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

County: Nottinghamshire
Year-end report for 2017
Table of Contents

1. Executive Summary................................................................. Error! Bookmark not defined.
2. Introduction................................................................. Error! Bookmark not defined.
3. Cattle Industry in Nottinghamshire................................................................. 4
4. Overview of the TB epidemic in Nottinghamshire................................................................. 6
   a. History of TB in the county................................................................. 6
   b. Geographical distribution of bovine TB cases (new and ongoing) in Nottinghamshire................................................................. 7
5. Descriptive epidemiology of bovine TB in Nottinghamshire................................................................. 9
   a. Level of bovine TB:................................................................. 9
   b. Risk pathways for bTB infection:................................................................. 10
   c. Role of other species:................................................................. 11
   d. Detection of cases................................................................. Error! Bookmark not defined.1
   e. Burden of bovine TB................................................................. Error! Bookmark not defined.3
   f. Key drivers of the bovine TB epidemic ................................................................. Error! Bookmark not defined.3
   g. County description:................................................................. 13
6. Summary of the risk to the Edge Area from the HRA................................................................. Error! Bookmark not defined.3
7. Assessment of effectiveness of controls and forward look................................................................. Error! Bookmark not defined.4

APPENDICES.................................................................................. Error! Bookmark not defined.5

Appendix 1: Overview of risk and surveillance areas of England and Edge Area objectives and controls................................................................. Error! Bookmark not defined.5
Appendix 2: Cattle industry in Nottinghamshire ................................................................. 16
Appendix 3: Summary of Nottinghamshire headline cattle TB statistics................................................................. 17
Appendix 4: Suspected sources of M. bovis infection for all the new OTF-W breakdowns identified in the report period................................................................. 19
Appendix 5: Overview of the bTB Control Programme in this Region of the Edge Area. Error! Bookmark not defined.0
1. Executive Summary

a. Introduction. The Edge Area was established in 2013 and was later incorporated into the Government’s strategy to achieve Officially Bovine Tuberculosis Free (OTF) status for England by 2038. It has a low but recently rising incidence of infected herds and is divided into three regions for reporting purposes. This end of year report describes the bovine tuberculosis (bTB) epidemic in Nottinghamshire, one of the counties forming the Edge Area.

b. Cattle industry. No significant changes in 2017

c. Overview of the bovine TB epidemic.

   i. History of TB in Nottinghamshire. Historically low levels of disease with cattle purchases from the High Risk Area (HRA) of England primarily for fattening being the main risk identified.

   ii. Geographical distribution. Breakdowns are typically spread throughout the county with no obvious clustering, while 2016-2017 cumulative figures indicate a relative accumulation of spoligotype 25 (mostly genotype 25:a) in OTF-W cases of undetermined origin in the centre of the county.

   iii. Risk pathways for bovine TB infection. Only one of the new breakdowns in 2017 in Nottinghamshire was of clear purchased origin. The remaining 12 breakdowns were assessed as of undetermined origin (mainly due to the lack of sufficient information to identify the most likely source of infection in unconfirmed breakdowns).

   iv. Role of other species. There have been no laboratory confirmed isolations of M. bovis in other species. Submission rates are routinely extremely low in other domestic species. A Defra-funded Edge Area Badger Survey was conducted in 2016-17 by the University of Nottingham to look for the presence of M. bovis in found dead badgers in Edge Area counties; results are pending at the time of writing.

   v. Detection of cases: 100% cases in 2017 were detected by active surveillance.

   vi. Impact of bovine TB: reactor numbers. All the reactors (76) were disclosed by active surveillance testing (60% disclosed by supplementary interferon-gamma (IFN-γ) blood testing).

   vii. Key drivers of the bovine TB epidemic The risk of the movement of cattle from the HRA into Nottinghamshire to populate finishing units was highlighted in previous years as the main driver of bTB cases identified in Nottinghamshire. Data from 2017 suggests that the potential involvement of wildlife in some of the breakdowns needs to be further investigated.
vii. **County descriptions** Nottinghamshire is one of the Edge Area counties with the lowest TB levels. The potential for achieving OTF status by 2025 appears to be dependent on the control of disease in wildlife in nearby endemic areas, early detection of any TB-infected cattle moved (translocated) into Nottinghamshire from higher risk counties and the better understanding of current disease levels in wildlife in lower incidence areas, to enable control measures according to the risk.

e. **Risks to the Low Risk Area and from the High Risk Area.** Although the movement of cattle from the HRA into Nottinghamshire to populate finishing units remains as one of the obvious risks of disease introduction to Nottinghamshire, the expansion of endemic areas in Derbyshire and the potential endemic area in north Leicestershire may also play an important role as a risk to this county and to the neighbouring LRA in Lincolnshire.

f. **Assessment of effectiveness and forward look.** The potential to improve control in future depends on:

   i. An emphasis on risk-based trading, making herd/holding TB-related information available more widely to enable and encourage informed buying practices and industry ownership of disease control.

   ii. The control of the epidemic in wildlife in nearby endemic areas, and the serious investigation of current disease levels in wildlife in lower incidence areas, to enable control measures according to the risk. Investigation under way on a number of genotype 25:a and spoligotype 25 breakdowns of undetermined origin were disclosed in the county in 2016 (two breakdowns), 2017 (two breakdowns) and beginning of 2018 (one breakdown), with a relative accumulation in the central area of the county.

g. **Other** A local TB eradication group was created in 2016, the Vale of Belvoir (between Leicestershire and Nottinghamshire) and was fairly active in 2017, including representatives from NFU (leading), Nottinghamshire Wildlife Trust, APHA and other stakeholders.

   The Defra-funded Badger Edge Vaccination Scheme (BEVS) remained suspended during 2017 due to a world-wide vaccine shortage. However the Nottinghamshire Wildlife Trust (NWT) continued to work on the project (surveying and engagement).

2. **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 varying the approach to control accordingly. To this end three management regions or zones have been established since 2013. This report describes the epidemiology of bTB in Nottinghamshire which forms part of the Edge Area (see Appendix 1). This area has a low but recently rising incidence of infected herds 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.

3. **Cattle industry in the Edge Area of Nottinghamshire**

   As shown in Figure 1a, there is a predominance of beef cattle (66%), both suckler and finishing herds. Dairy herd numbers continue to decline, with 31% of all cattle in Nottinghamshire being dairy breeds.

   There is a predominance of small herds of up to 50 cattle in the county (52% of all herds) as shown in Figure 1b and in the table in Appendix 2, and it is reasonable to assume that the majority of these are beef cattle.
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 still choose to sell their calves as stores through the local markets.

**Figure 1a: Distribution of cattle in Nottinghamshire in 2017 by herd type**

**Figure 1b: Distribution of cattle in Nottinghamshire in 2017 by herd size**

For further cattle industry information and tables see Appendix 2.
4. Overview of the TB epidemic in the Edge Area of Nottinghamshire

a. History of TB in the Edge Area of Nottinghamshire

The number of cases detected yearly since 2009 is displayed below in Figure 2. 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 TB testing intervals were set at the county and not the parish basis and Nottinghamshire was placed entirely on to annual testing.

In this context, 2017 has been the year with the fewest new breakdowns (13) since 2013.

![Figure 2: Yearly distribution of OTF-S and OTF-W bTB breakdowns in Nottinghamshire from 2009 to 2017](image)

Figure 3 below displays the monthly distribution of new cases in 2017, with a peak of new cases disclosed around April and a smaller peak around December.
b. Geographical distribution of bovine TB cases (new and ongoing) in the Edge Area of Nottinghamshire

The geographical distribution of all new bTB cases in 2017 and any pre-2017 OTFW bTB incidents still ongoing at the end of the report period are shown in Figure 4 overlaid on a map showing the cattle holding density for the Midlands Edge Area. This suggests a potential change in pattern in the geographical distribution of cases in 2017 in Nottinghamshire, with the majority of cases distributed in the North-Centre-East of the county (as opposed as to 2016 when the breakdowns appeared to be distributed throughout the county).
There are no areas of endemic bTB in Nottinghamshire.

Equally there are no identified emerging bTB areas, although a number of genotype 25:a and spoligotype 25 breakdowns of undetermined origin have been disclosed in the county in 2016 (two breakdowns) and 2017 (two breakdowns), with a relative accumulation in the central area of the county as evidenced in Figure 5 below. There were no genotype 25:a breakdowns of undetermined origin in 2015.

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.
A request has been submitted to determine the Whole Genome Sequence (WGS) of the *M. bovis* isolates of genotype 25:a obtained from these five cases (and similar cases in North Leicestershire and bordering Lincolnshire area). This is in order to investigate how closely related to each other these breakdowns are and to evaluate the likelihood that wildlife might be playing a part in the transmission of these cases. The WGS results will help to assess the need for specific bTB control measures in this area.

![Map of geographical distribution of new genotype 25:a and spoligotype 25 TB incidents from 2015 to April 2018](image)

**Figure 5:** Geographical distribution of new genotype 25:a and spoligotype 25 TB incidents from 2015 to April 2018

5. **Descriptive epidemiology of bovine TB in the Edge Area of Nottinghamshire**

   a. **Level of bovine TB**

   **Incidence**

   The annual incidence of bTB breakdowns in Nottinghamshire for 2014-2017 is shown in Figure 6 below. It is calculated for all new breakdowns (OTF-S and OTF-W) in the reporting period as a percentage of unique OTF cattle herds tested in each calendar year.

   The trend observed between 2014 and 2016 of progressive increase in total of breakdowns and incidence has been reversed in 2017, with a marked reduction in new breakdowns disclosed (13 in 2017 from 23 in 2016, 43% decrease) and herd incidence (3.06% in 2017 from 5.17% in 2016, 41% decrease).
No breakdown herds have been identified as persistent (>18 months duration), with no breakdowns disclosed in 2016 or before currently ongoing.

b. Risk pathways for bTB infection:

- Out of the five OTF-W breakdowns disclosed in 2017, only one (M. bovis genotype 17:a) was identified as of clear purchased origin (traced animal from 17:a breakdown).

- The other four OTF-W breakdowns have been assessed as of undetermined origin in which the potential involvement of wildlife cannot be ruled out, while there is not enough data to confirm this point.
  - Two of these breakdowns were identified as genotype 25:a (see Figure 5).
  - One breakdown was identified as genotype 17:a (see Figure 4).
  - One breakdown has not been confirmed by culture (re-culture pending), but the location is very near a 25:a genotype breakdown.

- There were eight OTF-S (lesion- and culture-negative) breakdowns, all of which have been categorised as of undetermined origin, as there was insufficient evidence to identify a clear source.

- While the total number of OTF-W breakdowns decreased from eight in 2016 to five in 2017, the number of breakdowns of undetermined origin (wildlife involvement in transmission not ruled out) increased from two in 2016 to four in 2017, as shown in Figure 7.
c. Role of other species:

a. Badgers and other wildlife

- There were no TB cases identified in wildlife in 2017
- Results of the Defra-funded found dead badger survey in the Edge Area by the University of Nottingham are pending at the time of writing
- The role of wildlife in the transmission of disease in four OTF-W breakdowns in 2017 could not be ruled out, as indicated previously.
- There are endemic areas to the west of Nottinghamshire (Derbyshire) and potential new endemic areas to the south (North Leicestershire)

b. Other domestic species:

- There were no TB cases identified in non-bovine domestic animals in 2017

d. Detection of cases

- As shown in Figure 8, three out of the five OTF-W breakdowns and six out of the eight OTF-S breakdowns in 2017 were detected by the routine WHT (Whole Herd Test), highlighting the importance of the minimum frequency of routine herd testing.
- No bacteriologically confirmed slaughterhouse cases were detected in 2017, again highlighting the importance of routine herd testing in order to disclose disease early.
Figure 8: Distribution of breakdowns of bTB in Nottinghamshire in 2017 according to type of disclosing test (WHT = Whole herd test, 12MT = 12 month test, 6MT = 6 month test, TR = Trace test, SLHC = Slaughterhouse case)

- One OTF-W breakdown was disclosed at an IR retest, as shown in Figure 9. Three OTF-S breakdowns were also disclosed at an IR retest. This highlights the relevance of the IR re-testing policy in disease control.

Figure 9: Total number of breakdowns of bTB in Nottinghamshire in 2017 against number of breakdowns disclosed at an IR retest

e. Burden of bovine TB

There was a total of 76 reactor cattle compulsorily slaughtered in 2017, although the majority were disclosed in OTF-W breakdowns in which interferon-gamma testing is compulsory, as shown in Figure 10.

The mean number of reactors per breakdown in 2017 was six, equating to 1.53 reactors per 1000 animal tests.
f. Key drivers of the bovine TB epidemic

The risk of the movement of TB-infected cattle from the HRA into Nottinghamshire to populate finishing units was highlighted in previous years as the main driver of TB cases identified in Nottinghamshire.

The 2017 data suggests that the potential involvement of wildlife in some of the breakdowns needs to be further investigated as previously mentioned.

g. County descriptions

Nottinghamshire is one of the Edge Area counties with the lowest TB levels. The potential for achieving OTF status by 2025 appears to be dependent on the control of disease in wildlife in nearby endemic areas, early detection of any TB-infected cattle moved (translocated) into Nottinghamshire from higher risk counties and the better understanding of current disease levels in wildlife in lower incidence areas, to enable control measures according to the risk.

6. Summary of risks to the Low Risk Area and from the High Risk Area, and any mitigating factors

The sporadic nature of bTB in Nottinghamshire does not pose an obvious risk to the adjoining LRA counties to the east and north. The risk of the movement of cattle from the HRA into Nottinghamshire to populate finishing units was highlighted in previous years as the main driver of TB cases identified in Nottinghamshire. This has changed in 2017 and the potential involvement of wildlife in some of the breakdowns needs to be further investigated as mentioned before.

7. Assessment of effectiveness of controls and forward look

Nottinghamshire is one of the Edge Area counties with the lowest levels of bovine TB. Data from 2017 suggest that the increase in number of breakdowns detected from 2013 onwards appears to have receded, indicating that it is likely that the increased bTB surveillance and controls introduced in recent years are being effective in controlling the epidemic in Nottinghamshire.

The forward look appears to be dependent on:
- An emphasis on risk-based trading, making herd/holding bTB data available more widely to enable and encourage informed buying practices and industry ownership of disease control.
- The control 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 according to the risk.
Appendix 1: Overview of risk and surveillance areas of England and Edge Area objectives and controls

1.1 Policy objectives for the Edge Area:
Short to medium term:
   a. slow down geographic spread
   b. maintain crude herd incidence of OTF-W breakdowns <2% overall by 2019
   c. begin to reduce the incidence rate

Longer term:
   d. reduce geographic spread of bTB and push the Edge Area boundaries westward
   e. reduce OTF-W herd incidence to <1% by 2025
   f. Attain OTF status (incidence of indigenous OTF-W herd breakdowns <0.1) for the lowest incidence counties in the Edge Area.

1.2 Key Control Measures
Surveillance
   a. enhanced herd test coverage (annual)
   b. extend targeted surveillance to 3km around new OTF-W breakdowns in Cheshire and Derbyshire (radial testing), with six month follow-up
   c. possible RTA badger survey

Management of cases (‘breakdowns’)
   a. increased sensitivity of breakdown herd testing:
      • OTF-S breakdowns to pass two short interval tests at severe interpretation to regain OTF status
      • mandatory IFN-g parallel testing in OTF-W breakdowns
   b. enhanced epidem. investigation and data analysis
   c. information sharing - location of breakdown herds

Figure A1: Bovine TB risk and surveillance areas of England effective since January 2013, as set out in the Government’s Strategy for Achieving Officially Tuberculosis-Free Status for England.
Appendix 2: Cattle industry in the Edge Area of the region

There is a predominance of beef cattle (66%), both suckler and finishing herds. Dairy herd numbers continue to decline, with 31% of all cattle in Nottinghamshire being dairy breeds.

There is a predominance of small herds of up to 50 cattle in the county (52% of all herds) as shown in the table below, and it is reasonable to assume that the majority of these are beef cattle.

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 still choose to sell their calves as stores through the local markets.

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

<table>
<thead>
<tr>
<th>Cattle per premises</th>
<th>1-50</th>
<th>51-100</th>
<th>101-200</th>
<th>201-350</th>
<th>351-500</th>
<th>501+</th>
<th>All</th>
<th>Mean</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of premises</td>
<td>255</td>
<td>75</td>
<td>77</td>
<td>46</td>
<td>12</td>
<td>15</td>
<td>485</td>
<td>101</td>
<td>41</td>
</tr>
</tbody>
</table>

Cattle/herd purpose:

<table>
<thead>
<tr>
<th></th>
<th>Beef</th>
<th>Dairy</th>
<th>Dual purpose</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Number</td>
<td>%</td>
<td>Number</td>
<td>%</td>
<td>Number</td>
</tr>
<tr>
<td>Cattle</td>
<td>32502</td>
<td>66.1%</td>
<td>15173</td>
<td>30.9%</td>
<td>1466</td>
</tr>
</tbody>
</table>

Approved Finishing Units (AFUs) registered in Nottinghamshire: There are six AFUs. These units are non-grazing and if correctly operated are not considered a risk for introduction or spread of bTB into the surrounding areas.

Markets in Nottinghamshire: There is one livestock auction market in the Nottinghamshire Edge Area – Newark Market - which is a facilitator for the flow of approximately 12,000 cattle per annum (mainly breeding and fattening beef cattle) from all three TB risk areas, potentially providing opportunity for spread of bTB from the HRA into the Edge and LRA. Additionally, this market operates an Approved Slaughter Gathering which is subject to licensing controls. This is likely to mitigate risk of spread of bTB by cattle moving through these gatherings as only movement directly to slaughter is allowed.

Common land in Nottinghamshire: There are limited areas of common land in Nottinghamshire, most of which has minimal significance because of the small land parcel size (less than 10 hectares), with fifteen parcels between 10 and 100 hectares, and one parcel in excess of 100 hectares. The 115 hectare parcel in Nottinghamshire has been subject to pro-active management for TB control purposes since 2013, before the legislation changes which removed the pre-movement testing exemptions for common grazings.
Appendix 3: Summary of the Edge Area regional headline cattle TB statistics

Herd-level statistics

<table>
<thead>
<tr>
<th>Description</th>
<th>Nottinghamshire</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Total number of cattle herds live on Sam at the end of the reporting period</td>
<td>531</td>
</tr>
<tr>
<td>b. Total number of herd tests carried out in the period</td>
<td>597</td>
</tr>
<tr>
<td>c. Total number of OTF cattle herds TB tested during the period for any reason</td>
<td>425</td>
</tr>
<tr>
<td>d. Total number of OTF cattle herds at the end of the report period (i.e. herds not under any type of TB02 restrictions)</td>
<td>506</td>
</tr>
<tr>
<td>e. Total number of cattle herds that were not under restrictions due to an ongoing TB breakdown at the end of the report period.</td>
<td>513</td>
</tr>
<tr>
<td>f. Total number of new TB breakdowns detected in cattle herds during the report period</td>
<td>13</td>
</tr>
<tr>
<td>• OTF status suspended (OTF-S)</td>
<td>8</td>
</tr>
<tr>
<td>• OTF status withdrawn (OTF-W)</td>
<td>5</td>
</tr>
<tr>
<td>g. Of the OTF-W herd breakdowns:</td>
<td></td>
</tr>
<tr>
<td>• How many can be considered the result of movement, purchase or contact from/with an existing breakdown based on current evidence?</td>
<td>1</td>
</tr>
<tr>
<td>• New OTF-W breakdowns triggered by skin test reactors or 2xIRs at routine herd tests</td>
<td>4</td>
</tr>
<tr>
<td>• New OTF-W breakdowns triggered by skin test reactors or 2xIRs at other TB test types (forward and back-tracings, contiguous, check tests, etc.)</td>
<td>1</td>
</tr>
<tr>
<td>• New OTF-W breakdowns first detected through routine slaughterhouse TB surveillance</td>
<td>0</td>
</tr>
<tr>
<td>h. Number of new breakdowns revealed by enhanced TB surveillance (radial testing) conducted around those OTF-W herds (may not be applicable to every county in the Edge Area)</td>
<td></td>
</tr>
<tr>
<td>• OTF-S</td>
<td>0</td>
</tr>
<tr>
<td>• OTF-W</td>
<td>0</td>
</tr>
<tr>
<td>i. Number of OTF-W herds still open at the end of the period (including any ongoing OTF-W breakdowns that began in a previous quarter)</td>
<td>6</td>
</tr>
<tr>
<td>j. New confirmed (positive <em>M. bovis</em> culture) incidents in non-bovine species detected during the report period (indicate host species involved)</td>
<td>0</td>
</tr>
</tbody>
</table>

Animal-level statistics (cattle)

<table>
<thead>
<tr>
<th>Description</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Total number of cattle tested in the period (animal tests)</td>
<td>49773</td>
</tr>
<tr>
<td>b. Reactors detected:</td>
<td></td>
</tr>
<tr>
<td>• tuberculin skin test</td>
<td>76</td>
</tr>
<tr>
<td>• additional IFN-gamma blood test reactors (skin-test negative or IR animals)</td>
<td>46</td>
</tr>
</tbody>
</table>

1 In some cases there is minor variation (under 4) between the total number of breakdowns reported in the Year End Descriptive Epidemiology Reports for individual counties and the report on Bovine tuberculosis in England in 2017. These are due to differences in the breakdown case definition, where incidents first detected in late 2016 are included as 2017 breakdowns in the individual county reports; and where incidents occur in epidemiologically linked premises.
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>c.</td>
<td>Reactors per breakdown</td>
<td>6</td>
</tr>
<tr>
<td>d.</td>
<td>Reactors per 1000 animal tests</td>
<td>1.53</td>
</tr>
<tr>
<td>e.</td>
<td>Additional animals identified for slaughter for TB control reasons (DCs, including any first-time IRs)</td>
<td>0</td>
</tr>
<tr>
<td>f.</td>
<td>SLH cases (tuberculous carcasses) reported by FSA</td>
<td>1</td>
</tr>
<tr>
<td>g.</td>
<td>SLH cases confirmed by culture of <em>M. bovis</em></td>
<td>0</td>
</tr>
</tbody>
</table>
Reactor and slaughterhouse (SLH) case density - All TB breakdowns (01/01/2017 - 31/12/2017)
Appendix 4: Suspected sources of *M. bovis* infection for all the new OTF-W breakdowns identified in the report period

<table>
<thead>
<tr>
<th>Most likely origin</th>
<th>Nottinghamshire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prov.</td>
</tr>
<tr>
<td>Introduction (e.g. purchase) of infected animal(s)</td>
<td></td>
</tr>
<tr>
<td>Local - lateral spread from neighbouring holdings</td>
<td></td>
</tr>
<tr>
<td>• exposure to infected wildlife</td>
<td></td>
</tr>
<tr>
<td>• other farmed species</td>
<td></td>
</tr>
<tr>
<td>• recrudescence of residual infection from a previous TB breakdown</td>
<td></td>
</tr>
<tr>
<td>• infected human source</td>
<td></td>
</tr>
<tr>
<td>Undetermined/obscure</td>
<td></td>
</tr>
<tr>
<td>Other (explain)</td>
<td></td>
</tr>
</tbody>
</table>

All new OTF-W TB breakdowns identified have been categorised using the following risk matrix, according to (a) the probability of them being the result of introduced infection (inward cattle movements) and (b) the strength of evidence that we are dealing with an isolated incident without further propagation from the index farm to neighbouring herds (or vice versa).

<table>
<thead>
<tr>
<th>Probability of introduced <em>M. bovis</em> infection</th>
<th>Probability of isolated, sporadic ('one-off') breakdown, without secondary cattle to cattle spread</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Likely (no secondary breakdowns detected)</td>
</tr>
<tr>
<td>Definite</td>
<td>1</td>
</tr>
<tr>
<td>Likely</td>
<td></td>
</tr>
<tr>
<td>Possible</td>
<td></td>
</tr>
<tr>
<td>Not likely (indigenous infection in the locality)</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 5: Overview of the bTB Control Programme in this Region of the Edge Area

5.1 Edge Area Testing Policy

- Discretionary measures implemented in OTF-S breakdowns: One OTF-S case was subjected to discretionary interferon-gamma test
- Mandatory interferon-gamma for OTF-W breakdowns and discretionary interferon-gamma for OTF-S breakdown (see above) disclosed 46 additional reactors (60% of all reactors)
- No exemptions were applied to the deployment of the interferon-gamma blood test in OTF-W breakdowns
- No persistently infected herds identified and no recommendations made for enhanced case management

5.2 Unusual bTB breakdowns

- No unusual TB breakdowns identified
- 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

- Five genotype 25:a and spoligotype 25 breakdowns of undetermined origin have been disclosed in Nottinghamshire in 2016 (two breakdowns), and 2017 (two breakdowns), with a relative accumulation in the central area of the county (see Figure 5 and comment in pages 8 and 9). A request to determine the Whole Genome Sequence (WGS) of these cases has been submitted in order to investigate how closely related to each other these breakdowns are and to evaluate the likelihood that wildlife might be playing a part in the transmission of these cases.

5.4 Other Control Measures

- Regional meetings held with farmers in the TB Eradication Group of the Vale of Belvoir area (partially south Nottinghamshire and north Leicestershire), led by the NFU
- Defra-funded found-dead badger survey in Edge Area was completed. Results are pending at the time of writing
- Badger vaccination project: The four-year projects which Defra funded under the original Badger Edge Vaccination Scheme (BEVS) which started in 2015 were terminated in 2016 due to the fact that manufacture of the ‘BadgerBCG’ vaccine had stopped. 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 last year. An expanded version of the previous Nottinghamshire Wildlife Trust project has been approved and started in May 2018.

APHA is an Executive Agency of the Department for Environment, Food and Rural Affairs and also works on behalf of the Scottish Government, Welsh Government and Food Standards Agency to safeguard animal and plant health for the benefit of people, the environment and the economy.