Mid-year (first six months) Descriptive Epidemiology Report: Bovine TB Epidemic in the England Edge Area

Regional Office: North; counties in the Edge: Cheshire (part)
Mid-year (first six months) for 2016

1. EXECUTIVE SUMMARY ............................................................................................................................................ 2
2. INTRODUCTION.......................................................................................................................................................... 3
3. GEOGRAPHICAL DISTRIBUTION OF TB INCIDENTS IN THE EDGE AREA OF CHESHIRE IN THE FIRST HALF OF 2016 ............................................................................................................................................................. 3
4. DESCRIPTIVE EPIDEMIOLOGY OF BOVINE TB BREAKDOWNS IN IN THE FIRST HALF OF 2016 IN THE EDGE AREA OF CHESHIRE ................................................................................................................................................................................... 9
5. CASES IN OTHER SPECIES .................................................................................................................................. 17
6. COUNTY DESCRIPTION......................................................................................................................................... 17
7. CHANGES IN THE BOVINE TB EPIDEMIC IN THE CHESHIRE EDGE AREA IN THE FIRST HALF OF 2016 ..................................................................................................................................................................................... 18
8. APPENDICES............................................................................................................................................................. 20
1. Executive Summary

a. The occurrence and distribution of cases in 2016 follows much the same pattern as 2015 with few notable changes, except for the occurrence of some explosive breakdowns in the north close to Manchester Airport with circumstantial evidence of substantial badger activity as a contributing factor.

b. The number of fully confirmed cases (OTFW breakdowns) has reduced by 17% in 2016 compared to the same period in 2015 whilst the number of strongly suspected cases (OTFS breakdowns) has risen by 50%. This may be in part due to the fact that six monthly whole herd TB testing is entering its second year in the Cheshire Edge and disease is being detected earlier. The overall numbers of breakdowns remains similar to 2015.

c. Slaughterhouse surveillance continues to identify new breakdowns with no increased numbers reported. This may be indicative of the limits of skin test sensitivity three of the four cases were purchased animals. However, only one was a genotype not found in Cheshire (74:A).

d. In April and May 2016, there was an increase in new breakdowns by 44-57% compared with the same period of last year but a reduction of over 60% was seen in June 2016.

e. 22,508 more cattle were tested in the first six months of 2016 compared to 2015 (see appendix 3: animal level statistics). Although 59 fewer herds were TB tested in 2016 compared to 2015, this could be due to the fact that some herds have been sold and others have expanded in numbers of cattle.

f. 53% of all new breakdowns (16/30) in 2016 had a confirmed incident of TB in the previous three years whereas there were 26 (23%) for the whole of 2015, however this apparent increase may be seasonal bias.

g. 70% of the fully confirmed breakdowns were spoligotype 25 (mostly genotype 25:A); 13% were spoligotype 17; one was genotype 74:A and four breakdowns had no genotyping completed at the time of writing this report.

h. The final source attributed to each resolved fully confirmed case (n=10) at the end of June 2016 shows that 40% were most likely attributed to exposure to infected wildlife indirectly through contamination of feed or during the housing or grazing period through environmental contamination. 40% were most likely attributed to purchase and 20% were classed as obscure due to the fact that no genotyping was completed for these cases. This compared with the provisional source assessment for the 30 fully confirmed (OTFW) cases in this period of 47% attributed to wildlife, 27% to purchase, 10% to residual infection and others to multiple or obscure pathways.

i. There were no new non-bovine incidents reported in this year half in the Cheshire Edge area.

j. The number of reactors disclosed decreased in 2016 to 430 compared with 588 in 2015 which represents a reduction of almost 27%. In terms of skin reactors, in 2016 there was an increase in the disclosure of skin reactors from 254 in 2015 to 298 which represents an increase of 17%. However, the disclosure of gamma positives fell by 60% in 2016 compared to 2015 from 334 to 132. There has been a decrease in both the average number of reactors per breakdown in the first six months of 2016 by 27% and in the number of reactors per 1000 animal tests which represents a 35% decrease. These figures should be interpreted with caution until the whole year data has been analysed in the next report.

k. The increased cattle controls in the Cheshire Edge Area are effective and are expected to continue to enable earlier detection of disease and reduce overall reactor numbers over time. However, it is expected that this effect will plateau unless a reduction in the heavy infection challenge from infected badgers in some areas, particularly in east Cheshire, is facilitated through wildlife control measures.
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. This report describes the incidents of bovine TB that have occurred in the first six months of 2016 in Cheshire which forms part of the ‘Edge’ area (refer to Appendix 1). A full description of the Region, its recent bTB epidemiology, industry structure etc. can be seen in the published Edge Area annual epidemiology reports for 2015 https://www.gov.uk/government/publications/bovine-tb-epidemiology-reports-2015.


The occurrence and distribution of cases in 2016 follows much the same pattern as 2015 with few notable changes. From figures 1a-c, the majority of new and ongoing breakdowns lie in the east of the Cheshire Edge with a few re-appearing in the west on premises with a previous history of disease. One breakdown in the far north of the Cheshire Edge is a beef fattening enterprise and it is likely that TB was introduced through purchase from a Staffordshire holding. Figures 2a & 2b show the density of TB-infected cattle detected in Cheshire in the context of the whole of England and show that the highest densities lie in east Cheshire.

The highest density of breakdowns and infected animals occurs in the areas of highest cattle holding densities similar to previous years.

A notable difference from last year is the appearance of a cluster of cases in the location of Manchester airport and close to the Greater Manchester and Stockport boundary. This area will be discussed later in the report.
Figure 1a: Map of Cheshire showing the distribution of all new bovine TB breakdowns in the Cheshire Edge for the first six months of 2016.
Figure 1b: Map showing all fully confirmed OTFW bovine TB breakdowns in the Cheshire Edge which carried over into 2016.
Figure 1c: Map showing the distribution of pre-existing OTFW cases carried over from 2015 and all new breakdowns in the Cheshire Edge Area for the first six months of 2016.
Figure 2a: Map showing the reactor and slaughterhouse case density for OTFW breakdowns in Cheshire in the context of other areas of England for the first six months of 2016.
Figure 2b: Map showing the reactor and slaughterhouse case density for all breakdowns in Cheshire in the context of other areas of England for the first six months of 2016
4. Descriptive epidemiology of bovine TB breakdowns in the first half of 2016 in the Edge Area of Cheshire

Definitions

Fully confirmed or OTFW cases refer to cases where lesions were visible at slaughter or culture returned positive results.

Strongly suspected or OTFS cases refer to those cases where lesions were not clearly visible at slaughter and may not have been cultured or returned negative cultures. This does not mean that the latter are not infected with *M. bovis*.

New cases of bovine TB

The total numbers of new bovine TB breakdowns for 2015 & 2016 are comparable and consistent for the first half of the year, but the proportions of fully confirmed and strongly suspected are quite different. In 2016, a reversal of the ratio has been seen and more strongly suspected breakdowns have been reported compared to last year with an increase of 50%. However, the reverse has been seen with fully confirmed cases with a reduction of 17% in 2016 compared to 2015. A full interpretation will be more meaningful in the full year report to examine temporal effects of testing and further trends compared to previous years. An alternative explanation may be that in the second year of six monthly whole herd TB testing, disease is being identified much earlier in most cases and it is not manifesting as visible lesions in more cases as a result of this. If this is the case, it supports the continuation of the current frequency of routine herd testing to reduce the propagation of disease within herds.

![Figure 3: Number of strongly suspected (OTFS) and fully confirmed (OTFW) breakdowns of bovine TB in the Cheshire Edge Area for January to June in 2015-2016.](image-url)
In Figure 4 above, the distribution of breakdowns has been compared by year and month for the first reporting period of 2015 & 2016. January and February are fairly consistent for both years whereas there are differences between the spring and early summer months. Many farmers prefer to TB test in the spring and early summer before turnout and more testing takes place in these months. This year the number of new breakdowns almost halved compared to 2015 but this could be affected by the amount of TB testing in place due to the changeover from radial to whole herd testing which was still ongoing from the previous year. In April and May 2016, there was an increase in new breakdowns by 44-57% compared with the same period of last year but a reduction of over 60% was seen in June. Factors such as temporal smoothing and weather related farming activities could have some effect on the distribution of cases and the full year’s data will allow more meaningful interpretation.

22,508 more cattle were tested in the first six months of 2016 compared to 2015 (see appendix 3: animal level statistics). Although 59 fewer herds were TB tested in 2016 compared to 2015, this could be due to the fact that some herds have been sold and others have expanded in numbers of cattle.

Figure 5: The number of breakdowns compared with sector for all breakdowns in the first six months of 2016.
The numbers of breakdowns compared with sector appears to be similar for both fully confirmed and strongly suspected cases for the Cheshire Edge so far this year. Cheshire is predominantly a dairy county, so it is no surprise that the largest number of breakdowns has occurred in dairy herds. There are a total of 33 breakdowns in dairy herds, 11 in beef fatteners and 10 in beef suckler herds.

![Figure 6: The average herd size of all breakdowns according to sector.](image)

The herd size varies both within and between sectors (see figure 6). For all breakdowns, the average dairy herd size is 375 (range 102-1120); beef suckler is 114 (range 12/370); and beef fattener is 180 (range 5-600). In all sectors, the size varies enormously. There are various confounding factors which may also influence the likelihood of disease occurring on a premises regardless of herd size such as average age of cattle, production stress, housing, biosecurity, grazing management practices, methods of feeding and intercurrent disease problems. Ideally all of these factors would be considered in combination with herd size as the breakdowns clearly show that in all sectors there are very small and very large herds which have become breakdowns and also many other herds which have not become breakdowns. Assessment of the full year data will be more meaningful in the next report.
The majority (63%) of all beef suckler and dairy herd TB breakdowns in the Cheshire Edge for the first six months of 2016 have been assessed to be effectively closed herds. That is, they are either a single site with no purchase activity, or effectively closed and breed all replacements but may purchase a bull every two to three years or may operate over several sites with no cattle purchased. The herds classed as flying have high purchase activities and either purchase all stock or purchase a large proportion of replacements from multiple sources. The fact that the majority of new breakdowns are assessed as closed implies that disease is not being introduced through cattle movements from other risk areas.

70% of the fully confirmed breakdowns were spoligotype 25 (mostly genotype 25:A – also the predominant strain of *M. bovis* in Staffordshire, Derbyshire and North Shropshire); 13% were spoligotype 17; one was genotype 74:A and four breakdowns had no genotyping completed at the time of writing this report.

This is consistent with previous years and with the homerange data available on SPIDA (see below). Genotype 74:a was found by slaughterhouse surveillance in a purchased cow and was linked back to the holding of origin in Oxfordshire. Interestingly, the cow had passed clear TB tests since purchase.
Figure 9: Genotype 25:a homorange map for Cheshire 2016 (from SPIDA).

Figure 10: Genotype 17:a homorange map for Cheshire 2015 (from SPIDA)

Risk pathways for bTB infection

Recurrent cases

Figure 12: New breakdowns with an OTFW incident in the previous 3 years

53% of all new breakdowns (16/30) in 2016 had a confirmed incident of TB in the previous three years whereas there were only 23% (26/112) for the whole of 2015. The full years’ data will provide a more meaningful comparison. Note the overall skin testing requirement for TB breakdown herds has not changed since last year and two short interval tests at severe interpretation are required after the initial disclosing test regardless of confirmation status.

The majority of the recurrent breakdowns (14/16) were situated in heavily infected areas of the Cheshire Edge especially to the north of Congleton in the parishes of Marton, Gawsworth, Siddington.
and Lower Withington which have been described in previous reports. Infected badgers have been found in these areas.

Provisional source

![Provisional source of infection using risk pathways for fully confirmed TB breakdowns in the first half of 2016 in the Cheshire Edge.](image)

The provisional source assigned to each case by the case vet is shown above in figure 13. These data are sourced from the Disease Report Form in all cases which is completed after the initial farm visit. Each risk pathway is assessed as possible, likely, most likely and definite. A maximum of three may be considered for provisional sources of infection.

Infected wildlife is cited in almost 50% of new fully confirmed cases as the most likely provisional source of infection, followed by 27% possibly purchased, 10% residual infection and other cases obscure/multiple or equally weighted risk pathways. Only 1/30 was thought to be of contiguous origin and it is uncommon practice for cattle to contact other cattle on neighbouring holdings on the majority of farms in Cheshire. The case vet will consider the local area, the herd activity, cattle movements, TB testing history and the local disease situation. Herd portfolios are now available to assist both the case vet and farmer to assess these risks more accurately. As the case progresses and genotyping results become available, a final report is written which details the final risk pathways for each case (see figure 14) at the closure of the case.

Final source

The final source attributed to each resolved fully confirmed case (n=10) at the end of June 2016 is shown in Figure 14. 40% were most likely attributed to exposure to infected wildlife indirectly through contamination of feed or during the housing or grazing period by environmental contamination. 40% were most likely to be attributed to purchase and 20% were classed as obscure due to the fact that no genotyping was completed for these cases and therefore, no conclusions could be drawn in these cases. These data are based on the evidence available and is limited by the amount of genotyping performed for each case which is usually only one sample.
Figure 14: Final source of infection using risk pathways for all resolved fully confirmed breakdowns in the Cheshire Edge for the first half of 2016.

Three of the four cases detected at slaughter during this period are considered to be of purchased origin either due to the length of time on farm or due to the genotype; interestingly only one was in a beef herd, with the remainder in dairy herds. The former was from an AFU which is part of a very large beef fattening enterprise near the Welsh border. All cattle move direct to slaughter and up to 50 cattle are routinely slaughtered every week. Another case was genotype 74:A and can be linked back to the farm of origin in Oxfordshire to a 2007 breakdown with the same genotype. This is most unusual as the animal was not born at the time of the 2007 breakdown and the herd was dispersed in 2015 when this cow was purchased by the current owners. However, this appears to be the only explanation in this case due to the rarity of the genotype. The cow had also passed several clear skin tests before being identified as a slaughterhouse case. The Cheshire herd had suffered previous breakdowns with genotype 25:A which is more commonly found in this area of Cheshire.
c. Impact of bovine TB: reactor numbers

The number of reactors disclosed decreased in January – June 2016 to 430 compared with 588 in January – June 2015 which represents a reduction of almost 27%. In terms of skin reactors, in 2016 there was an increase in the disclosure of skin reactors from 254 in January – June 2015 to 298 which represents an increase of 17%. However, the disclosure of gamma positives fell by 60% in 2016 compared to 2015 from 334 to 132 for the same time period. The gamma positives were either negative to the skin test or were IRs. In 2016, there have been several examples of excellent correlation between the skin reactors and gamma positive results and it appears that both tests in combination are detecting infected cattle earlier and accurately.

Figure 15: Stacked bar chart showing the comparative number of skin reactors and gamma positives (which were skin negative or IRs) in the Cheshire Edge from January to June 2015 & 2016.

Figure 16: Chart showing the number of reactors per breakdown and the number of reactors per 1000 animal tests between January and June in 2015 & 2016 in the Cheshire Edge.
Similarly, there has been a decrease in both the average number of reactors per breakdown in the first six months of 2016 by 27% and in the number of reactors per 1000 animal tests which represents a 35% decrease. These figures should be interpreted with caution until the whole year data has been analysed in the next report.

5. Cases in other species
   (a) Badgers and other wildlife
   No further badger or wildlife cases have been reported to APHA in the Cheshire Edge during this reporting period.

   A Defra-funded Edge Area badger road kill survey began on 1\textsuperscript{st} August 2016 and is due to last for 12 months. No new data is available for Cheshire.

   (b) Other domestic species
   No other domestic species have been reported as being affected in Cheshire for this report, but there is a suspect human case undergoing treatment for tuberculosis in the Gawsworth area. The person is resident on a heavily infected beef suckler farm which is undergoing its first TB breakdown. It is a closed herd within a single premises. Genotyping results from the human are currently outstanding but genotype 25:A has been isolated from the cattle which is consistent with the local area and within the home range of the genotype.

   There is also a case of bovine TB of genotype 25:A in a domestic cat in the Cheadle Hulme area of Stockport. Further investigations are ongoing.

6. County description
   The pattern of disease is much the same in this reporting period as it was for 2015 except for an area near Greater Manchester/Stockport, close to Manchester airport in the parishes of Mobberley, Morley and Wilmslow. In this area we have seen some very large explosive breakdowns with high prevalences of reactors and gross TB pathology. In one case there were 20 skin reactors disclosed at a whole herd test and 50% had visible lesions at slaughter. Further disease was disclosed by interferon-gamma parallel testing. This number of reactors represented 20% of the milking portion of the herd. All replacements were homebred. An infected badger had been found very close by in 2014. The genotype was identical for both (25:A). Further incidents have occurred in this area all with the same genotype to date and will be reported in the next report. Just over the border at Woodford a potentially \textit{M. bovis} positive badger has been identified by the NFU funded badger survey. Genotyping is currently outstanding. Further results will be discussed in the next report.
Further east and north of Macclesfield, a new breakdown was disclosed in a Pedigree dairy herd where 42 skin reactors were disclosed at a whole herd test. Again a high level of infection was present. Badger vaccination activities took place on a neighbouring premises in 2015 and the occupant had also considered the possibility of badger rehabilitation from a well known rehabilitation centre in SW England. The farmer on the breakdown premises had seen abundant badger activity on farm during the months prior to his herd breakdown.

The majority of reactors were from one group which was fed on the outside of the shed throughout the winter. Badgers were seen at night time in this area. The genotype is still outstanding.

7. Changes in the bovine TB epidemic in the Cheshire Edge area in the first half of 2016

Six monthly whole herd testing appears to be effective in detecting infected cattle herds earlier and reducing spread within herds with a minority of exceptions. The use of parallel IFN gamma testing is also useful by increasing the overall test sensitivity when used with the skin test to resolve TB breakdowns. This extra diagnostic tool has been largely accepted in the Cheshire Edge with a few exceptions.

The established areas of endemic TB are described in the 2015 report and have not changed. In these areas, it is common to see prolonged restrictions as a result of ongoing disclosure of reactors and recurrence of disease on OTF holdings. The mandatory use of the interferon-gamma test is still policy in these areas. However, the use of repeated interferon-gamma testing is reviewed on an ongoing basis where it is thought that there is endemic wildlife infection unless biosecurity measures are such that contact with wildlife is negligible.

The only new risks identified since the last report include the disclosure of 8/30 potentially *M. bovis* positive badgers found as part of the Stockport/Greater Manchester badger survey which was funded by the NFU last year. These are currently undergoing spoligotyping at the University of Nottingham and the results should be available for the next report. This area was identified as a risk in the last report on...
p22. It is currently part of the LRA and increased cattle skin testing has been conducted over the past two years showing no current evidence of infection. However, the report’s recommendation would be to review this TB testing area with urgency to assess whether further bespoke TB testing is required to monitor the situation once the genotype results are known.

The increased cattle controls in the Cheshire Edge Area are effective and are expected to continue to enable earlier detection of disease and reduce overall reactor numbers over time. However, it is expected that this effect will plateau unless a reduction in the heavy infection challenge from infected badgers in some areas, particularly in east Cheshire, is facilitated through wildlife control measures.
8. 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 (in effect from January 2013, as set out in the strategy for achieving Officially Bovine Tuberculosis Free status for England)

1.1 Policy objectives for the Edge Area:
Short to medium term:
(c) Slow down geographic spread
(d) Maintain crude herd incidence of OTFW breakdowns <2% overall by 2019
(e) Begin to reduce the incidence rate

Longer term:
(f) Reduce geographic spread of bTB and push the Edge Area boundaries westward
(g) Reduce OTFW herd incidence to <1% by 2025
(h) Attain OTF status (incidence of indigenous OTFW 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 OTFW breakdowns in Derbyshire (radial testing), with 6 month follow-up
c. 6 monthly whole herd testing in Cheshire from January 2015
d. Survey of badgers found dead in the Edge area (starting Spring 2016)

Management of cases (‘breakdowns’)
a. Increased sensitivity of breakdown herd testing:
   • OTFS breakdowns to pass 2 short interval tests at severe interpretation to regain OTF status
   • Mandatory IFN-g parallel testing in OTFW
b. Enhanced epidemiological investigation & data analysis
Preventive measures
a. Compulsory pre-movement TB testing
b. Remove CTS links between HRA and Edge areas
c. Approved Finishing Units (AFUs) with grazing not permitted
d. Promote risk based trading of cattle
e. Badger (Edge) vaccination scheme
f. bTB biosecurity review project (underway)
g. Local bTB awareness events and Eradication Boards
h. Information sharing – location of breakdown herds published

Appendix 2: Relevant changes in the cattle industry in the Edge Area of the Region since 2015

There have been no major changes to the cattle industry in Cheshire since the last report. Some of the Pre-movement exempt finishing units have converted into non-grazing Approved Finishing Units instead. There are no changes to the markets, abattoirs or farming practices since the last report and there are no new areas of common grazing.

Appendix 3: Summary of the Edge Area Regional headline cattle TB statistics

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Total number of cattle herds live on Sam at the end of the reporting period</td>
<td>1403</td>
<td>1446</td>
<td>1453</td>
</tr>
<tr>
<td>b. Total number of herd tests carried out in the period</td>
<td>1351</td>
<td>1410</td>
<td>1507</td>
</tr>
<tr>
<td>c. Total number of OTF cattle herds TB tested during the period for any reason</td>
<td>1019</td>
<td>907</td>
<td>980</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>1310</td>
<td>1360</td>
<td>1100</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>1341</td>
<td>1388</td>
<td>1283</td>
</tr>
<tr>
<td>f. Total number of new TB breakdowns detected in cattle herds during the report period</td>
<td>54</td>
<td>52</td>
<td>77</td>
</tr>
<tr>
<td>• OTF status suspended (OTF-S)</td>
<td>24</td>
<td>16</td>
<td>30</td>
</tr>
<tr>
<td>• OTF status withdrawn (OTF-W)</td>
<td>30</td>
<td>36</td>
<td>47</td>
</tr>
<tr>
<td>g. Of the OTF-W herd breakdowns:</td>
<td></td>
<td></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>4</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>• New OTF-W breakdowns triggered by skin test reactors or 2xIRs at routine herd tests</td>
<td>12</td>
<td>20</td>
<td>14</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>14</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>• New OTF-W breakdowns first detected through routine slaughterhouse TB surveillance</td>
<td>4</td>
<td>4</td>
<td>9</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>N/A</td>
<td>N/A</td>
<td>20</td>
</tr>
<tr>
<td>• OTF-S</td>
<td>N/A</td>
<td>N/A</td>
<td>9</td>
</tr>
<tr>
<td>• OTF-W</td>
<td>N/A</td>
<td>N/A</td>
<td>11</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>40</td>
<td>49</td>
<td>32</td>
</tr>
<tr>
<td>j. New confirmed (positive M. bovis culture) incidents in non-bovine species detected during the report period (indicate host species involved)</td>
<td>0</td>
<td>1 ALPACA</td>
<td>5 BADGERS</td>
</tr>
</tbody>
</table>
Animal-level statistics (cattle)

<table>
<thead>
<tr>
<th></th>
<th>196457</th>
<th>173949</th>
<th>167969</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Total number of cattle tested in the period (animal tests)</td>
<td>196457</td>
<td>173949</td>
<td>167969</td>
</tr>
<tr>
<td>b. Reactors detected:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• tuberculin skin test</td>
<td>298</td>
<td>254</td>
<td>448</td>
</tr>
<tr>
<td>• additional IFN-gamma blood test reactors (skin-test negative or IR animals)</td>
<td>132</td>
<td>334</td>
<td>296</td>
</tr>
<tr>
<td>c. Reactors per breakdown</td>
<td>8</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>d. Reactors per 1000 animal tests</td>
<td>2.19</td>
<td>3.38</td>
<td>4.49</td>
</tr>
<tr>
<td>e. Additional animals identified for slaughter for TB control reasons (DCs, including any first-time IRs)</td>
<td>13</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>f. SLH cases (tuberculous carcases) reported by FSA</td>
<td>11</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>g. SLH cases confirmed by culture of <em>M. bovis</em></td>
<td>5</td>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>

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>Cheshire Edge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prov.</td>
</tr>
<tr>
<td>Introduction (e.g. purchase) of infected animal(s)</td>
<td>8</td>
</tr>
<tr>
<td>Local - lateral spread from neighbouring holdings</td>
<td>1</td>
</tr>
<tr>
<td>• exposure to infected wildlife</td>
<td>14</td>
</tr>
<tr>
<td>• other farmed species</td>
<td>0</td>
</tr>
<tr>
<td>• recrudescence of residual infection from a previous TB breakdown</td>
<td>3</td>
</tr>
<tr>
<td>• infected human source</td>
<td>0</td>
</tr>
<tr>
<td>Undetermined/obscure</td>
<td>4</td>
</tr>
<tr>
<td>Other (explain)</td>
<td>0</td>
</tr>
</tbody>
</table>

All new OTF-W bTB breakdowns identified in the Cheshire Edge Area were categorised by county 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). The corresponding numbers of breakdowns are entered in the relevant boxes. (Greyed-in boxes show introduced breakdowns with no evidence of local spread).

The uncertainties that have resulted in cases being included in the 'possible' column or row are primarily because all testing associated with the breakdown has not yet been completed (radial and contiguous testing).
### Probability of isolated, sporadic ('one-off') breakdown, without secondary cattle to cattle spread

<table>
<thead>
<tr>
<th>Probability of introduced <em>M. bovis</em> infection</th>
<th>Likely (no secondary breakdowns detected)</th>
<th>Possible (no secondary breakdowns detected, but dataset incomplete)</th>
<th>Not likely (secondary spread has occurred)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definite</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Likely</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Possible</td>
<td>0</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Not likely (indigenous infection in the locality)</td>
<td>1</td>
<td>1</td>
<td>13</td>
</tr>
</tbody>
</table>

The Animal and Plant Health Agency is an Executive Agency of the Department for Environment, Food and Rural Affairs working to safeguard animal and plant health for the benefit of people, the environment and the economy.