

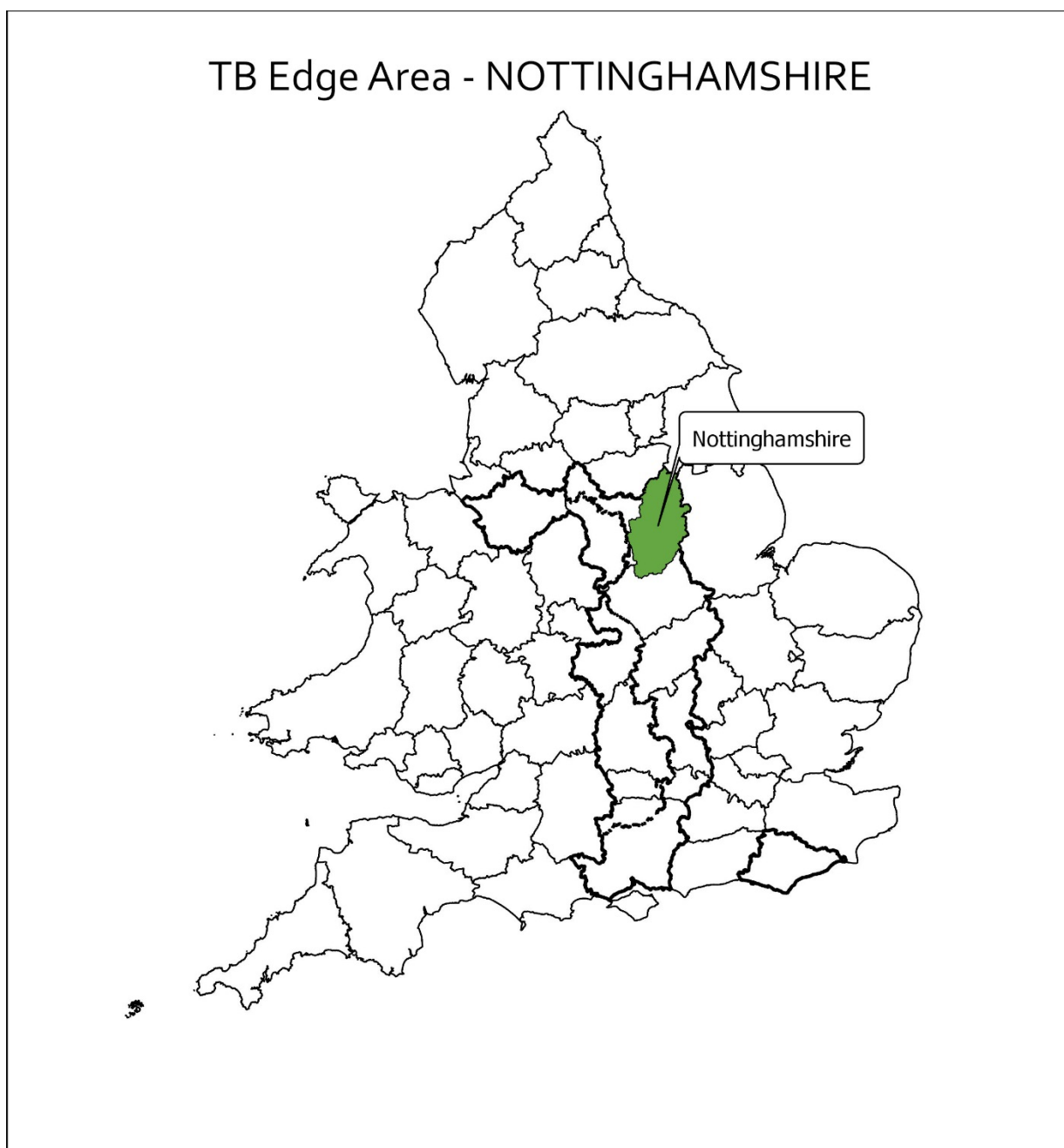


Year End Descriptive Epidemiology Report: Bovine TB Epidemic in the England Edge Area

Delivery Area: Northern

Name of County: Nottinghamshire

Year-end report for: 2018



Contents

Executive Summary	3
Introduction	5
Changes to the Edge Area in 2018	5
Cattle industry in Nottinghamshire	5
Overview of the bovine TB epidemic in Nottinghamshire	6
History of bovine TB in Nottinghamshire	6
Geographical distribution of bovine TB cases (new and ongoing) in Nottinghamshire	9
Descriptive epidemiology of bovine TB in Nottinghamshire.....	12
Characteristics of bovine TB in Nottinghamshire	12
Risk pathways for bovine TB infection in Nottinghamshire	14
Role of other species in Nottinghamshire	15
Detection of cases in Nottinghamshire	15
Burden of bovine TB.....	16
Key drivers of the bovine TB epidemic	16
County summary	16
Summary of risks to the Low Risk Area (LRA) and any mitigating factors.....	17
Summary of the risk to the Edge Area from the HRA.....	17
Summary of the risk to Nottinghamshire from the adjacent Edge Area counties.....	17
Assessment of effectiveness of controls and forward look	17
APPENDICES	18
Appendix 1: Overview of risk and surveillance areas of England and Edge Area objectives and controls.....	18
Appendix 2: Cattle industry in the Edge Area of the region	20
Appendix 3: Summary of the Nottinghamshire headline cattle TB statistics	21
Appendix 4: Suspected sources of <i>M. bovis</i> infection for all the new OTFW and OTFS breakdowns identified in the report period	23
Appendix 5: Overview of the TB Control Programme in	24

Executive Summary

1. The Edge Area has a low but recently rising incidence of infected herds. **Nottinghamshire** is part of the Edge Area that was established in 2013 as part of the Government's strategy to achieve Officially Bovine Tuberculosis Free (OTF) status for England by 2038. The whole county has been part of the Edge Area since it was established in 2013. This end of year report describes the bovine tuberculosis (TB) epidemic in Nottinghamshire in 2018.
2. **Local cattle industry.** No significant changes in 2018. Predominance of small herds of up to 50 cattle in the county, the majority of these are beef cattle and a significant arable industry which is supportive of units finishing beef stock.
3. **New breakdowns of TB.** The number of breakdowns disclosed in 2018 (17) represents a relative increase from 2017 which was the year with the fewest new breakdowns (13) since 2013. Nevertheless, it appears that the number of breakdowns remains relatively stable.
4. **Risk pathways for TB infection.** A new methodology has been introduced to calculate the weighed contribution of the different suspected sources of *M. bovis* infection for all the new Officially Bovine Tuberculosis Free Status Withdrawn (OTFW) and Officially Bovine Tuberculosis Free Status Suspended (OTFS) breakdowns identified in 2018. Wildlife infection represents over 40% (25% badgers and 16% other wildlife) of the suspected sources, while the weight of movement of undetected infected cattle represents 35%. These figures appear to confirm a change in trend from previous years, with an increase of breakdowns potentially attributed to wildlife.
5. **Role of other species.** There have been no laboratory confirmed isolations of *M. bovis* in domestic species other than cattle. Submission rates are routinely extremely low. A Defra-funded Edge Area found dead badger survey was conducted in 2016/17 to look for the presence of *M. bovis* in badgers in Edge Area counties. Results are yet to be published. The potential role of wildlife in the transmission of disease in six OTFW breakdowns in 2018 could not be ruled out. To the west of Nottinghamshire there are endemic areas in Derbyshire and potential new endemic areas to the south (in north Leicestershire and south west Lincolnshire) which could potentially spread into Nottinghamshire. There is ongoing badger vaccination, as part of the Badger Edge Vaccination Scheme (BEVS), run by Nottinghamshire Wildlife Trust on the Nottinghamshire/Leicestershire border.
6. **Disclosing tests.** In 2018, 88% of the breakdowns were disclosed by active surveillance, and 35% of breakdowns were detected following retesting of inconclusive reactors (IRs), suggesting that disease is generally being detected early in its course in Nottinghamshire. Approximately 40% of the new breakdowns were disclosed by routine annual whole herd surveillance tests (WHT), with this group representing the most important stream for new cases. Radial testing was introduced in 2018 as a compulsory measure in herds located within 3km of any herd with an OTFW breakdown in Nottinghamshire, contributing to 18% of the new breakdowns.
7. **Impact of TB and reactor numbers.** In total, 81 cattle were compulsorily slaughtered due to bovine TB in 2018, continuing the progressive increase in this number observed since 2015. Of the 81 animals, 50 were detected by interferon gamma tests and 31 were skin test reactors. Overall, there was a slight increase in reactors removed and breakdowns detected, while the number of herds and animals tested has not changed significantly from 2017.
8. **Risks to the Low Risk Area (LRA).** Evidence suggests that some of the genotype 25:a cases in South Lincolnshire (Grantham area) are likely to be related to other breakdowns in north

Leicestershire (Vale of Belvoir) and south Nottinghamshire. This suggests that the TB epidemic could be moving into the LRA around south Lincolnshire. Hotspot disease control measures (HS23) were implemented following a case in this area of Lincolnshire where the involvement of wildlife in the transmission of infection could not be ruled out.

9. **Risks from the High Risk Area (HRA) and/or other adjacent Edge Area counties.** There is no HRA adjacent to Nottinghamshire. The main risk from the HRA is the purchase of cattle from HRA farms, particularly for finishing units which are widespread throughout the county. There is no evidence of infection from the adjacent Edge Area county of Derbyshire. Some genotype 25:a cases in the county potentially associated with wildlife appeared clustered with similar cases in north Leicestershire and in the new potential hotspot (HS23) in the bordering LRA in Lincolnshire.
10. **Forward look.** Historically Nottinghamshire has had low levels of bovine TB. The infection risk from purchases of cattle from the HRA destined primarily for fattening has been the main risk identified in previous reports. The importance of continuing to address this significant infection pathway remains key to reducing the herd incidence in this county. Nevertheless cumulative figures since 2016 indicate several genotype 25:a OTFW breakdowns of undetermined origin in the centre and south of the county. The potential involvement of wildlife in some of these breakdowns needs to be further investigated. The potential for achieving OTF status by 2025 appears to be dependent on the control of disease in wildlife in nearby endemic areas, and the better understanding of current disease levels in wildlife in lower incidence areas, to enable control measures to be implemented according to the risk. It is also important to continue to promote informed purchasing practices and industry ownership of disease control.

Introduction

A key action in the implementation of the Government's objective to achieve Officially Bovine Tuberculosis Free (OTF) status for England by 2038 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 regions or zones have been established. Overall, the Edge Area has a low but recently rising incidence of infected farms and control efforts are seeking to slow down and reverse geographic spread, and reduce the incidence rate, with the aim of obtaining OTF status for this area as soon as possible. This report describes the epidemiology of bovine TB in Nottinghamshire which forms part of the Edge Area (see Appendix 1).

Changes to the Edge Area in 2018

On 1st January 2018 the Edge Area boundary was expanded westwards to incorporate fully into the Edge Area the former HRA parts of the five previously split counties of Cheshire, Derbyshire, Warwickshire, Oxfordshire and East Sussex. The reports for those five counties will focus on incidents of bovine TB in the whole county, but noting key differences between the old and new parts where relevant.

Annual surveillance testing continued in the whole county of Nottinghamshire. From January 2018, herd surveillance was enhanced with the introduction of targeted radial testing of herds within a 3km radius of OTFW breakdown herds.

Cattle industry in Nottinghamshire

Herd types

There is a predominance of small herds of up to 50 cattle in the county (53% of all herds) as shown in Figure 1, and it is reasonable to assume that the majority of these are beef cattle.

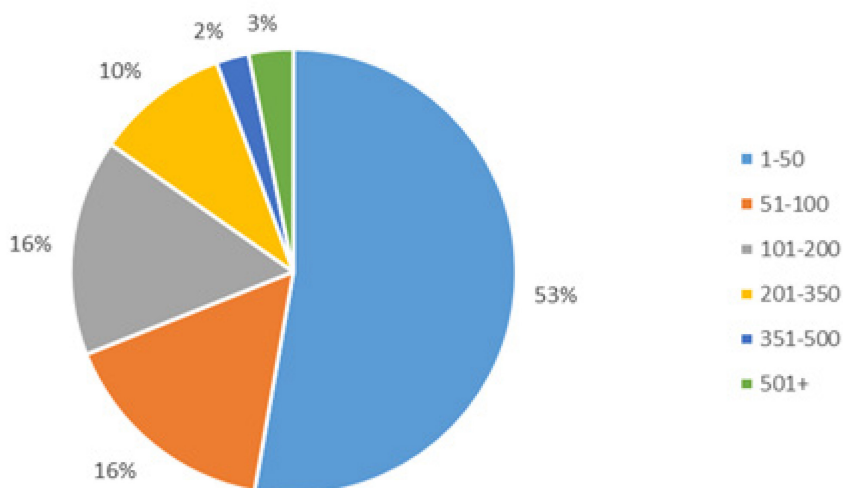


Figure 1: Proportion of cattle holdings by herd size in Nottinghamshire in 2018 (n=466)

As shown in Figure 2, there is a predominance of beef cattle (60%), both suckler and finishing herds in the county. Dairy herd numbers continue to decline, with 21% of all cattle herds (30% of all cattle) in Nottinghamshire being dairy breeds.

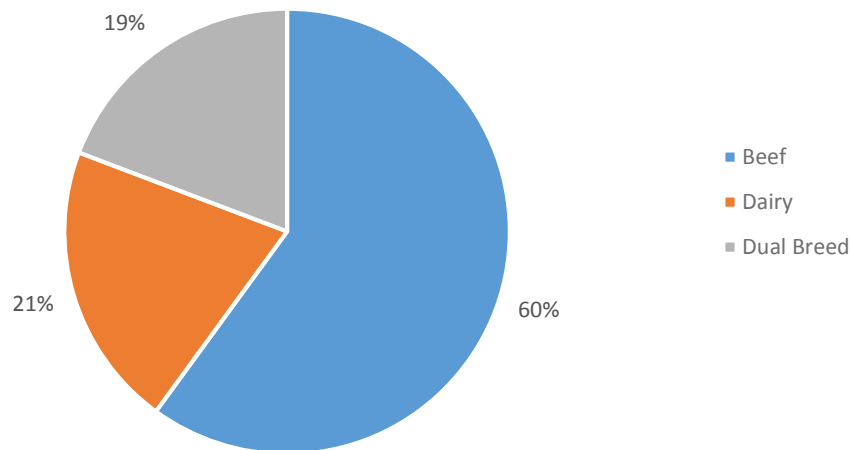


Figure 2: Proportion of cattle holdings by breed purpose in Nottinghamshire in 2018 (n=728)
 (Note: the total number of holdings in Figure 1 varies from the total number of holdings in Figure 2 because holdings are counted more than once when cattle with different breed purposes are present)

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

Markets

There is one livestock market in Nottinghamshire, Newark Livestock Market, which holds a weekly sale every Saturday and a sale for TB-restricted cattle every Wednesday.

Approved Finishing Units (AFU)

There are seven AFUs without grazing in Nottinghamshire.

Common land

There is one area of common land in Nottinghamshire (Sutton Holmes) where six different farmers graze cattle. It was included in radial testing procedures following an OTFW breakdown in the area.

Overview of the bovine TB epidemic in Nottinghamshire

History of bovine TB in Nottinghamshire

Three measures are used to explore the level of bovine TB in this report.

Firstly, the number of new herd breakdowns that were disclosed in each year.

Secondly, the annual herd incidence rate, reported as the number of new incidents per 100 herd-years at risk (100 HYR). 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 tests in herds that other incidence measures, such as new TB incidents per number of herds or tests do not¹.

Thirdly, the annual end of year herd prevalence. This is the number of herds under restriction due to a TB incident at the end of the reporting year, divided by the number of active herds at that same point in time, and provides a snap shot of the burden of TB on the local cattle industry.

For all three measures, both breakdowns where lesions at post-mortem or *M. bovis* in tissue samples have been identified in one or more animals (officially tuberculosis free status withdrawn, OTFW) and breakdowns where lesions at post-mortem or *M. bovis* in tissue samples have not been identified (officially tuberculosis free status suspended, OTFS) are included. However, TB incidents in AFUs without grazing are not included in the prevalence and incidence calculations in the Edge Area reports due to the limited epidemiological impact of these cases. Furthermore, herds restricted due to an overdue test rather than a TB incident are also excluded from calculations.

The number of cases detected yearly since 2009 is displayed below in Figure 3. A clear increase in new breakdowns disclosed from 2013 can be observed with peaks in 2013 (21 breakdowns) and 2016 (23 breakdowns). This increase can be partially attributed to changes to the surveillance testing regime that took place in 2013, when surveillance testing intervals were set at county (not parish) level and the whole county of Nottinghamshire became subject to annual testing.

In this context, the number of breakdowns disclosed in 2018 (17) represents a relative increase from 2017 which was the year with the fewest new breakdowns (13) since 2013, but appears to indicate that the number of breakdowns remains relatively stable (the mean of yearly breakdowns since 2013 is 17.66).

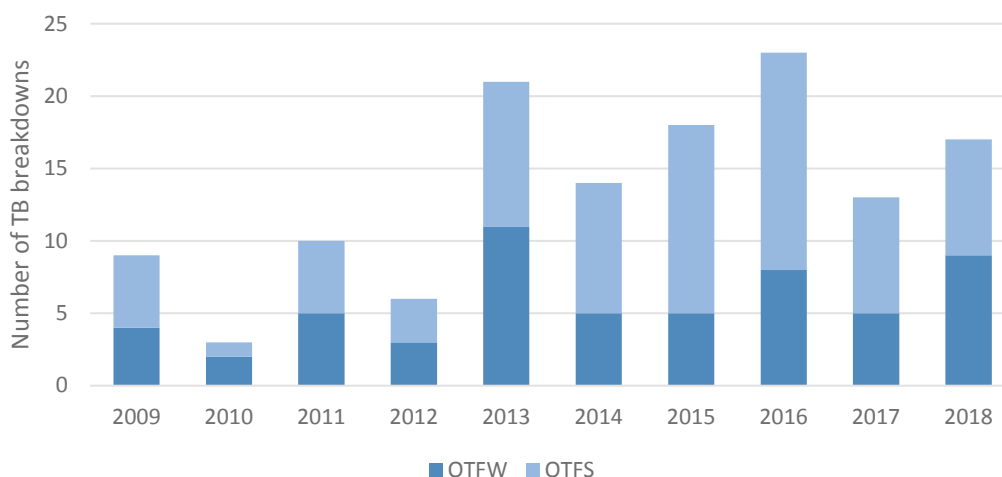


Figure 3: Annual number of new TB breakdowns in Nottinghamshire, 2009-2018

The number of OTFW cases in 2018 (9), second highest after 2013 (11) since 2009, is the factor that appears to be driving incidence up compared to 2017 (5), while the number of OTFS incidents remained very similar. The slight increase in incidence rate (Figure 4) from 3.1 (per 100 herd-years at risk) in 2017 to 3.9 in 2018 may be due to the increase in the sensitivity of routine surveillance testing in the county by supplementing annual surveillance testing with radial testing but in the context of a county

¹The 100 HYR incidence rate measure is described further in 'Bovine tuberculosis in Great Britain in 2018: Explanatory Supplement to the annual reports' <https://www.gov.uk/government/publications/bovine-tb-epidemiology-and-surveillance-in-great-britain-2018>

with a relatively low number of incidents per year any small changes in disease parameters are difficult to assess.

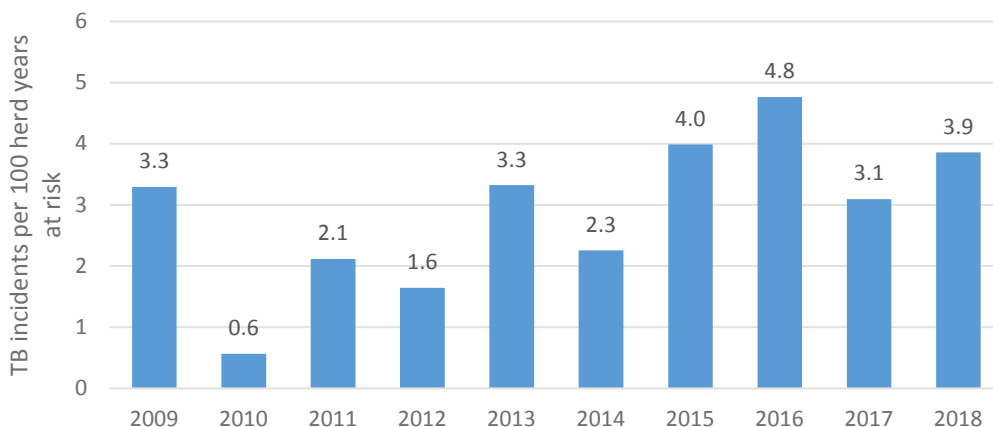


Figure 4: Annual herd incidence rate (per 100 herd-years at risk) for all new breakdowns (OTFW and OTFS) in Nottinghamshire, 2009-2018.

The slight increase in herd prevalence shown in Figure 5 below, which is the highest recorded since 2009, appears to follow an upward trend. This is probably explained by policies which have been introduced in the Edge Area which have increased test sensitivity (greater proportion of infected animals detected) as well as the development of infection clusters in certain areas of the county.

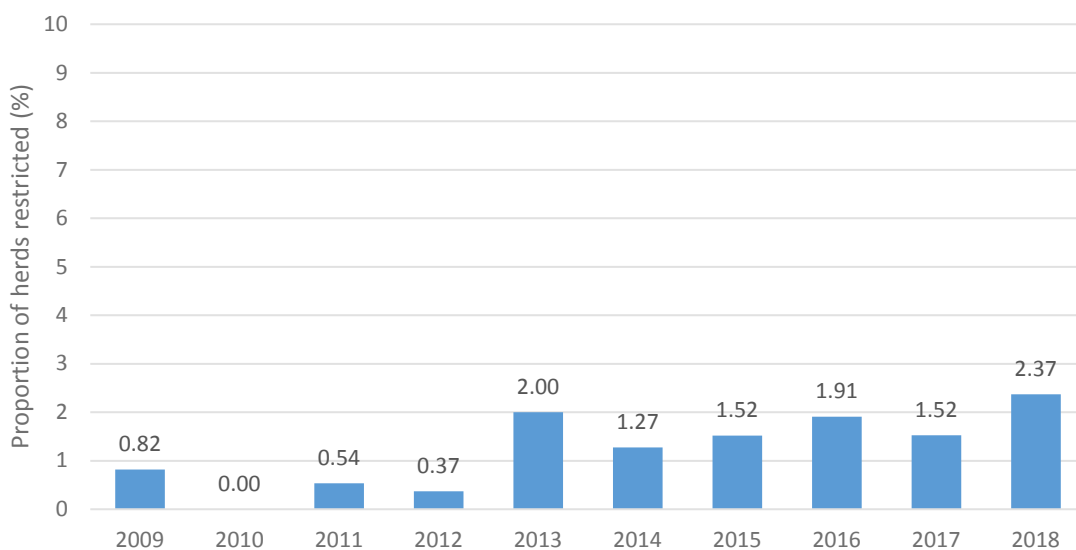


Figure 5: Annual end of year prevalence of restricted herds in Nottinghamshire, 2009-2018.

Geographical distribution of bovine TB cases (new and ongoing) in Nottinghamshire

Figure 6 shows the geographical distribution of all new TB breakdowns (OTFW and OTFS) in 2018, and pre-2018 OTFW breakdowns still ongoing at the end of the report period, overlaid on a cattle holding density map. A cattle density map for the area is inset. This shows that the majority of OTFW breakdowns in 2018 appear to be clustered in the south of the county which coincides with higher cattle density. This clear clustering in 2018 was not as evident in 2017, when several OTFW cases appeared to be spread over the north and east of Nottinghamshire.

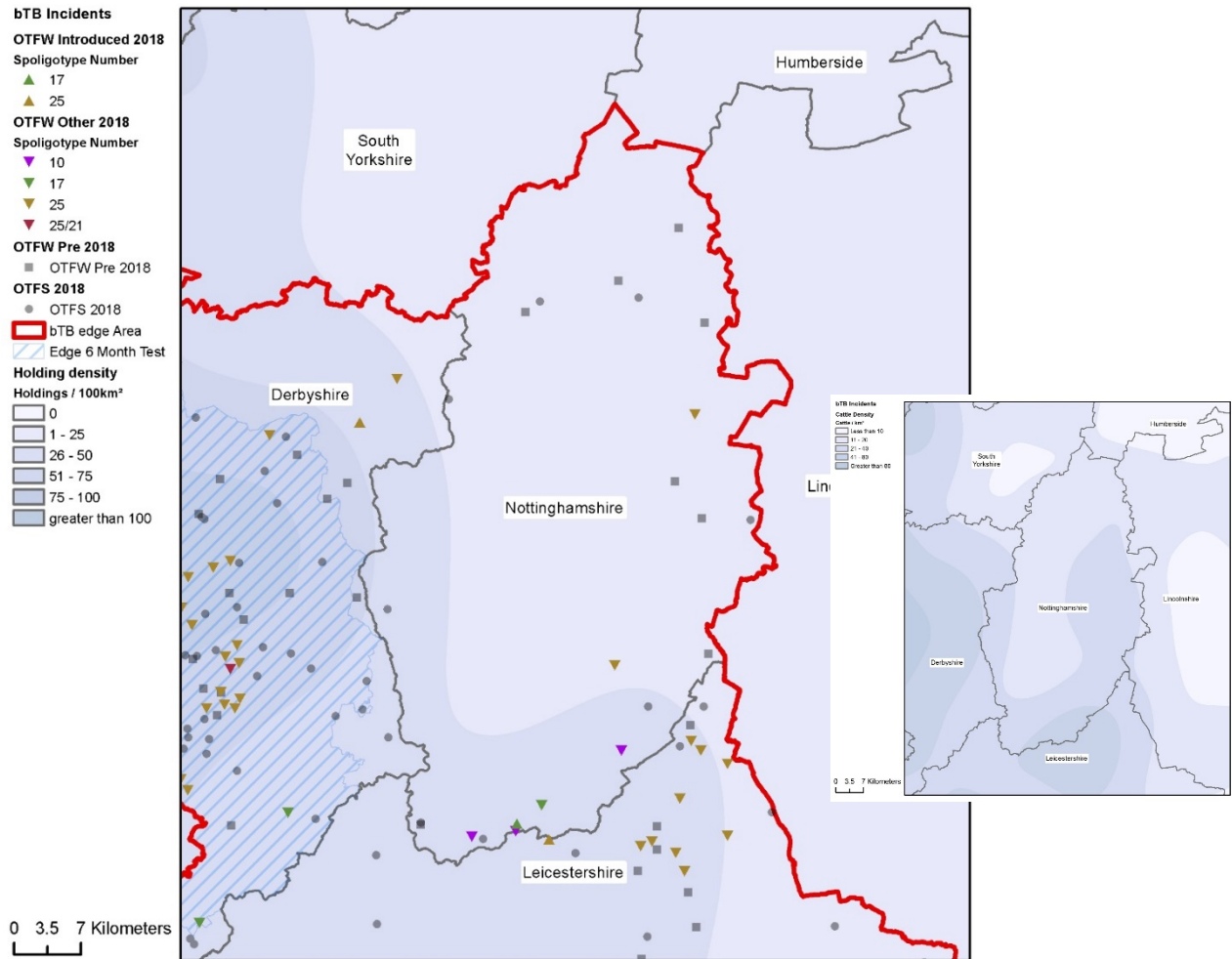


Figure 6: Geographical distribution of all new TB breakdowns (OTFW and OTFS) in 2018 and pre 2018 OTFW breakdowns still ongoing at the end of the report period overlaid on a cattle holding density map, with a cattle density map for the area inset

Figure 7 shows the *M. bovis* genotypes detected in Nottinghamshire where the source was attributed to wildlife infection with a 75% certainty or above. This is an indication of possible endemicity within local wildlife populations (OTFW breakdowns only). This totals three breakdowns, with the following two genotypes identified:

- Genotype 10:a. Two breakdowns in 2018. In previous years there was no evidence indicating that this genotype might be present in local wildlife. The potential link between these two cases and wildlife is being investigated, but this is hindered by the lack of TB surveillance in wildlife.
- Genotype 25:a. One breakdown in 2018. This is a relatively low figure for 2018, especially considering that this genotype is endemic in neighbouring areas in two bordering Edge Area counties (Derbyshire and Leicestershire, see Figure 7). There is no evidence of infection from Derbyshire. Genotype 25:a cases are potentially associated to wildlife and appeared clustered with similar cases in north Leicestershire and in the new potential hotspot (HS23) in the bordering LRA county of Lincolnshire.

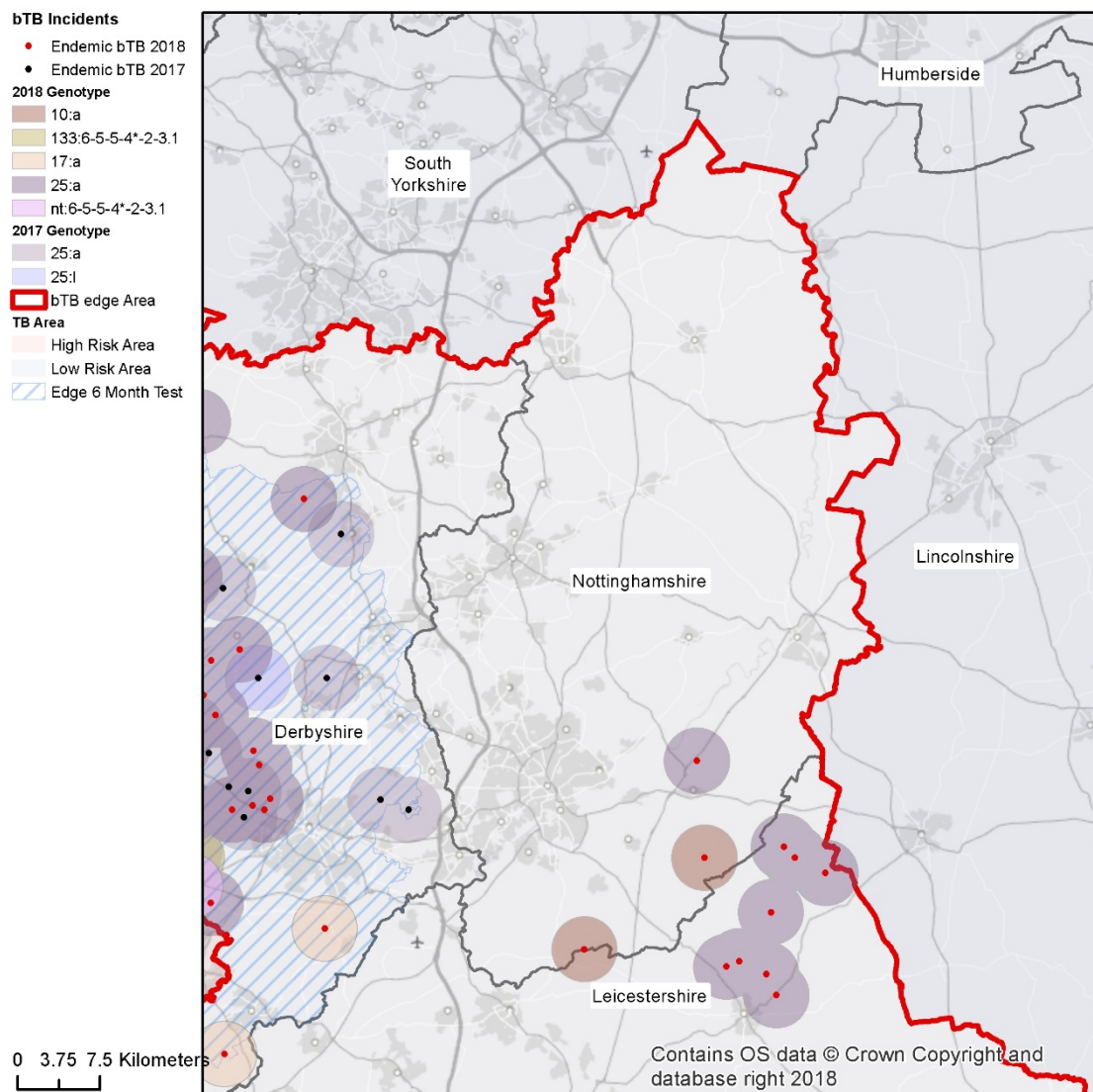


Figure 7: Genotypes of *M. bovis* detected in Nottinghamshire, where a wildlife source was attributed with a 75% certainty or above, as an indication of endemicity within local wildlife populations (OTFW breakdowns only).

Figure 8 shows the source of infection recorded with the highest level of certainty, for all TB breakdowns (OTFW and OTFS) that started in 2018. The majority of OTFW breakdowns were attributed to likely infection from local wildlife (5), and just one case that was likely due to purchase of undetected infected cattle. While reports for previous years did not use this methodology for the calculation and therefore a direct comparison cannot be made, these figures appear to indicate a change in trend from previous years, with an increase in breakdowns attributed to wildlife.

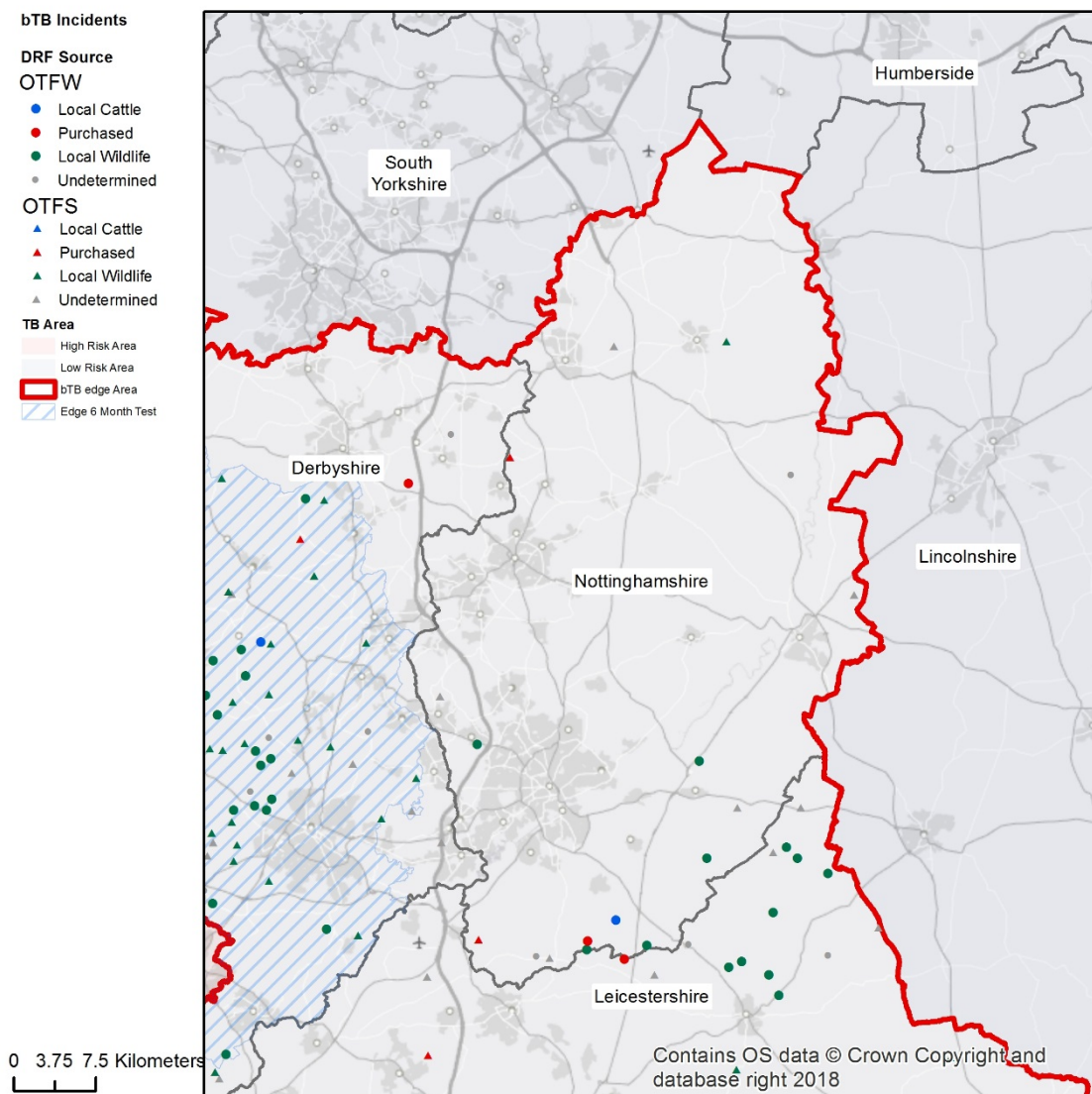


Figure 8: The source of infection recorded with the highest level of certainty, for all TB breakdowns (OTFW and OTFS) that started in 2018

Descriptive epidemiology of bovine TB in Nottinghamshire

Characteristics of bovine TB in Nottinghamshire:

Figure 9 displays the number of new TB breakdowns (OTFW and OTFS) in Nottinghamshire, by cattle herd size and type. Beef sucker herds experienced 52% of the total new breakdowns in 2018, compared to dairy herds with 29% of the total new breakdowns in 2018. However, dairy herds had a higher proportion of OTFW breakdowns (four out of five (80%) breakdowns in dairy herds were OTFW, compared to four out of eight (50%) in suckler herds).

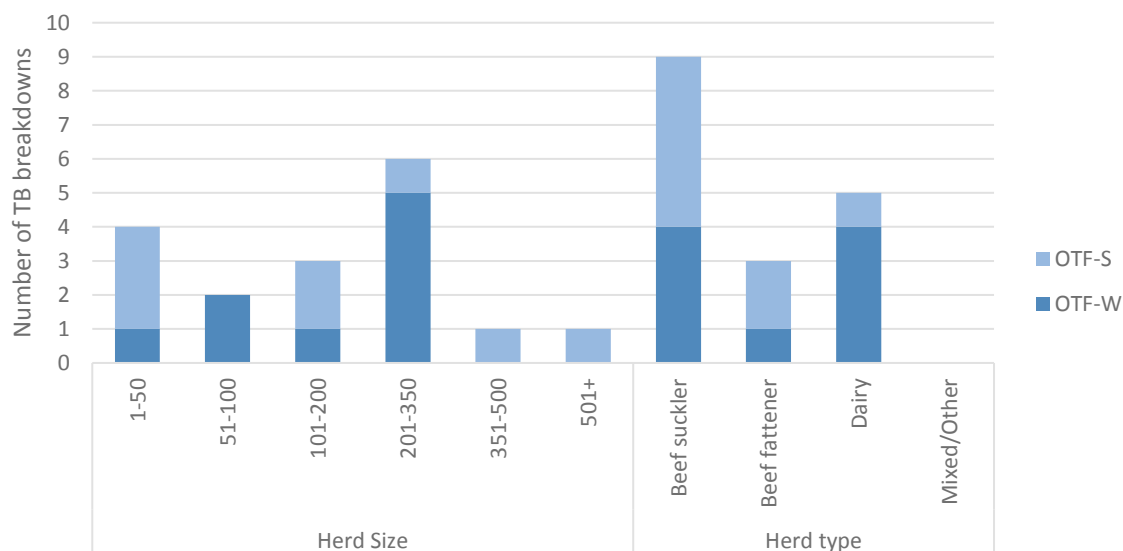


Figure 9: Number of new TB breakdowns (OTFW and OTFS) in Nottinghamshire, by cattle herd size and type.

Figure 10 displays the monthly distribution of new cases in 2018. There was a peak of new cases disclosed in the spring (when most testing is carried out before turning animals out for grazing) and a second peak in December. This is consistent with the distribution previously observed in 2016 and 2017.

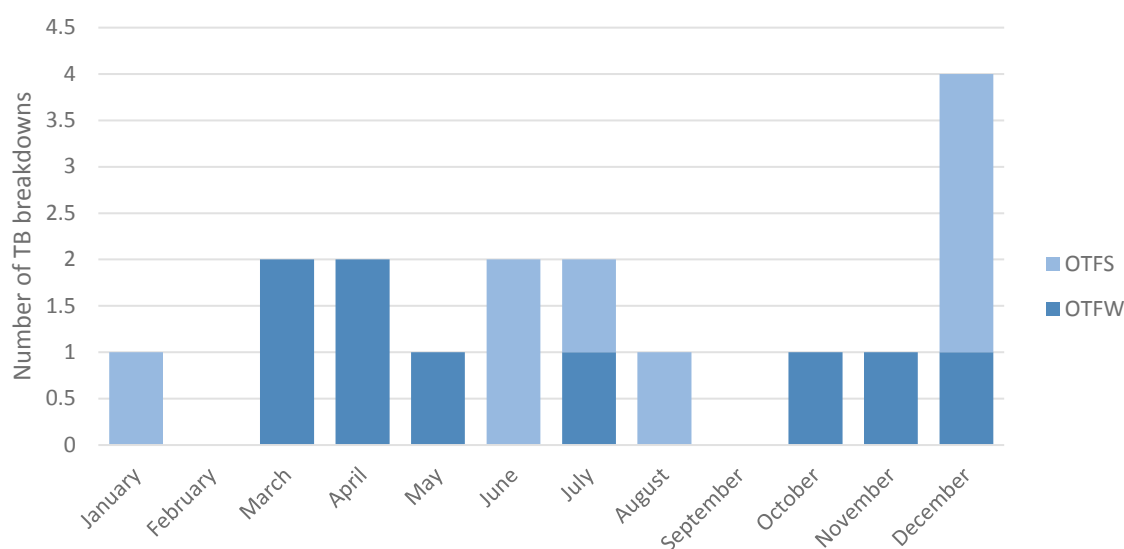


Figure 10: Number of new TB breakdowns (OTFW and OTFS) in Nottinghamshire, by month of disclosure.

Figure 11 shows the genotypes of *M. bovis* identified in Nottinghamshire in 2018. Genotype 17:a was identified in two cases, both apparently related to cattle purchases. Genotype 10:a was identified in three cases of obscure origin, which are being further investigated to assess if there is any indication of potential involvement of wildlife.

Finally, genotype 25:a was also identified in two cases, one likely related to cattle purchases and one of undetermined origin. Genotype 25:a is endemic in parts of Derbyshire (to the west of Nottinghamshire) and has also been identified in several breakdowns of undetermined origin in north Leicestershire and south west Lincolnshire, where a potential TB hotspot (HS23) was established following a genotype 25:a TB breakdown. Investigations continue to assess how closely related these breakdowns are, and to evaluate the likelihood that wildlife might be playing a part in the transmission of disease in these cases.

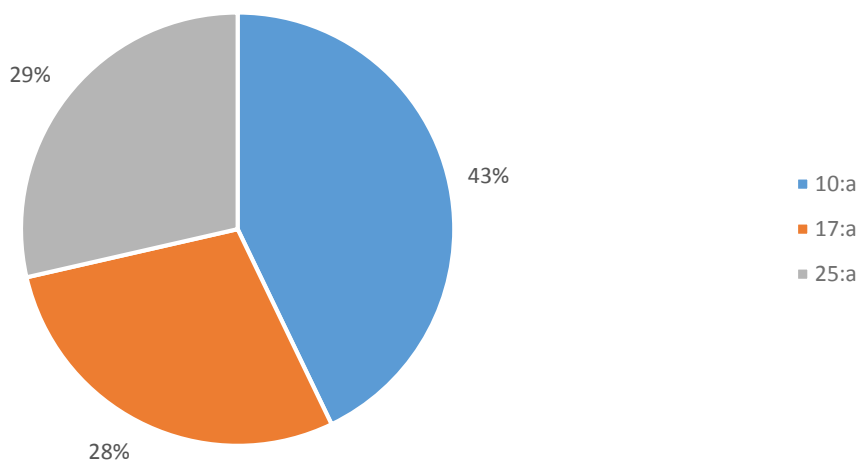


Figure 11: Genotypes of *M. bovis* (OTFW only) identified in Nottinghamshire in 2018 (n=7).

Figure 12 shows the duration of TB breakdowns (OTFW and OTFS) which closed in Nottinghamshire in 2018. There were no persistently infected (breakdown with a duration of greater than 18 months) herds identified in 2018.

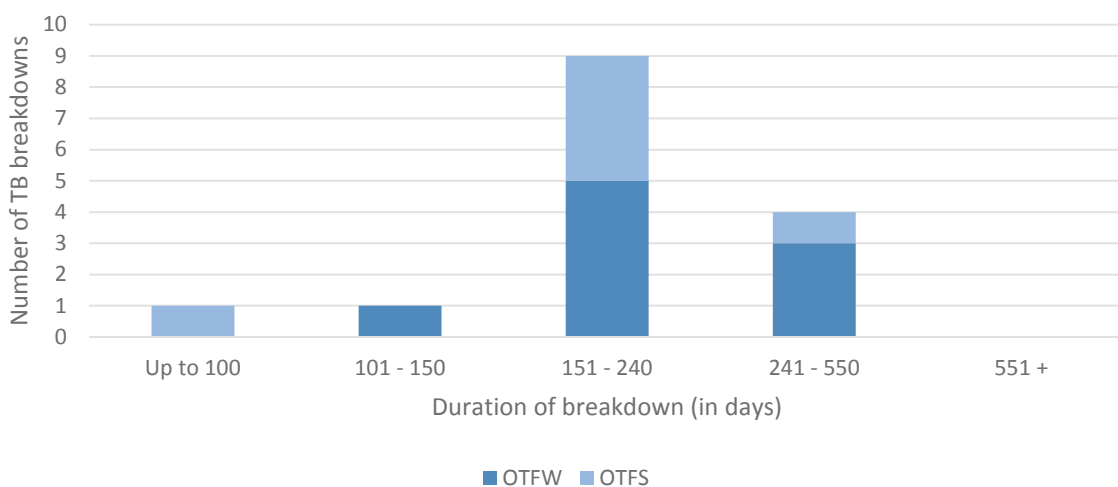


Figure 12: Duration of TB breakdowns (OTFW and OTFS) closed in Nottinghamshire in 2018.

Risk pathways for bovine TB infection in Nottinghamshire

Establishing the route of entry of infection into a herd experiencing a new TB incident can be challenging. The Animal and Plant Health Agency (APHA) aims to complete an epidemiological assessment of all TB incidents in the Edge Area (both OTFW and OTFS), including a thorough on-farm investigation. However where resource constraints exist, as many new incidents as possible are randomly selected or triaged for an investigation visit. Scrutiny of routinely collected data such as cattle movements and *M. bovis* genotypes (available for OTFW incidents only), combined with data from the on-farm investigation and knowledge of the local area epidemiological situation provides information which enables APHA case vets to assess and then rank the possible disease pathways.

A mathematical algorithm based on risk pathway data was used for the 2018 period to determine the relative contribution of different sources for each breakdown herd. However, this methodology also included those incidents where certainty about risk pathways was lower because of gaps in the epidemiological evidence. The effect of uncertainty has been increased by the inclusion of OTFS herds, where by definition, no genotype was determined. Therefore the relative proportions of each risk pathway are very approximate, and broad generalisations only can be made from these data.

A more detailed description of this methodology is provided in the Explanatory Supplement.

Appendix 4 presents the weighted contribution of the different suspected sources of *M. bovis* infection for all the new OTFW and OTFS breakdowns identified in 2018. This is also represented in Figure 13, where wildlife infection represents over 41% (25% badgers and 16% other wildlife) of the suspected sources, slightly more than movement of undetected infected cattle (35%). The overall levels of infection in cattle appear to be relatively stable. While reports for previous years did not use this methodology, these figures appear to confirm a change in trend from previous years, with an increase in the number of breakdowns attributed to wildlife.

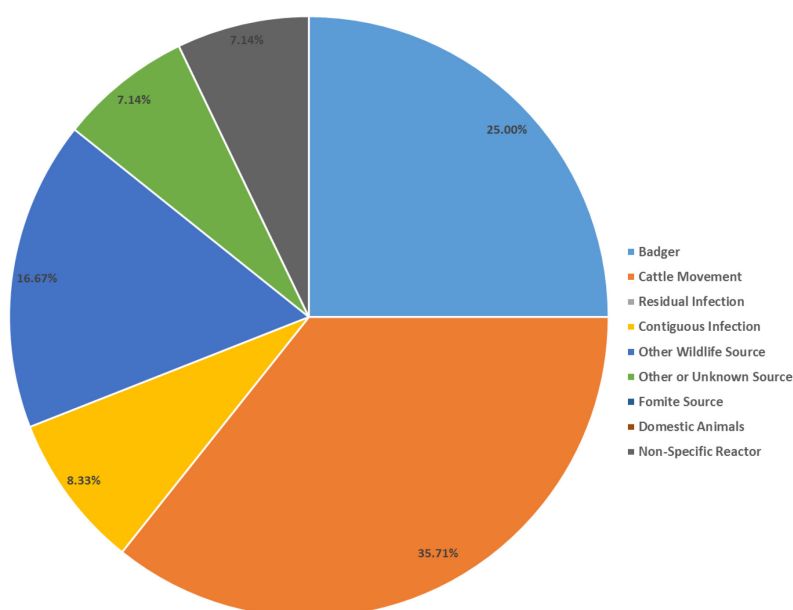


Figure 13: Summary of the weighted source of infection attributed for all incidents (both OTFW and OTFS) in Nottinghamshire that started in 2018

This suggests that endemicity, possibly related to infection in wildlife, could be emerging in Nottinghamshire, particularly in the south of the county. This continues the trend identified in 2017, where there were also a number of breakdowns in which the involvement of wildlife as the source of infection could not be ruled out.

There is a gap in surveillance data of TB infection levels in wildlife (badgers and wild deer mainly) and this clearly increases the uncertainty in the assessment of wildlife as an infection source. A Defra-funded Edge Area found dead badger survey was conducted in 2016/17 to look for the presence of *M. bovis* in badgers in Edge Area counties but the results are yet to be published.

Role of other species in Nottinghamshire

Badgers and other wildlife

There were no TB cases identified in wildlife in 2018 in Nottinghamshire.

There are recognised endemic areas to the west of Nottinghamshire (Derbyshire) and potential new endemic areas to the south (north Leicestershire and south west Lincolnshire) where new hotspot procedures (HS23) have been put in place. Infection from either area could potentially spread into Nottinghamshire through wildlife movements. The potential role of wildlife in the transmission of disease in six OTFW breakdowns in 2018 could not be ruled out.

The original four-year Defra-funded Badger Edge Vaccination Scheme (BEVS) projects which started in 2015 were terminated in 2016 due to the unavailability of the ‘Badger BCG’ vaccine. One of those projects was run by Nottinghamshire Wildlife Trust on the Nottinghamshire/Leicestershire border. A new scheme – BEVS2 – was launched at the end of 2017. An expanded version of the previous Nottinghamshire Wildlife Trust project has been approved and started in May 2018.

Other domestic species

There were no TB cases identified in other domestic species in 2018.

Detection of cases in Nottinghamshire:

Figure 14 shows that 15 (88%) of the breakdowns new in 2018 were disclosed by active surveillance (skin testing of cattle), and two (12%) by passive slaughterhouse surveillance (SLH). Seven breakdowns (41% of the total) were disclosed by whole herd routine surveillance testing (WHT), with this group representing the most important stream for new cases. The remaining cases were disclosed by enhanced surveillance testing (radial, pre-movement, 6M post breakdown, and trace tests).

These data suggest that disease is generally being detected early in its course in Nottinghamshire.

No recurrent cases were disclosed in 2018.

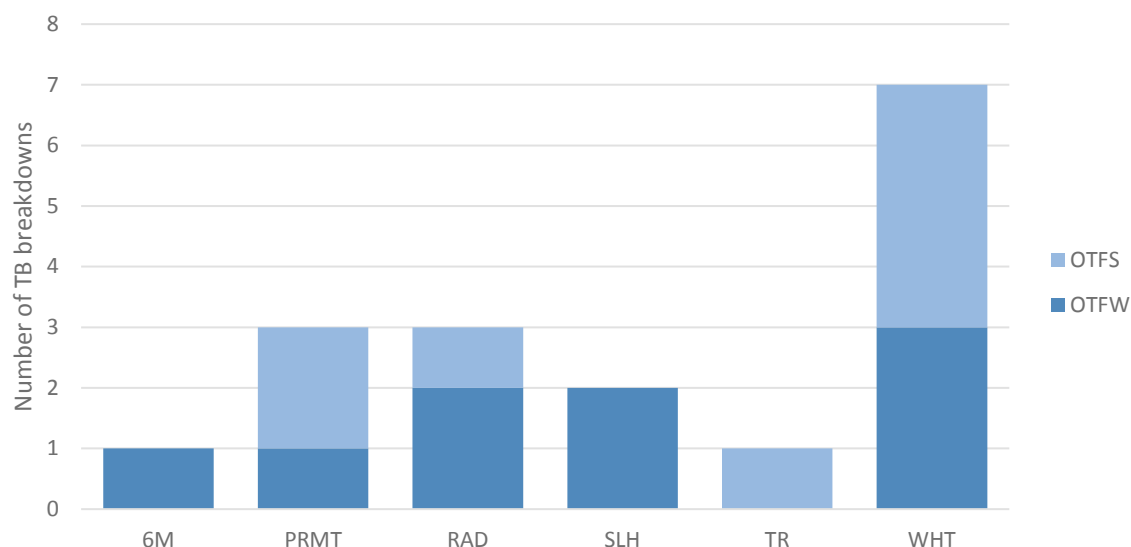


Figure 14: Number of TB breakdowns (OTFW and OTFS) in Nottinghamshire in 2018, disclosed by different surveillance methods (surveillance method types are further described in the Explanatory Supplement¹).

Burden of bovine TB

There were 81 cattle compulsorily slaughtered due to TB in Nottinghamshire in 2018. Figure 15 displays a progressive increase in this number since 2015, although it is lower than the peak in 2014 when more than 130 animals were slaughtered. Of those 81 cattle, 50 were detected by interferon gamma testing and 31 were skin test reactors. Overall, there has been a slight increase in the number of reactors removed and breakdowns detected, while the number of herds and animals tested has not changed significantly from 2017.

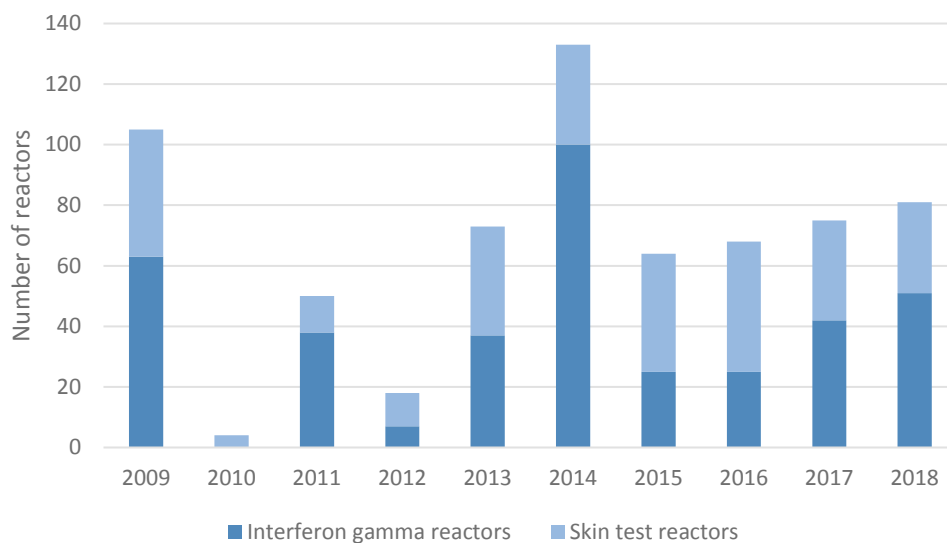


Figure 15: Number of reactors detected by interferon gamma and skin tests in Nottinghamshire, 2009 to 2018

Key drivers of the bovine TB epidemic

Nottinghamshire is a county with low TB levels compared with other counties in the Edge Area. In the majority of cases, infection pathways have previously been attributed to cattle purchases, with very low levels of recurrence. However the overall levels of the epidemic has not decreased and the suspected involvement of wildlife in the TB epidemic appears to be increasing, advancing from neighbouring counties with areas of endemic infection.

County summary

The number of new breakdowns increased from 2017 to 2018 but, overall, breakdown numbers remained relatively stable. The annual herd incidence rate and herd prevalence both increased slightly in 2018. The potential for achieving OTF status by 2025 appears to be dependent on both control of disease in wildlife in the county and in nearby endemic areas as well as wider implementation of informed purchasing and on farm biosecurity, particularly for those beef finishing units which frequently purchase cattle from higher risk areas of the country.

Summary of risks to the Low Risk Area (LRA) and any mitigating factors

Nottinghamshire borders two counties in the LRA, Lincolnshire to the east and South Yorkshire to the north west. The risk from Nottinghamshire to South Yorkshire, based on the location of confirmed breakdowns in 2018, appears to be very low.

On the contrary, there is evidence that some of the genotype 25:a cases in south Lincolnshire (Grantham area) are likely to be related to other breakdowns in north Leicestershire (Vale of Belvoir) and south Nottinghamshire. The majority of these cases are in Leicestershire, suggesting that the TB epidemic is likely to be moving into south Lincolnshire. A potential Hotspot (HS23) was implemented following a case in this area of Lincolnshire where the involvement of wildlife could not be ruled out.

Summary of the risk to the Edge Area from the HRA

There is no HRA county adjacent to Nottinghamshire. The main risk from the HRA is in the form of cattle movements from holdings in HRA counties, particularly into finishing units.

Summary of the risk to Nottinghamshire from the adjacent Edge Area counties

The genotype 25:a cases which are potentially associated with wildlife, appeared clustered with similar cases in north Leicestershire and in the new potential hotspot (HS23) in the bordering LRA county of Lincolnshire.

As with cattle movements from the HRA, there is also a risk from movements from the Edge Area, particularly from the neighbouring counties of Derbyshire and Leicestershire.

Assessment of effectiveness of controls and forward look

The cyclical component of the TB epidemic, its multifactorial nature, and the constantly evolving control policies requires retrospective assessment over time. These complexities make it difficult to provide an assessment of the effectiveness of controls and the course of the epidemic over the next two years.

Overall, the TB epidemic in Nottinghamshire appears currently stable, but there are increasing concerns that wildlife could be playing a larger role than previously thought.

The objective of OTF status in 2025 seems ambitious considering that disease indicators in the county remain stable at best while disease levels in adjacent areas are higher and have the potential for incursion.

APPENDICES

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

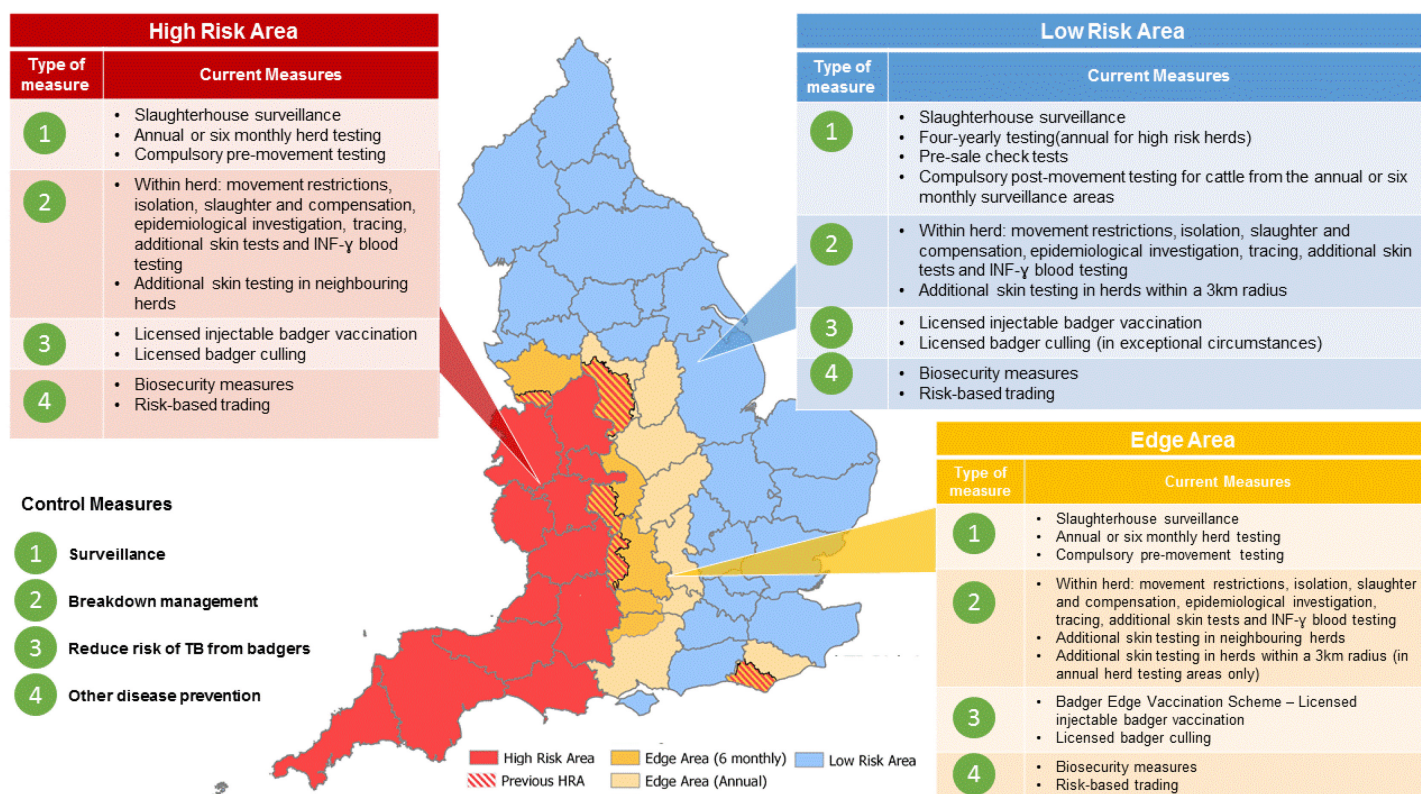


Figure A1: Bovine TB risk and surveillance areas of England effective since January 2018, as set out in the Government's Strategy for Achieving Officially Tuberculosis-Free Status for England².

1.1 Policy objectives for the Edge Area:

Short to medium term:

- slow down geographic spread
- maintain crude herd incidence of OTFW breakdowns <2% overall by 2019
- begin to reduce the incidence rate

Longer term:

- reduce geographic spread of bTB and push the Edge Area boundaries westward
- reduce OTFW herd incidence to <1% by 2025
- attain OTF status (crude incidence of indigenous OTFW herd breakdowns <0.1%) for the lowest incidence counties in the Edge Area.

1.2 Key Control Measures

Surveillance:

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

² <http://www.tbhub.co.uk/wp-content/uploads/2017/09/infographic-TB-measures.pdf>

Management of cases ('breakdowns'):

- increased sensitivity of breakdown herd testing:
 - all breakdown herds must pass two consecutive short interval skin tests at severe interpretation to regain OTF status, irrespective of post-mortem and bacteriological findings
 - mandatory IFN-gamma parallel testing of herds with OTFW breakdowns
 - enhanced management of herds with persistent breakdowns
- enhanced epidemiological investigation and data analysis
- information sharing - location of breakdown herds publicly available (via ibTB interactive mapping tool)³

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 breakdowns

³ ibTB interactive mapping tool - <https://ibtb.co.uk/>

Appendix 2: Cattle industry in the Edge Area of the region

Number of cattle premises by size band in the Edge Area of the region at 1 January 2018

(RADAR data)

Cattle per premises	1-50	51-100	101-200	201-350	351-500	501+	All	Mean	Median
Number of premises	245	75	73	45	11	15	466	102.1052	44

Finishing units registered in Nottinghamshire:

	Grazing	Non-grazing
Number of Approved Finishing Units (AFUs)	0	7
Number of Pre-movement Testing Exempt Finishing Units (EFUs)	0	1

Common land in the County: There is one area of common land in Nottinghamshire (Sutton Holmes) where six different farmers graze cattle. It was included in radial testing procedures following an OTFW breakdown in the area.

Cattle/herd purpose:

	Beef		Dairy		Dual purpose		Unknown		Total
	Number	%	Number	%	Number	%	Number	%	Number
Cattle	31849	66.9	14275	30.0	1457	3.1	0	0.0	47581
Holdings	437		151		140		0		

Appendix 3: Summary of the Nottinghamshire headline cattle TB statistics

Herd-level statistics	2016	2017	2018
Total number of cattle herds live on Sam at the end of the reporting period	530	531	514
Total number of herd tests carried out in the period	505	469	518
Total number of OTF cattle herds TB tested during the period for any reason	431	425	421
Total number of OTF cattle herds at the end of the report period (i.e. herds not under any type of TB02 restrictions)	504	507	486
Total number of cattle herds that were not under restrictions due to an ongoing TB breakdown at the end of the report period.	518	521	502
Total number of new TB breakdowns detected in cattle herds during the report period	23	13	17
OTF status suspended (OTFS)	15	8	8
OTF status withdrawn (OTFW)	8	5	9
Of the OTFW herd breakdowns:			
How many can be considered the result of movement, purchase or contact from/with an existing breakdown based on current evidence?	4	1	2
New OTFW breakdowns triggered by skin test reactors or 2xIRs at routine herd tests	2	4	3
New OTFW breakdowns triggered by skin test reactors or 2xIRs at other TB test types (forward and back-tracings, contiguous, check tests, etc.)	0	1	4
New OTFW breakdowns first detected through routine slaughterhouse TB surveillance	6	0	2
Number of new breakdowns revealed by enhanced TB surveillance (radial testing) conducted around those OTFW herds (may not be applicable to every county in the Edge Area)			
OTFS	N/A	N/A	1
OTFW	N/A	N/A	2
Number of OTFW herds still open at the end of the period (including any ongoing OTFW breakdowns that began in a previous quarter)	7	5	5
New confirmed (positive <i>M. bovis</i> culture) incidents in non-bovine species detected during the report period (indicate host species involved)	0	0	0

Animal-level statistics (cattle)	2016	2017	2018
Total number of cattle tested in the period (animal tests)	56175	56627	56501
Reactors detected:			
tuberculin skin test	43	33	30
additional IFN-gamma blood test reactors (skin-test negative or IR animals)	25	42	51
Reactors per breakdown	3.0	5.8	4.8
Reactors per 1000 animal tests	1.2	1.3	1.4
Additional animals identified for slaughter for TB control reasons (DCs, including any first-time IRs)	0	4	4
Private slaughters	0	2	4
SLH cases (tuberculous carcasses) reported by FSA	8	1	6
SLH cases confirmed by culture of <i>M. bovis</i>	8	0	5

Appendix 4: Suspected sources of *M. bovis* infection for all the new OTFW and OTFS breakdowns identified in the report period

Source of infection	Possible	Likely	Most likely	Definite	Weighted contribution
Cattle movement (e.g. purchase) of infected animal(s)	7	1	1	1	35.7%
Local contiguous infection - lateral spread from neighbouring holdings	2	1	0	0	8.3%
Exposure to badgers	9	0	1	0	25%
Exposure to other infected wildlife	5	1	0	0	16.7%
Residual infection from a previous TB breakdown	0	0	0	0	0%
Infected human source	0	0	0	0	0%
Fomite source	0	0	0	0	0%
Domestic animals	0	0	0	0	0%
Undetermined/obscure	0	1	0	1	7.1%
Other (Non-specific Reactor)	3	0	0	0	7.1%

Appendix 5: Overview of the TB Control Programme in Nottinghamshire

Summary of TB control measures specific to Nottinghamshire:

5.1 Edge Area Testing Policy

- Annual whole herd surveillance testing (no change from previous year).
- A new radial testing policy commenced on 1st January 2018. This provides additional targeted surveillance of cattle herds located within a 3km radius of new OTFW breakdowns.
- No OTFS breakdowns were subjected to discretionary interferon gamma testing.
- Mandatory interferon gamma testing of OTFW breakdown herds disclosed 51 additional reactors (62% of all reactors).
- Four animals removed for TB control reasons (inconclusive reactors or direct contacts)
- No exemptions were applied to the deployment of the interferon gamma blood test in OTFW breakdowns.
- No persistently infected herds

5.2 Unusual TB breakdowns

- Two OTFW cases, confirmed due to liver-only lesions which yielded negative culture results for *M. bovis*.
- No known confirmed or suspected cases of zoonotic (human) *M. bovis* infection.
- No suspected cases of fraudulent skin test reactors.

5.3 Other Testing Measures

- Ongoing investigation aided with ad hoc analysis of Whole Genome Sequence (WGS) of several clustered cases in south Nottinghamshire to determine the links between these cases and other local cases in Leicestershire and Lincolnshire and to evaluate the likelihood of wildlife involvement
- HS23 in Lincolnshire and Leicestershire is related to these cases and it is located immediately adjacent to the south east border of Nottinghamshire
- Occasionally statutory TB testing does become overdue but these cases are usually resolved within 60 days of the test becoming overdue.

5.4 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 NFU.
- TB Advisory Service (TBAS)⁴ provides biosecurity and other TB related advice to farmers in the Edge Area.
- Badger survey in Edge Area completed. Results pending.
- Defra-funded Badger Edge Vaccination Scheme (BEVS) run by Nottinghamshire Wildlife Trust on the Nottinghamshire/Leicestershire border. An expanded version of the previous

⁴ TB advisory service - <http://www.tbas.org.uk/>

BEVS was licensed by Natural England and started in May 2018. Scheme data for 2018 show that:

- 8310 ha (83.1 km²) comprises total project area
- 5976 ha (59.7 km²) of land (72% of project area) where there has been contact with landowners
- 15 different landholdings within the scheme
- 1986.46 ha (19.8 km²) comprises vaccinated landholding
- 84 badgers vaccinated
- 20 badgers re-trapped at 30 setts