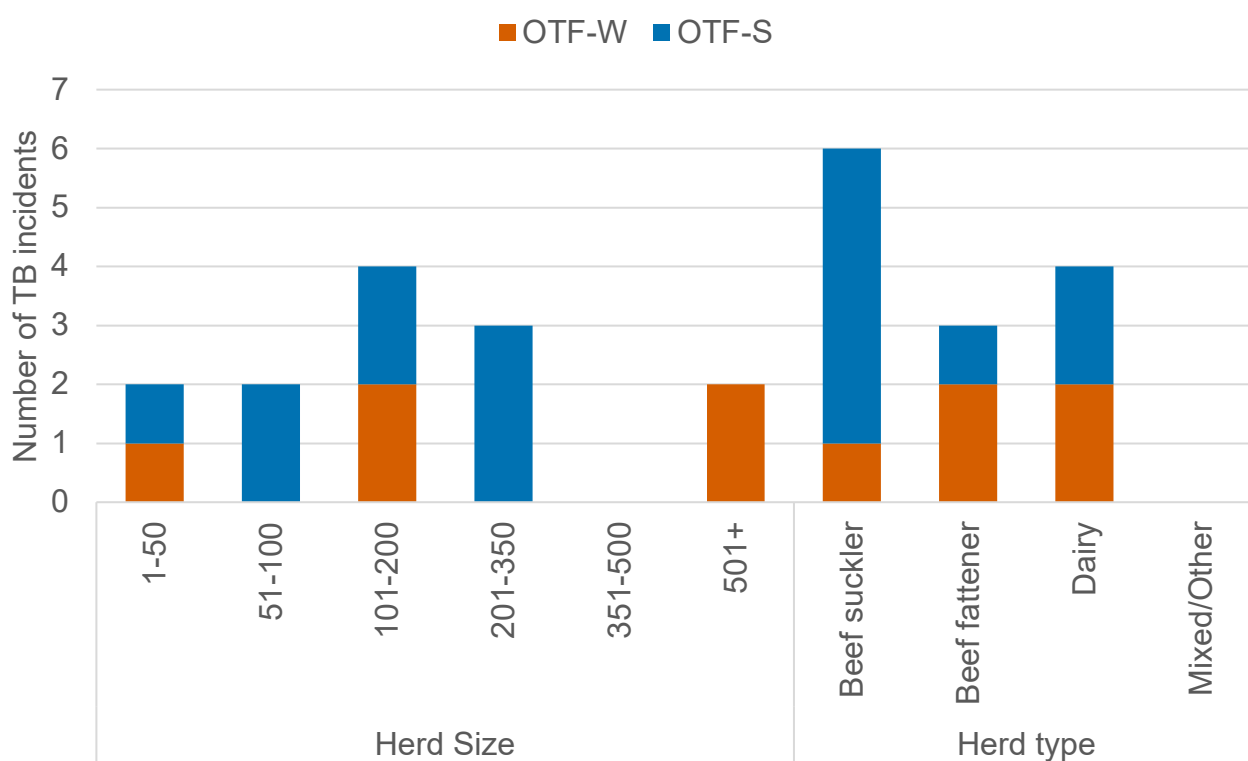


Figure 8: Number of TB incidents (OTF-W and OTF-S) in Nottinghamshire in 2020, by cattle herd size and type.

Incidents by month of disclosure

The majority of incidents were disclosed in the first half of 2020 (Figure 9). There was some correlation to the amount of testing (Figure 10) during this period. However, the very low numbers of incidents disclosed in autumn and early winter despite relatively high testing levels, differed from 2019 when the distribution was more evenly spread throughout the year.

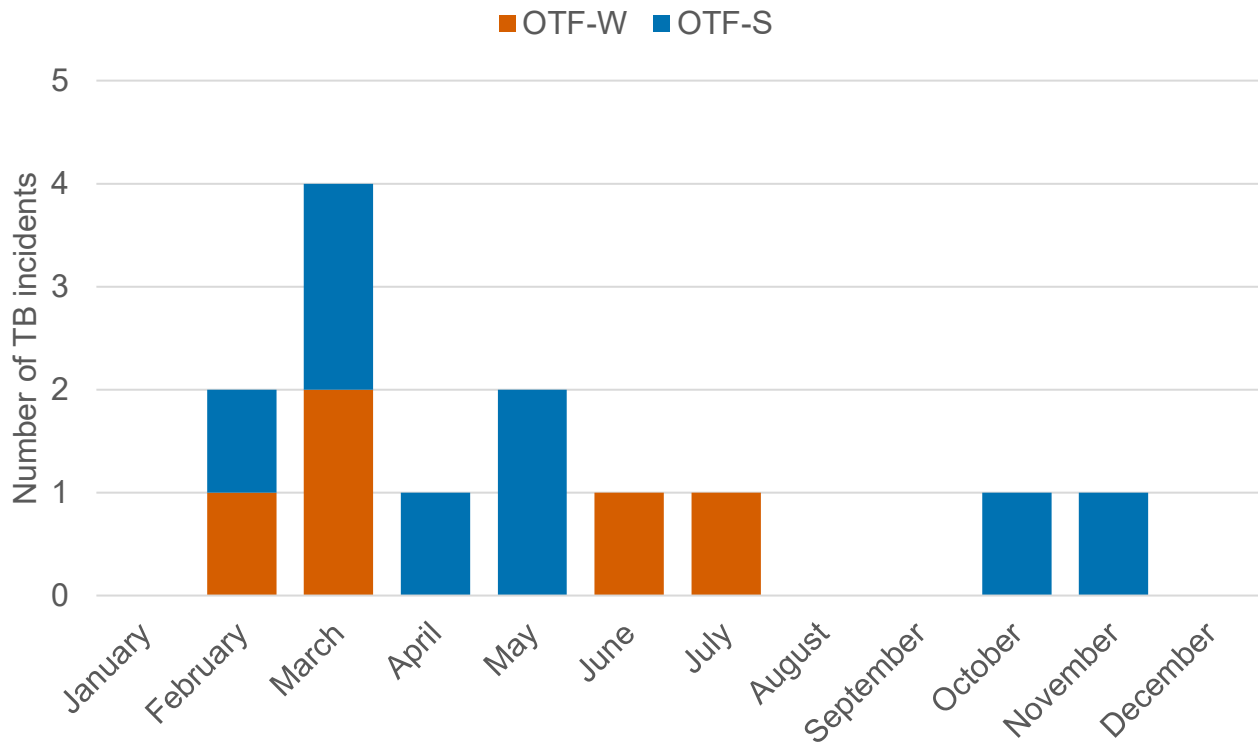


Figure 9: Number of TB incidents (OTF-W and OTF-S) in Nottinghamshire in 2020, by month of disclosure.

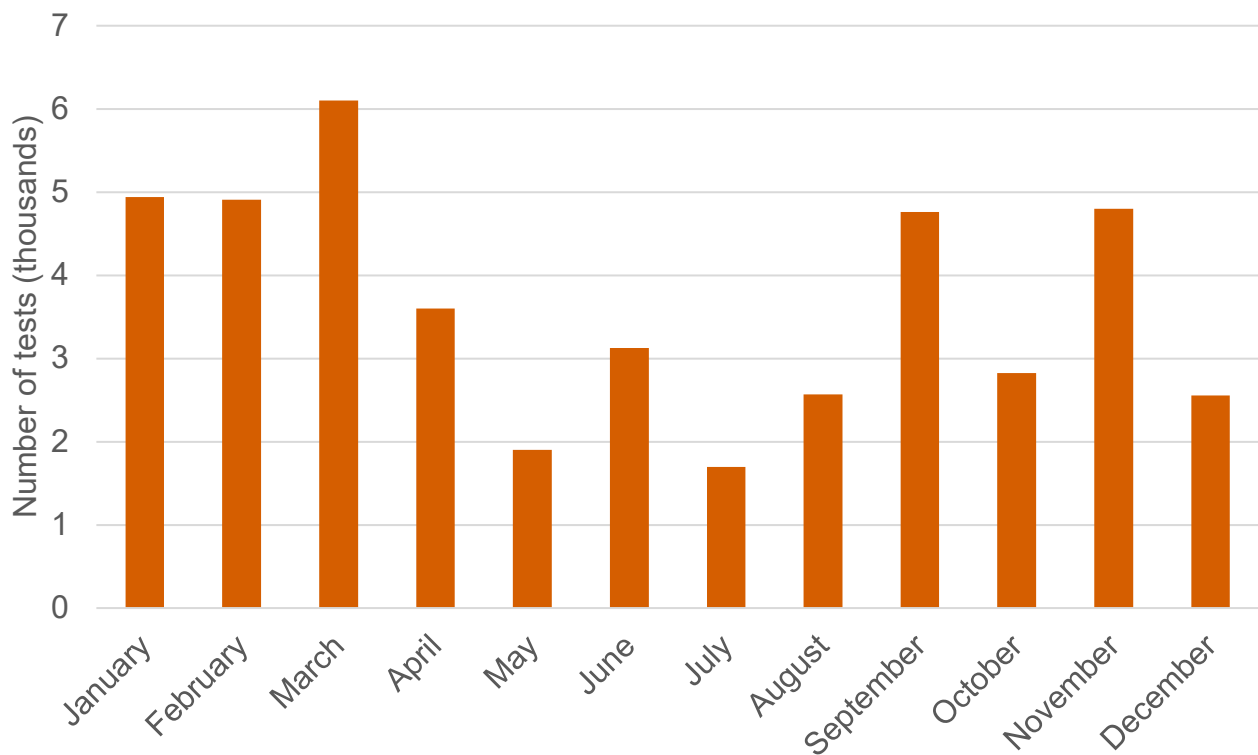


Figure 10: Number of tests undertaken in OTF herds in Nottinghamshire in 2020, by month

Duration of incidents

Of the TB incidents that closed in 2020, the majority (nine out of 11) were resolved before 240 days (eight months) since disclosure (Figure 11). This is indicative of a relatively prompt resolution of incidents in Nottinghamshire.

Only two incidents lasted longer than 241 days, with no incidents unresolved after 550 days. This will have contributed to the relatively low end-of-year prevalence in 2020 (0.99) which was identical to that of 2019.

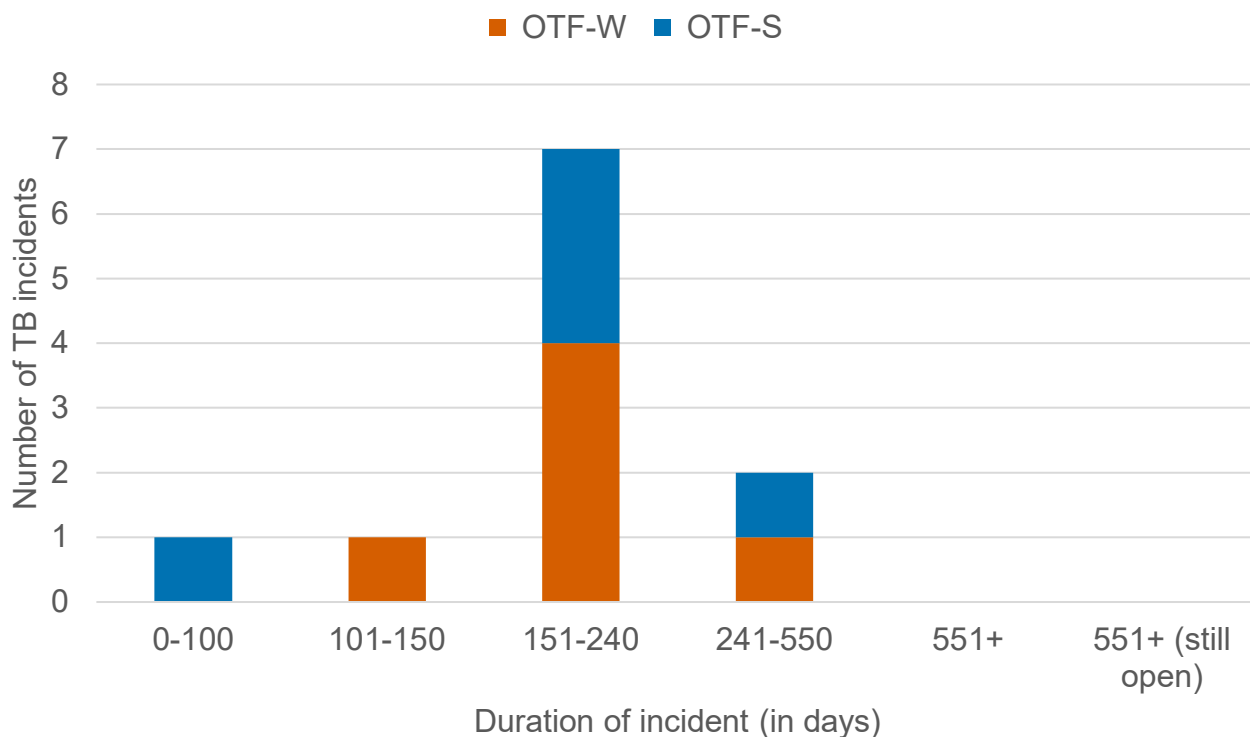


Figure 11: Duration of all TB incidents (OTF-W and OTF-S) that ended in 2020, and the number of persistent TB incidents (551+ days) that were unresolved at the end of 2020 in Nottinghamshire. Note that Approved Finishing Units (AFUs) have been excluded.

Genotypes associated with TB incidents

Genotyping of *M. bovis* isolates has been used to trace the origin of TB infection. It is particularly useful in identifying where spread has occurred through cattle movements. Stable genotype clusters tend to be found in areas where there is a persistent local reservoir of infection.

APHA implemented whole genome sequencing (WGS) in place of genotyping from April 2021. During 2020 however, genotyping was still performed on *M. bovis* samples isolated from all OTF-W herds in the Edge Area.

There were three different genotypes identified in the five OTF-W incidents in Nottinghamshire in 2020 (Figure 12a): 10:a, 25:a, and 25:b.

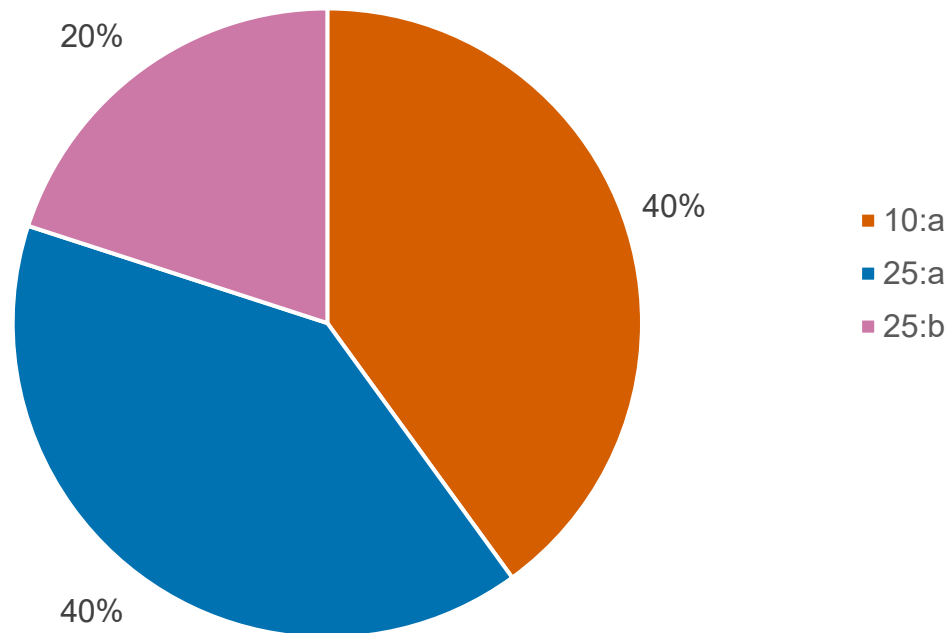


Figure 12a: Genotypes of *M. bovis* identified in herds with OTF-W incidents in Nottinghamshire in 2020 (n=5).

Two incidents were identified as most likely related to purchases of infected cattle; one genotype 25:b in the east of the county near to the border with Lincolnshire and one genotype 10:a in the south west of the county near the border with Leicestershire.

For the two genotype 25:a TB incidents and one genotype 10:a, the source of infection was unclear. Both genotype 10:a incidents disclosed in 2020 were located in south Nottinghamshire and are being investigated as part of a group of genotype 10:a incidents with undetermined origin disclosed in this area in recent years.

Unusual TB incidents

There were no unusual TB incidents in Nottinghamshire in 2020.

Suspected sources, risk pathways and key drivers for TB infection

Key drivers of infection

The key drivers of the TB epidemic in Nottinghamshire during 2020 were as follows:

- Cattle purchases
- Other or undetermined sources

Sources of infection and risk pathways

It can be challenging to retrospectively establish the route of infection for a TB incident herd. The Animal and Plant Health Agency (APHA) aims to complete an epidemiological assessment captured on a Disease Report Form (DRF) for all TB incidents in the Edge Area (both OTF-W and OTF-S).

This includes a thorough on-farm investigation and scrutiny of routinely collected data, such as cattle movement records, and the results of molecular analyses where available. This information is captured on the Disease Report Form (DRF).

During the assessment up to three risk pathways of infection are selected for each herd. 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) or possible (score 1). Risk pathway data are explored both at the herd and county level.

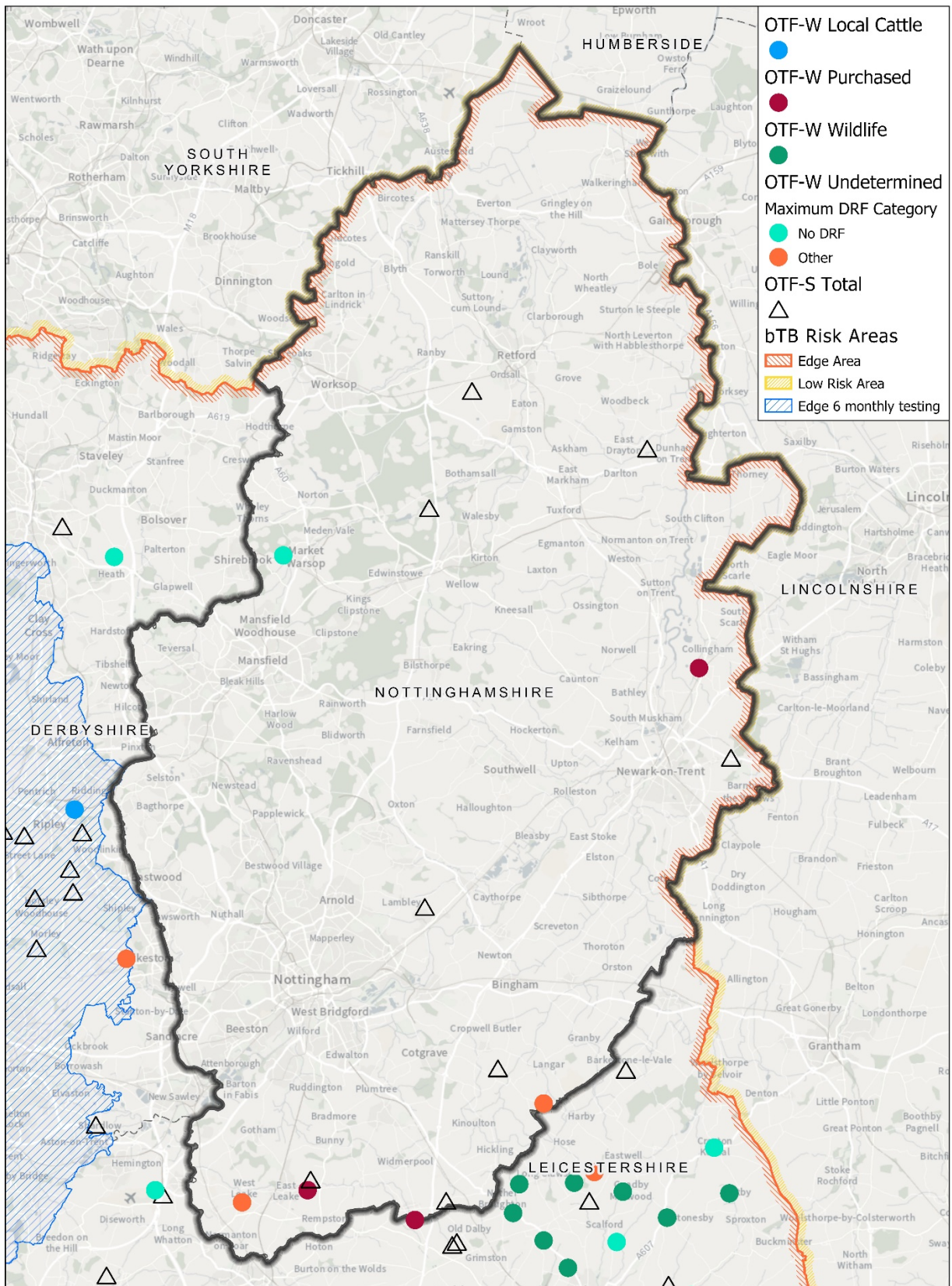
The mostly likely source of infection in individual TB incidents

The most likely source identified by the APHA veterinary assessment is explored spatially for individual TB incidents. The most likely source of infection for individual TB incidents discounts additional risk pathways identified with a lower level of certainty.

Where two sources were ranked equally as the most likely source for an incident, both sources are reported for the incident using a split symbol in the map.

Buying in cattle with undisclosed TB infection was an important source of infection for two of the five OTF-W incidents disclosed in 2020 (40%; Figure 13). As for 2019, the risk from purchasing infected animals was noted in fattening units where there was high cattle throughput and short residence times for infected cattle.

This risk has been somewhat mitigated over recent years, with several fattening units converting to Approved Finishing Units: two in 2019, and one in 2020. For two of the OTF-W incidents in 2020, the most likely source of TB infection on the farm was unclear, indicated by 'other' in Figure 13. In these incidents, multiple sources were selected, all with the lowest level of certainty 'possible'.



Creator: GIS Team
 Source: Sam
 OTFW data as at 15th of April 2021
 Ref: 20210604
 Date: 04/06/2021

DRF Source - Nottinghamshire

0 2.75 5.5 11 Kilometers
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 Ordnance Survey 100051110
 Animal & Plant Health Agency

The weighted source of infection at county level

To consider the contribution of all sources of infection within an area, the source(s) for each incident are weighted by the certainty ascribed. Any combination of definite, most likely, likely, or possible sources can contribute towards the overall picture for possible routes of introduction into a herd.

If the overall score for a herd is less than six, then the score is made up to six using the 'Other/Unknown Source' option. Buffering up to six in this way helps to reflect the uncertainty in assessments where only 'likely' or 'possible' sources are identified.

The weight of infection outputs in Appendix 4 are produced by combining the data from multiple herds. This presents the overall proportion of pathways in which each source was identified, weighted by the level of certainty each source caused the introduction of TB. The outputs do not show the proportion of herds where each pathway was identified (this is skewed by the certainty calculation).

Genotyping of *M. bovis* isolates can be a powerful tool in identifying a likely source of infection, however genotypes are not determined for OTF-S herds. The inclusion of OTF-S herds in these calculations increase the uncertainty in the outputs. As a result, the relative proportions of each risk pathway is very approximate and only broad generalisations should be made from these data. A more detailed description of this methodology is provided in the [Explanatory Supplement](#).

In general, the overall (OTF-W and OTF-S) weighted contributions (Table A4) for each risk pathway were very similar to those recorded for 2019. Cattle movements contributed almost 50% of the weighted source of infection for OTF-W incidents (Figure 14a).

This was a much smaller proportion (6%) for OTF-S incidents (Figure 14b) whereby definition no genetic data is available, making it difficult to attribute risk pathways with certainty. For this reason, the relative proportion of 'other/unknown' for OTF-S incidents was high (73%).

Like in 2019, wildlife sources were considered as a possibility for several TB incidents, with low certainty.

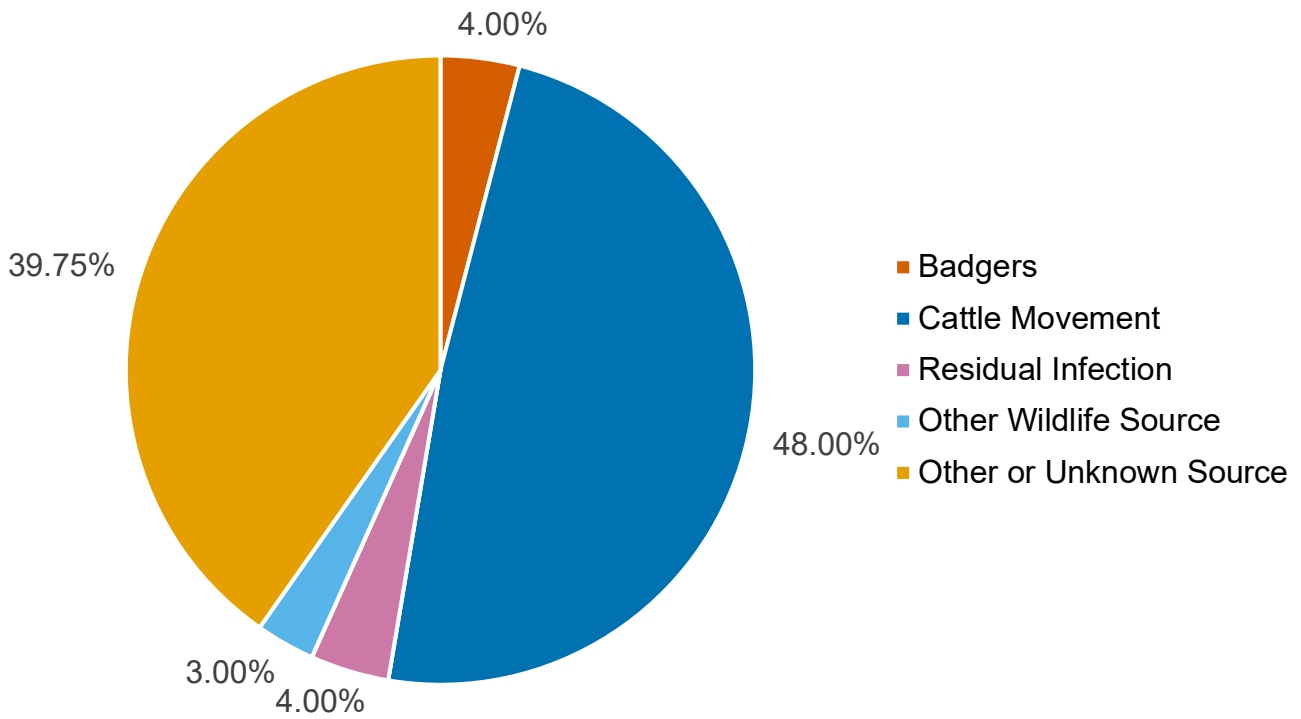


Figure 14a: Summary of the weighted source of infection pathways attributed for OTF-W TB incidents that started in 2020 in Nottinghamshire, that had a completed DRF (n=4).

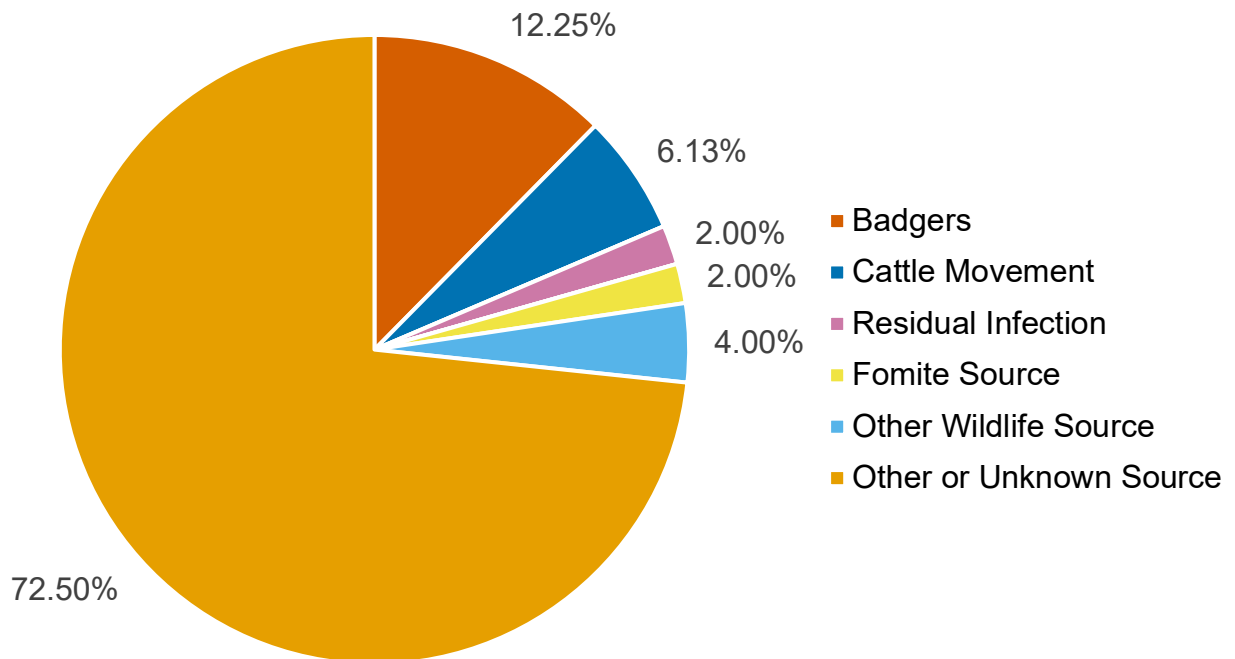


Figure 14b: Summary of the weighted source of infection pathways attributed for OTF-S TB incidents that started in 2020 in Nottinghamshire, that had a completed DRF (n=8).

TB in other species

There is no statutory routine TB surveillance of live non-bovine species. Post-mortem examination (PME) is performed on suspected clinical cases reported to APHA. Furthermore, post-mortem meat inspection is carried out on all captive animals (for example, sheep, goats, pigs or deer) slaughtered for human consumption.

There were no cases of TB in non-bovine species in 2020 in Nottinghamshire.

Detection of TB incidents

The majority of new incidents was disclosed with routine active surveillance (Figure 15): ten of 13 incidents were disclosed at a whole herd test (WHT).

However, the majority of OTF-W incidents were disclosed with passive surveillance: three of five OTF-W incidents were disclosed at routine post-mortem meat inspection of non-reactor cattle in slaughterhouses (SLH). This indicates that both active and passive surveillance provided important contributions to the detection of TB in Nottinghamshire.

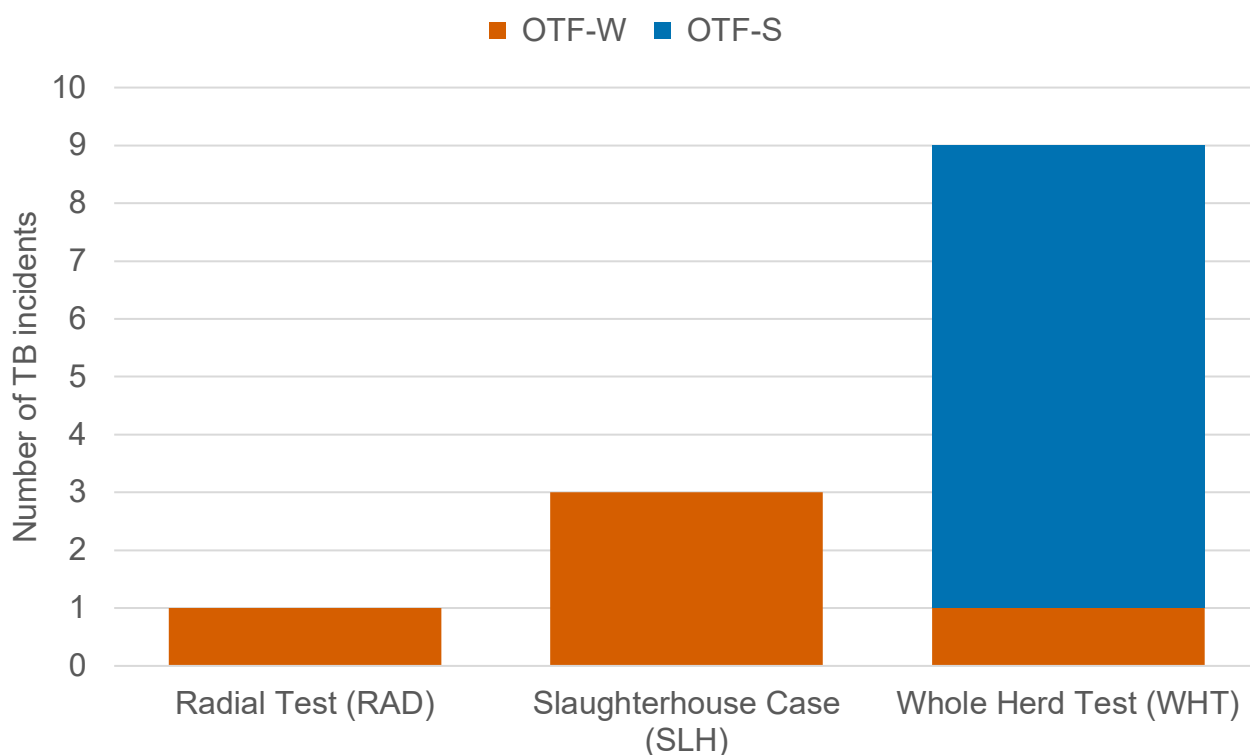


Figure 15: Number of TB incidents (OTF-W and OTF-S) in Nottinghamshire in 2020, disclosed by different surveillance methods.

Figure 16 shows the number of new OTF-W and OTF-S incidents in 2020, that had experienced an OTF-W incident in the previous three years. It excludes new incidents that were also on restrictions in the first four or more months of 2020 due to an incident that started before 2020.

The [Explanatory Supplement](#) (see section 4.3) provides more details on the reporting of recurrent TB incidents.

Of the 13 TB incidents (OTF-W and OTF-S) in Nottinghamshire in 2020, only one had suffered an OTF-W incident in the previous three years (Figure 16). This indicates that there has been effective clearance of disease following detection in cattle herds in Nottinghamshire, with limited evidence of residual infection.

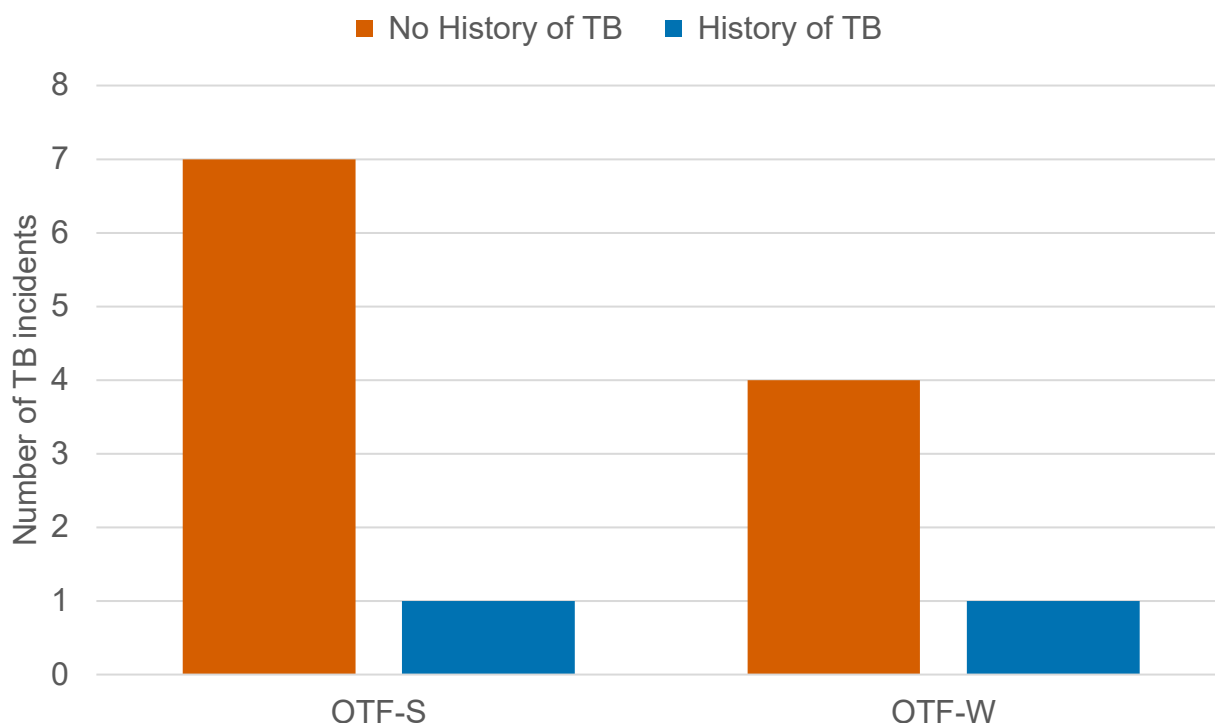


Figure 16: Number of herds with a TB incident (OTF-W and OTF-S) in Nottinghamshire in 2020, with a history of TB (herds that experienced an OTF-W incident in the previous three years), and holdings without a history of TB in the previous three years.

Skin test reactors and interferon gamma test positive animals removed

In 2020, 32 cattle were compulsorily slaughtered for TB control purposes, which was fewer than half the number removed in 2019 (77, Figure 17). Of these, nine animals were detected by IFN- γ blood tests and 23 were skin test reactors (36 and 41 in 2019, respectively).

Most incidents had just one reactor or a reactor with an inconclusive reactor at the disclosing test. In one incident, disclosed after an inconclusive reactor failed at a retest, several inconclusive reactors and two dangerous contacts were slaughtered along with subsequent reactors detected at ensuing short interval tests.

Low numbers of reactors were detected both at the initial disclosing test and during control testing in 2020. This, together with the relatively short duration of TB incidents (see Figure

12) and low annual prevalence (see Figure 4), points to early detection of disease in 2020, and a low probability of spread within herds.

The financial impact on farmers of reactor removal has been relatively low for incidents detected in Nottinghamshire in 2020 (due to the low number of reactors removed per incident), with the exception of one farm in which eight reactors were detected and removed.

The impact of the duration of movement restrictions has also been relatively low given the low number and short duration of incidents in 2020 continuing the trend from 2019.

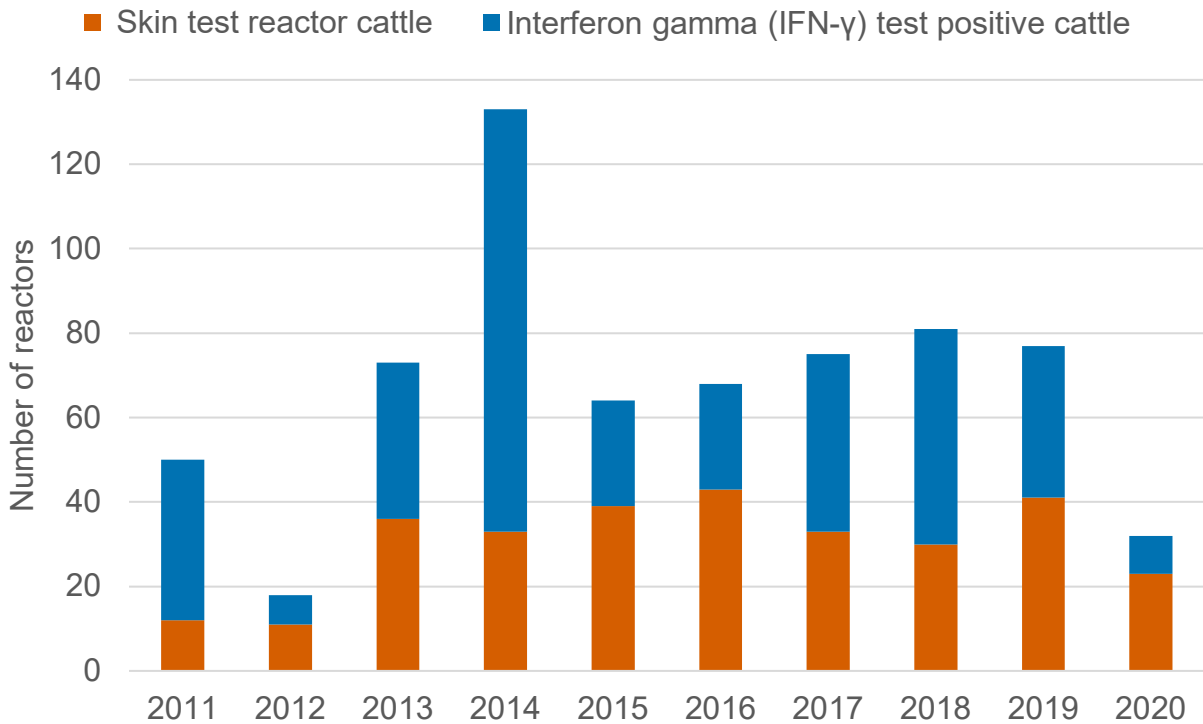


Figure 17: Number of skin test reactors and interferon gamma (IFN-γ) test positive cattle removed by APHA for TB control reasons in Nottinghamshire, 2011 to 2020.

Summary of risks to Nottinghamshire

Risks to the county from other areas were primarily from purchases of infected cattle especially from the HRA.

The endemic area described by HS23 is mostly located within south-west Lincolnshire and north-east Leicestershire, but also extends into the south-east of Nottinghamshire (see Figure 6). This area of Nottinghamshire is a high-cattle density area and spread of infection remains an ongoing risk to the county. In 2020, only one OTF-W incident occurred in the HS23 area in Nottinghamshire.

The incident had the genotype mostly commonly encountered in HS23 (25:a). The source for this infection was uncertain, although infected badgers were considered a possibility. The incident involved a flying herd, leaving purchase as another possible risk pathway, along with residual infection from a previous incident.

Summary of risks from Nottinghamshire to surrounding areas

The TB risk from Nottinghamshire to adjacent counties appears to be low, but possible areas of endemicity close to the borders of Leicestershire raise the risk of exporting infecting cattle from these parts of the county.

Assessment of effectiveness of controls and forward look

Effectiveness of controls

Several measures suggest that the TB situation in Nottinghamshire marginally improved in 2020.

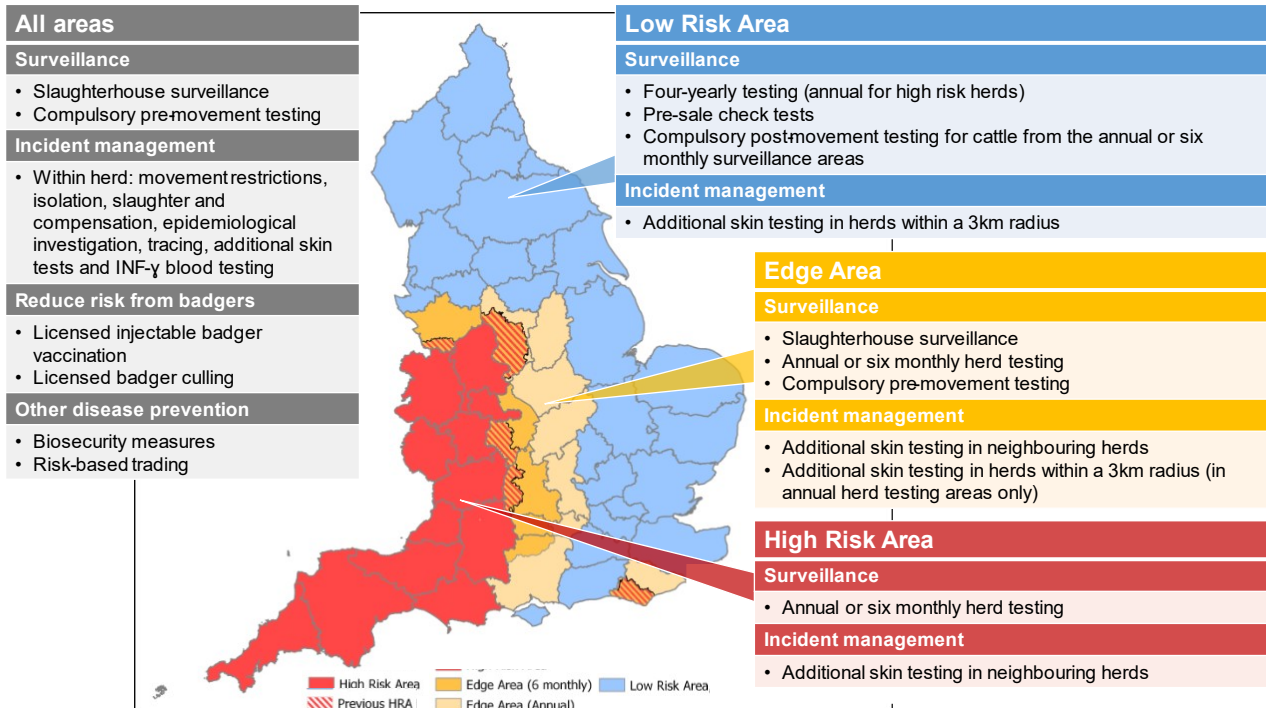
Forward look

The objective to reduce OTF-W herd incidence to less than 1% by 2025 appears achievable if the positive trend is maintained.

The objective to attain OTF status (crude incidence of indigenous OTF-W herd incidents less than 0.1%) for the lowest incidence counties in the Edge Area depends on what happens in the two probable endemic areas to the south of the county. Some wildlife controls may be needed to prevent spread.

Appendices

Appendix 1: Overview of risk and surveillance areas of England and Edge Area objectives and controls



[Explanatory Supplement for England](#)

[2020.](#)

Policy objectives for the Edge Area

Short to medium term:

- slow down geographic spread of endemic infection
- maintain crude herd incidence of OTF-W incidents less than 2% overall by 2019
- begin to reduce the incidence rate

Longer term:

- reduce geographic spread of TB and push the Edge Area boundaries westward
- reduce OTF-W herd incidence to less than 1% by 2025
- attain OTF status (crude incidence of indigenous OTF-W herd incidents less than 0.1%) for the lowest incidence counties in the Edge Area

For more information about the governments approach to controlling TB, visit the strategy for achieving Officially Bovine Tuberculosis Free status for England, published in 2014 and independently reviewed in 2018, see:

- [A strategy for achieving officially bovine tuberculosis free status for England](#)
- [Government sets out next phase of strategy to combat bovine tuberculosis](#)

Key control measures

Surveillance:

- six monthly or annual routine whole herd testing
- additional targeted surveillance of cattle herds located within a 3km radius of new OTF-W incidents in annual testing sections of the Edge Area (radial testing)
- slaughterhouse (SLH) surveillance

Management of cases ('incidents'):

- increased sensitivity of incident herd testing:
- all incident herds must pass two consecutive short interval skin tests at severe interpretation to regain OTF status, irrespective of PM and bacteriological findings
- mandatory IFN- γ parallel testing of herds with OTF-W incidents
- enhanced management of herds with persistent incidents
- enhanced epidemiological investigation and data analysis
- information sharing - location of incident herds publicly available (using [ibTB](#) online interactive mapping tool)
- restriction for life of all inconclusive reactors (IRs) that give a negative result on a re-test was introduced in November 2017 ('resolved IRs' policy). The only permitted movements of these animals are to slaughter or an Approved Finishing Unit, or after being subjected to a private IFN- γ test with negative results
- TB controls in the wildlife reservoir (badgers):
- licensed badger culling in high incidence sections of the Edge Area
- Government grants for licensed voluntary badger vaccination projects using injectable badger BCG (Badger Edge Vaccination Scheme (BEVS))

Other measures:

- compulsory pre-movement skin testing of cattle moved between herds
- promotion of herd biosecurity measures to reduce the risk of new incidents

Summary of enhanced TB control measures in Nottinghamshire

Edge Area testing policy

- No discretionary measures were implemented in OTF-S incidents (no OTF-S incidents were subjected to discretionary IFN- γ testing).
- Mandatory IFN- γ testing of new OTF-W incident herds in 2020 found nine IFN- γ positive animals (28% of all reactors) which was higher than the previous year.

- There were no exemptions applied to the deployment of IFN- γ testing in OTF-W incidents.
- There were no exemptions applied to the deployment of radial testing.
- There were no persistently infected herds or incidents where enhanced case management was recommended in 2020.

Other testing measures

- Continuing ongoing investigation of OTF-W incidents aided with analysis of Whole Genome Sequencing (WGS) to determine the links between these incidents and other local incidents in Leicestershire and Lincolnshire, and to increase certainty in attributed infection risk pathways
- In the recent past (not in 2020) occasionally testing does become overdue, but it is usually resolved within 60 days of the test becoming overdue. There is no evidence of those delayed tests having had any notable impact on the epidemiology of TB in Nottinghamshire in 2020.

Other control measures

- Regional meetings held with farmers in the TB eradication group of the Vale of Belvoir area (south Nottinghamshire and north Leicestershire), led by the National Farmers Union
- Provision of free biosecurity advice by the [TB Advisory Service \(TBAS\)](#)
- Badger found dead survey in the Edge Area completed by the Universities of Nottingham and Surrey. Results of the [Badger survey in the Edge Area](#) can be on GOV.UK.
- Badger Edge Vaccination Scheme (BEVS): The four-year projects which Defra funded under the original BEVS which started in 2015 were terminated in 2016 due to a worldwide shortage of BCG vaccine. One of those projects was run by Nottinghamshire Wildlife Trust (NWT) on the Nottinghamshire/Leicestershire border. A new scheme (BEVS2) was launched at the end of 2018.
- HS23 area (hotspot involving parts of Lincolnshire (LRA), Leicestershire (Edge) and Nottinghamshire) - additional surveillance measures have been implemented in cattle and wildlife across the whole hotspot, including the collection of 'found dead' badger and wild deer carcasses.

Appendix 2: Cattle industry in Nottinghamshire

Table A2.1: Number of cattle premises by size band in Nottinghamshire at 1 January 2020. (RADAR data)

Size of herds	Un*	1-50	51-100	101-200	201-350	351-500	501+	Total number of herds	Mean herd size	Median herd size
Number of herds	2	226	71	68	32	13	15	427	102	43

*The number of herds with an undetermined size.

Table A2.2: Number of animals by breed purpose in Nottinghamshire at 1 January 2020.

Breed purpose	Beef	Dairy	Dual purpose	Unknown	Total
Number of cattle	29,126 (66%)	13,158 (30%)	1,292 (2%)	0	43,576

Appendix 3: Summary of headline cattle TB statistics

Table A3.1: Herd-level summary statistics for TB in cattle in Nottinghamshire between 2018 and 2020.

Herd-level statistics	2018	2019	2020
(a) Total number of cattle herds live on Sam at the end of the reporting period	514	515	515
(b) Total number of whole herd skin tests carried out at any time in the period	518	514	478
(c) Total number of OTF cattle herds having TB whole herd tests during the period for any reason	421	413	394
(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)	486	496	481
(e) Total number of cattle herds that were not under restrictions due to an ongoing TB incident at the end of the report period	502	507	506
(f) Total number of new TB incidents detected in cattle herds during the report period, (including all FUs)	17	14	13
• OTF-S	8	9	8
• OTF-W	9	5	5
(g) Of the OTF-W herd incidents:			
• How many can be considered the result of movement, purchase or contact from/with an existing incident based on current evidence?	2	3	2

Herd-level statistics	2018	2019	2020
<ul style="list-style-type: none"> New OTF-W incidents triggered by skin test Reactors or 2xIRs at routine herd tests 	3	2	1
<ul style="list-style-type: none"> New OTF-W incidents triggered by skin test Reactors or 2xIRs at other TB test types (such as, forward and back-tracings, contiguous or check tests) 	4	0	0
<ul style="list-style-type: none"> New OTF-W incidents first detected through routine slaughterhouse TB surveillance 	2	3	3
(h) Number of new incidents revealed by enhanced TB surveillance (radial testing) conducted around those OTF-W herds			
<ul style="list-style-type: none"> OTF-S 	0	1	1
<ul style="list-style-type: none"> OTF-W 	1	0	2
(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)	4	3	1
(j) New confirmed (positive <i>M. bovis</i> culture) incidents in non-bovine species detected during the report period (indicate host species involved)	0	1Cat	0
(k) Number and type of finishing units active at end of the period:			
<ul style="list-style-type: none"> Approved Finishing Units: Grazing 	0	0	0
<ul style="list-style-type: none"> Approved Finishing Units: Non-Grazing 	7	9	10
<ul style="list-style-type: none"> Exempt Finishing Units: Grazing 	0	0	0
<ul style="list-style-type: none"> Exempt Finishing Units: Non-Grazing 	1	1	1

Table A3.2: Animal-level summary statistics for TB in cattle in Nottinghamshire between 2018 and 2020.

Animal-level statistics (cattle)	2018	2019	2020
(a) Total number of cattle tested in the period (animal tests)	56,503	58,057	53,735
(b) Reactors detected in tests during the year:			
• Tuberculin skin test	30	41	23
• Additional IFN- γ blood test reactors (skin-test negative or IR animals)	51	36	9
(c) Reactors detected during year per incidents disclosed during year	4.8	5.5	2.5
(d) Reactors per 1,000 animal tests	1.4	1.3	0.6
(e) Additional animals slaughtered during the year for TB control reasons:			
• DCs, including any first-time IRs	0	3	4
• Private slaughters	4	6	1
(f) SLH cases (tuberculous carcasses) reported by Food Standards Agency (FSA)	6	12	6
(g) SLH cases confirmed by culture of <i>M. bovis</i>	5	4	4

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

Table A4: Suspected sources of *M. bovis* infection for all the new OTF-W and OTF-S incidents identified in Nottinghamshire, in 2020.

Source of infection	Possible (1)	Likely (4)	Most likely (6)	Definite (8)	Weighted contribution
Badgers	3	1	0	0	9.7%
Cattle movements	5	0	2	0	20.3%
Contiguous	0	0	0	0	0.0%
Residual infection	2	0	0	0	2.8%
Domestic animals	0	0	0	0	0.0%
Non-specific reactor	0	0	0	0	0.0%
Fomites	1	0	0	0	1.4%
Other wildlife	3	0	0	0	3.8%
Other or unknown source	6	2	0	0	62.0%

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

Details of the methodology used to calculate the weighted contribution of the different suspected sources of *M. bovis* infection for all new incidents can be found in the main body of the report and in the [Explanatory Supplement](#).



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National.TBEpi@apha.gov.uk

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