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

County: Derbyshire (part county)

Year-end report for 2017
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1. Executive Summary

a. 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 farms. This end of year report describes the bovine tuberculosis (bTB) epidemic in the Edge Area section of Derbyshire, one of the five counties straddling the Edge Area and the High Risk Area (HRA) of England until the end of 2017.

b. Level of bovine TB. The herd incidence of bTB has almost halved from 7% seen in 2015 to 3.65% in 2017. This reflects a return to the level seen in 2014. The high level in 2015 is considered an anomaly, attributed to railway works causing unusual disturbance to badgers.

c. New breakdowns of bovine TB. The number of breakdowns decreased slightly from 14 in 2016 to 13 in 2017. This decrease was seen in Officially Bovine Tuberculosis Free Status Suspended (OTFS) breakdowns with the number of Officially Bovine Tuberculosis Free Status Withdrawn (OTFW) incidents remaining unchanged.

d. Disclosing tests. The majority of breakdowns (90% of total) were disclosed at active surveillance (on-farm testing), but 61.5% (n=8) of these remained unconfirmed. Two OTFW breakdowns were disclosed by routine annual surveillance testing (WHT), and two were disclosed by enhanced surveillance testing (tracing and pre-movement testing). One breakdown was disclosed following slaughterhouse surveillance.

Four of the OTFS breakdowns were disclosed by routine annual surveillance testing, and four were disclosed by enhanced surveillance testing (6 and 12 months post breakdown, pre-movement, and radial skin testing).

e. Risk pathways for bovine TB infection. The most likely infection source of 54% (n=7) of breakdowns new in 2017 was wildlife. This is also the most likely source of infection in beef suckler and dairy herds. Purchased origin (infected cattle movement) was considered responsible for 31% (n=4) of breakdowns, and also the most likely source of infection in beef herds. Recrudescence of a previous infection was the cause of 7.5% (n=1) of breakdowns. The remaining 7.5% (n=1) was of undetermined origin.

f. Impact of bovine TB. Active surveillance disclosed 33 reactors, of which 39% were disclosed by interferon gamma (IFN-g) blood test.

g. Cluster – north west Derbyshire. The area of the north west Derbyshire cluster had a reduced number of breakdowns in 2017. However, there was one new OTFW breakdown caused by genotype 25:a of M. bovis in this area, with wildlife being the most likely source of the infection. This suggests that disease still persists in this area, with some evidence of possible spread further north.

h. Cases in other species. There have been no laboratory confirmed isolations of M. bovis in other species in the Derbyshire Edge Area. Submission rates are extremely low in other domestic species. There is no systematic surveillance that would reveal such infection in badgers and other wildlife, however a Defra-funded survey of road-killed badgers was conducted in 2016-17 to look for the presence of M. bovis in found dead badgers in Edge Area counties. The survey results have not been published at the time of writing this report.

i. Changes in the epidemic. Despite the decrease in breakdowns, there are still signs of developing endemic bTB in the northwestern section of the Derbyshire Edge Area. Industry stakeholders have been relatively inactive in Derbyshire over the last year, with no meetings of the NFU Derbyshire TB group. Bovine tuberculosis herd accreditation under the Cattle Health Certificate Standards (CHeCS) scheme is a new national, industry-led health certification scheme which could help publicise incentives for farmers to practice risk-based trading.
j. **Risks to the Low Risk Area and from the High Risk Area** remain unchanged from the 2016 year end report.

k. **Forward look.** Emphasis on risk-based trading, making herd/holding data available more widely to encourage industry ownership of disease control. Enhancement of badger control measures are needed.

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 differing 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 Derbyshire (part county) 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 Derbyshire.**

**Herd Types**

Beef herds (suckler and fattening) are the predominant herd type in the Derbyshire Edge Area, with beef suckler herds being almost equivalent in number to beef fattening herds. Both the fattening and suckler herds can exist as very small units comprising fewer than ten animals, but with the range for suckler herds extending up to 500 animals, and with some fattening herds comprising over 1000 animals. Dairy herds are far less common: a few large dairy herds are situated in south Derbyshire, but most dairy herds are medium to large in size (100 - 1000 animals). There is a predominance of mainly small herds of up to 50 cattle in the Derbyshire Edge Area as shown in the pie chart at Figure 1, and it would be reasonable to assume that the majority of these are beef fatteners or beef sucklers.
Figure 1. Proportion and number of cattle holdings in the Derbyshire Edge Area with the number of cattle per holding (CPH) shown (n=1672, data in Appendix 2)

Markets

There are no auction markets in the Derbyshire Edge Area, the nearest being Bakewell Market which is located in the Derbyshire High Risk Area (HRA). Other markets utilised by farmers in this area are located in the HRA: Leek (Staffordshire) and Edge Area: Newark (Nottinghamshire). This facilitates the flow of cattle from the HRA to the Edge Area, potentially providing opportunity for spread of bTB from the HRA into the Edge Area. Some of these markets operate Pre-movement Testing Exempt sales and Approved Slaughter Gatherings which are subject to specific licensing TB controls. This is likely to mitigate risk of spread of bTB by cattle moving through these gatherings as only onward movements of cattle directly or indirectly to slaughter is allowed. However, local authority supervision of these gatherings has been reduced in recent years, which increases the risk of spread of bTB in the event of breaches in the licensing controls.

Approved Finishing Units

The number of Approved Finishing Units (AFUs) for TB-restricted cattle in 2017 (3) increased from 2016 (1). All the AFUs in the Edge Area have to be non-grazing and, if correctly operated according to the strict biocontainment licensing conditions, they are not considered a risk for introduction or spread of bTB into the surrounding areas.

Common Land

There are some small areas of common land in the Derbyshire Edge Area, with low numbers of cattle grazed and no significant co-grazing by more than one herd, so spread of bTB related to common land is unlikely in this area.

See Appendix 2 for a fuller report on the cattle industry in the Edge Area of the Derbyshire.
4. Overview of the TB epidemic in the Edge Area of Derbyshire

a. History of TB in the Edge Area of Derbyshire

There has been an increase in the number of infected herds in the Derbyshire Edge Area as shown in Figure 2. Prior to 2013, the majority of parishes in the current Edge Area counties were subject to two, three, or four yearly testing with, in many cases, exemptions from testing for cattle not used for breeding. The implementation in January 2013 of annual whole herd testing for all cattle herds in the newly-established Edge Area counties, supplemented in the Edge Areas of Derbyshire and Cheshire by targeted (radial) testing around herds with OTFW breakdowns, resulted in an overall increase in testing frequency with few exemptions from testing applicable. This explains in part the rise in the number of new breakdowns from 2013 as more herds were tested per annum than in previous years, with the expectation that more disease would be disclosed as a result. There is an ongoing element of seasonality in the disclosure rate with a general reduction over the summer months, which may be partially explained by a reduced testing rate at this time of year. The number of breakdowns reached a peak of 26 in 2015, but has almost halved in 2016 (14) and 2017 (13), returning to a level similar to that seen in 2013.

The source of a significant number of cases in the 2015 spike has been attributed to badgers, and this is thought to be directly linked to major works undertaken on the main Sheffield to Manchester railway line during 2014 and 2015. Anecdotal evidence suggests that there may have been perturbation of badgers located near to the line, which may have changed the usual pattern of contact between badgers and cattle in the locality. The reasons for the subsequent decrease in the number of cases in 2016 and 2017 are not clear.

![Figure 2: Epidemic curve of new TB cases in the Derbyshire Edge from 2006 to 2017](image)

b. Geographical distribution of bovine TB breakdowns (new and ongoing cases) in the Edge Area of Derbyshire

The geographical distribution of all TB herd breakdowns new in 2017 and any pre-2017 OTFW TB breakdowns still ongoing at the end of the report period is shown at Figure 3 overlaid on a map showing the cattle holding density for the Midlands Edge Area. The inset map shows the cattle density for the county.

The occurrence and distribution of breakdowns in 2017 in Derbyshire continued with just over half of cases occurring in the north west of the Edge Area (2 OTFW and 5 OTFS incidents) and the remaining cases in the northeast and southern sections of the area, with a total of 6 TB incidents (3 OTFW and 3 OTFS breakdowns). Overall, there were slightly fewer incidents in the Derbyshire Edge Area in 2017 (n=13) compared with 2016 (n=14).
Figure 3: Geographical distribution of all TB breakdowns new in 2017 and any pre-2017 OTFW TB incidents 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 (NB only breakdowns which occurred within the Edge Area outlined in red are shown)
As shown in Figure 4 below there was a marginal decrease in the number of breakdowns in 2017 compared to 2016. The number of OTFS breakdowns decreased from nine to eight between 2016 and 2017. The number of OTFW breakdowns remained unchanged at five.

![Figure 4: Number of fully confirmed (OTFW) and strongly suspected (OTFS) breakdowns in the Derbyshire Edge in 2016 and 2017.](image)

- **Breakdowns by herd type**

  The new breakdowns in 2017 were differentiated into herd type as shown in Figure 5a. Beef suckler herds accounted for 46% of breakdowns and half of those were OTFW. This is in contrast to that seen in dairy herds, which accounted for 23% of the total breakdowns and all were OTFS. Beef fattener herds accounted for 31% of the total breakdowns, and half of those were OTFW. The general distribution of breakdowns partly reflects the distribution of cattle herd types in the Derbyshire Edge Area.

![Figure 5a: Number of fully confirmed (OTFW) and suspected (OTFS) breakdowns in 2017 by sector in the Derbyshire Edge Area.](image)
• Breakdowns by herd size

As shown in Figure 5b, the largest number of breakdowns occurred in the 51-100 herd size group, this group accounting for 17% of all herds. This is in comparison to approximately 50% of Derbyshire herds having 0-50 cattle present but with only one breakdown in this sector.

![Figure 5b](image)

Figure 5b: Number of fully confirmed (OTFW) and suspected (OTFS) breakdowns in 2017 by herd size in the Derbyshire Edge Area

• Breakdowns by month of disclosure

Figure 6 shows the epidemic curve for 2017 where breakdowns are differentiated into OTFS and OTFW status. The graph shows a peak of seven breakdowns disclosed between September and November 2017, which is likely due to the increase in TB testing carried out when herds are tested at the end of the grazing season. The rest of the TB breakdowns were disclosed in January (1), in February (1), in May (2) and in July (2).

![Figure 6](image)
Figure 6: Epidemic curve showing the distribution of new breakdowns per month from January to December 2017

- Breakdowns by surveillance method

Figure 7 shows the number of breakdowns disclosed according to surveillance test type. Routine active surveillance testing - the annual whole herd test (WHT) – disclosed almost 40% of new breakdowns. Enhanced targeted surveillance testing of individual animals – pre-movement testing (PRMT) and trace testing (TR) – and of herds – radial testing (RAD) – disclosed 66% of new breakdowns. Slaughterhouse surveillance (SLH) disclosed one new breakdown (8%).

![Figure 7: Number of OTFW and OTFS breakdowns disclosed by different surveillance methods](image)

- Number of breakdowns detected at an inconclusive reactor (IR) retest and at the initial skin test.

Figure 8 shows the number of breakdowns detected by active surveillance testing, differentiating between OTFW and OTFS cases. The number of new breakdowns detected as reactors at an IR retest is compared with the number of new breakdowns detected as reactors at the initial skin test. Half of OTFS breakdowns were disclosed at an IR retest, suggesting successful early detection of disease. This shows that the requirement to isolate IRs prior to retest is important, as they are a potential infection risk to the rest of the herd.
Figure 8: Number of new breakdowns detected as reactors at an IR retest and those detected as reactors at the initial skin test.

Cluster – north west Derbyshire

The cluster in north west Derbyshire, as detailed in the 2016 year end report, persisted in 2017. There was one new OTFW breakdown caused by genotype 25:a of *M. bovis* in the area, with wildlife being regarded as the most likely source of the infection. This suggests that while the enhanced control measures in cattle have prevented the spike from continuing, there is still a degree of disease persisting in the area, with some evidence of possible spread further north.

5. Descriptive epidemiology of bovine TB in the Edge Area of Derbyshire

a. Level of bovine TB

   - Incidence
   The incidence of bTB breakdowns in Derbyshire was calculated for 2015-2017 and this is shown in Figure 10 below. The figures from previous years have changed slightly to allow better comparison with the 2016 and 2017 figures. This is due to the increase in testing as a result of more radial testing in the Derbyshire Edge, and so the incidence calculation has been amended to ensure reporting of an annual incidence based on unique herds tested rather than number of herd tests.

   As Figure 9 shows, the near doubling of incidence between 2014 and 2015 has not continued into 2016 and 2017, with a reduction to an incidence in 2017 that is slightly lower than the 2014 incidence. This supports the conclusions from the 2015 report that the cluster in the north west Derbyshire Edge Area was due to a disturbance in the local badger population as this was a one time event that has not led to a sustained increase in incidence. Additionally, it suggests that the measures used have helped control the outbreak and prevented secondary spread from these breakdowns to other herds.
Figure 9: Incidence for the years 2014 to 2017 calculated for all new breakdowns (OTFS and OTFW) in the reporting period as a percentage of unique OTF cattle herds tested in the reporting period.
b. Risk pathways for bovine TB infection:

Figure 10 shows the most likely source for new breakdowns in the Derbyshire Edge Area. As can be seen, a relatively high number of breakdowns in north west Derbyshire have been attributed to a wildlife infection source. This is consistent with the pattern seen in 2016.

Figure 10: Origin of infection and, where known, the genotype of *M. bovis* for new breakdowns in 2017 in the Derbyshire Edge Area.

For each breakdown the most likely infection source was considered and is shown in Figure 11. The infection sources can be differentiated into four broad groups – wildlife, local cattle (residual infection within herds that have regained OTF status after a breakdown, or contiguous spread from neighbouring herds), cattle movement (purchased animals, shows etc) and undetermined.

- The majority of 2017 new TB breakdowns, 54% (*n*=7) were of wildlife origin.
- 31% (*n*=4) of breakdowns were of purchased origin. This is consistent with the nature of the cattle industry in the area which sources beef animals partially from the TB HRA.
- 7.5% (*n*=1) of breakdowns were due to residual infection in the herd.
- 7.5% (*n*=1) of breakdowns were of undetermined origin.
Figure 11: Origin of infection for breakdowns new in the reporting period

As shown in Figure 12, seven of the thirteen breakdowns detected were considered to originate from a wildlife (badgers and deer) source and occurred in beef suckler and dairy herds. Three of the four breakdowns in beef fattener herds were of purchased origin. This is consistent with the nature of the cattle industry in the area, which sources beef animals partially from the HRA. One breakdown in a beef suckler herd was identified as resulting from residual infection in that herd. One of the breakdowns in the beef fattener herds was of undetermined origin.

Figure 12: Origin of infection for breakdowns new in the reporting period by herd type

As shown in Figure 13, the largest number of breakdowns (n=5) occurred in the 51-100 herd size group, this group accounting for 17% of all herds. This is in comparison to approximately 50% of Derbyshire herds having 0-50 cattle present but with only one breakdown in this sector.
c. Role of other species:

a. Badgers and other wildlife

APHA laboratories have not confirmed any isolations of *M. bovis* in wild animals such as badgers, wild deer or wild boar carcases in this area in 2016 and 2017. The Defra-funded found dead badger survey in the Edge Area will provide information about the prevalence of *M. bovis* in badgers in Derbyshire. Results are pending at the time of writing.

A Defra-funded Badger Edge Vaccination Scheme (BEVS II) in the north west Derbyshire Edge Area is due to recommence in summer 2018. This scheme has been on hold since 2016 due to lack of availability of the BCG vaccine.

There is continuing anecdotal evidence to suggest that there is infection ‘creep’ from the adjoining HRA of Derbyshire and Edge Area of Cheshire. The 2015 privately-funded found dead badger survey in Cheshire also indicated that infection was present in badgers near Stockport (Greater Manchester), close to the Derbyshire Edge Area where breakdowns with a badger source have been identified.

b. Other domestic species:

There have been no laboratory confirmed isolations of *M. bovis* in domestic non-bovine farm animals (camelids, goats, sheep, and pigs), pets, zoo animal collections, captive (farmed/park) deer holdings and captive wild boar farms in 2017.

d. Detection of cases

Figure 14 shows the proportion of breakdowns disclosed according to the surveillance method. The majority (76%) of breakdowns were disclosed at routine herd surveillance tests and enhanced surveillance tests (trace test or PRMT).

Only one breakdown was disclosed by slaughterhouse surveillance (7.7% of the total).
e. Burden of bovine TB

The number of reactors disclosed by different test types is shown in Figure 15. In 2016 the 37.5% of the reactors were identified by the interferon-gamma test whereas in 2017 the interferon-gamma test identified 56.5% of the reactors.

As shown in Figure 16, the mean number of reactors per breakdown in 2017 was three, half that of 2016, but the same mean as in 2015.

In 2017 the mean number of reactors per 1000 animals tested was 1.03, showing a decrease from 2015 and 2016.
f. **Key drivers of the bovine TB epidemic**

- **Infected badgers**

  The number of breakdowns has reduced (by one) compared to 2016, but with the same numbers of OTFW cases. The endemic spread in the north west Edge continues to be evident in the distribution of cases. Infected badgers continue to be considered as a significant source of infection for cattle in the Derbyshire Edge Area with 54% of new breakdowns in 2017 being attributed to a badger source in both dairy and beef herds of fewer than 200 cattle. This is particularly the case in the northwest Edge Area, as detailed in this report and previous year-end reports. There has been active encouragement, both from the NFU and the Derbyshire Wildlife Trust, for participation in the collection of found dead badgers as part of the Defra-funded survey during 2016-17. This has proved successful and Derbyshire met its requirements for this survey and it is hoped that the results may help to provide more certainty regarding badger infection in the area. There is no industry appetite currently to consider licensed badger culling in this area.

  The impact of the suspended Defra-funded Badger Edge Vaccination Scheme (BEVS) project in 2016 and 2017 is not known - this was due to a moratorium, recommended by Public Health England, on purchases of vaccine for badgers. However, in 2017 the Derbyshire Wildlife Trust (a BEVS participant) secured human BCG in ampoules from Intervax. Its use was approved by the Veterinary Medicines Directorate (VMD) and the Derbyshire Wildlife Trust, in consultation with APHA, compiled a training package for lay vaccinators.

- **Cattle movements**

  The inward movement of cattle from higher risk areas in 2017 was considered to be responsible for 31% of breakdowns, and also the most likely source of infection in beef herds. This demonstrates that there is still a significant risk of bTB transmission from the inward movement of cattle to holdings in the Derbyshire Edge Area.

  A new, industry led scheme set up nationally by the Cattle Health Certification Scheme (CHeCS) was established in 2016 to try to encourage farmers to minimise risk when buying cattle. However, there needs to be collaboration with industry, government and private veterinarians to encourage uptake of these schemes.

  The new Farm Level bTB reports have proven useful and of interest to farmers. However, these are only issued during a breakdown. If these reports could be generated at the request of the farmer or private veterinarian, it could be used to inform herd health plans or else feed into the CHeCS scheme.
The source of 7.5% of breakdowns was of undetermined origin in 2017, either because of a lack of information to support a specific transmission pathway or because there may have been more than one source of infection. This means that it was not possible to differentiate between the sources, because of a lack of supporting information.

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

The summary of risks to the LRA is unchanged from those detailed in the 2016 year end report. The narrow expanse of the North Derbyshire Edge Area continues to pose a potential risk to the Low Risk Area county of South Yorkshire in particular, which is a high cattle density county with many large dairy herds. However lack of suitable badger habitat and radial testing around fully confirmed (OTFW) incidents provide some mitigation against wildlife spread. In addition the northernmost extent of the Derbyshire Edge is sparsely populated by cattle limiting the potential for cattle to cattle spread. Conversely the finding of infected badgers in the LRA of Greater Manchester suggests that there may be disease pressure from the north west Derbyshire Edge (as well as from Cheshire).

Summary of the risk to the Edge Area from the Hisk Risk Area

The summary of risks to the Derbyshire Edge Area is unchanged from those detailed in the 2016 year end report, namely the risk of an advancing endemic front of infection from the HRA part of Derbyshire. In addition, the finding of infected badgers in the LRA of Greater Manchester suggests that there may be disease pressure from the north west Derbyshire Edge Area (as well as from Cheshire).

7. Assessment of effectiveness of controls and forward look

Radial testing in the Derbyshire Edge Area has been successful in identifying disease within 3km of a fully confirmed (OTFW) breakdown, but it in many cases it is considered that there was a common badger source rather than lateral spread from cattle.

Parallel interferon-gamma testing of herds with OTFW breakdowns has been useful in removing infected cattle undetected by the skin test. This has been effective in reducing within herd and lateral spread, but other measures are still required to address the sources and pathways of infection to prevent recurrence or introduction of new infection into a herd once testing and slaughter has removed disease.

Serial interferon-gamma testing has been utilised to identify some rare instances of suspected fraudulent behaviour by herd owners (tampering with the tuberculin skin test injection site to create ‘reactors’) and has also resulted in the resolution of chronic OTFS breakdowns which had erroneously appeared to have disease persistence.

The increased efforts by APHA and Defra to engage with the cattle industry and stakeholders to raise awareness and share information (disease information and farmers’ own data) is welcome. Much needs to be done to make herd- or holding-specific information easily accessible to farmers and the private veterinary practices in order to enable businesses to take ownership of their risks and responsibilities.

The introduction of licensed badger control measures – vaccination and culling – have helped to reassure the cattle industry that there is an official holistic approach to bTB control, and that should help to encourage industry to accept their own disease control responsibilities.

Although the Derbyshire Edge Area has a declining incidence in 2017, it is not currently a candidate for achieving OTF status in the near future.
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 OTFW 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 OTFW herd incidence to <1% by 2025
- f. 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 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:
  - OTFS breakdowns to pass two short interval tests at severe interpretation to regain OTF status
  - mandatory IFN-g parallel testing in OTFW
- b. enhanced epidemiological investigation and data analysis
- c. information sharing - location of breakdown herds
Appendix 2: Cattle industry in the Edge Area of Derbyshire

The cattle industry in the northern part of the Derbyshire Edge Area comprises principally beef suckler herds, the terrain and altitude making it less favourable for dairy herds. The cattle herds tend to be co-located with sheep flocks. Most suckled calves are sold as stores, usually through local markets, although some are finished on the holding of birth. The eastern Edge Area contains large intensive finishing units, with dairy predominating in the south Edge Area. There are no auction markets in the Derbyshire Edge Area, but Bakewell Market is located nearby in the Derbyshire HRA.

Number of cattle premises by size band in the Edge Area of the region at 1 January 2017
(RADAR Cattle book 2008 (or most current update))

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<th>351-500</th>
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Cattle purpose

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<td>Number</td>
<td>%</td>
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<td>%</td>
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There are 3 Approved Finishing Units (AFUs) registered in the Derbyshire Edge Area.

There is some common land in the Derbyshire Edge Area, but of low significance because of the small land parcel sizes (less than 10 hectares).

![Figure B1: Proportion of holdings according to breed purpose](image-url)
### Appendix 3: Summary of the Edge Area regional headline cattle TB statistics

<table>
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</tr>
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**Table B1: Number of new breakdowns over time: by month in 2017, to support epidemic curve presented in Section 4a**

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</tr>
<tr>
<td>October</td>
<td>2</td>
</tr>
<tr>
<td>November</td>
<td>3</td>
</tr>
<tr>
<td>December</td>
<td>0</td>
</tr>
</tbody>
</table>

**Table B2: Number of new breakdowns over time: by year from 2006 to 2017, to support epidemic curve presented in Section 4a**
### Herd-level statistics

<table>
<thead>
<tr>
<th>Herd-level statistics</th>
<th>Derbyshire</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Total number of cattle herds live on Sam at the end of the reporting period</td>
<td>472</td>
</tr>
<tr>
<td>b. Total number of herd tests carried out in the period</td>
<td>574</td>
</tr>
<tr>
<td>c. Total number of OTF cattle herds TB tested during the period for any reason</td>
<td>356</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>446</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>451</td>
</tr>
<tr>
<td>f. Total number of new TB breakdowns detected in cattle herds during the report period¹</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>4</td>
</tr>
<tr>
<td>• New OTF-W breakdowns triggered by skin test reactors or 2xIRs at routine herd tests</td>
<td>0</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>1</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>2</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>4</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>N/A</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.

### Animal-level statistics (cattle)

<table>
<thead>
<tr>
<th>Animal-level statistics (cattle)</th>
<th>Derbyshire</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Total number of cattle tested in the period (animal tests)</td>
<td>32183</td>
</tr>
<tr>
<td>b. Reactors detected:</td>
<td></td>
</tr>
<tr>
<td>• tuberculin skin test</td>
<td>20</td>
</tr>
<tr>
<td>• additional IFN-gamma blood test reactors (skin-test negative or IR animals)</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>c. Reactors per breakdown</td>
<td>3</td>
</tr>
<tr>
<td>d. Reactors per 1000 animal tests</td>
<td>1.03</td>
</tr>
<tr>
<td>e. Additional animals identified for slaughter for TB control reasons (DCs, including any first-time IRs)</td>
<td>0</td>
</tr>
<tr>
<td>f. SLH cases (tuberculous carcases) reported by FSA</td>
<td>1</td>
</tr>
<tr>
<td>g. SLH cases confirmed by culture of <em>M. bovis</em></td>
<td>1</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>Derbyshire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prov.</td>
</tr>
<tr>
<td>Introduction (e.g. purchase) of infected animal(s)</td>
<td>0</td>
</tr>
<tr>
<td>Local - lateral spread from neighbouring holdings</td>
<td>0</td>
</tr>
<tr>
<td>• exposure to infected wildlife</td>
<td>0</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>0</td>
</tr>
<tr>
<td>• infected human source</td>
<td>0</td>
</tr>
<tr>
<td>Undetermined/obscure</td>
<td>0</td>
</tr>
<tr>
<td>Other (explain)</td>
<td>0</td>
</tr>
</tbody>
</table>

All new OTFW bTB breakdowns identified in the Derbyshire Edge Area were 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). 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).

### DERBYSHIRE

<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></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>

DERBYSHIRE

- **Definite**
  - Probability of isolated, sporadic ('one-off') breakdown, without secondary cattle to cattle spread
    - Likely (no secondary breakdowns detected): 3
    - Possible (no secondary breakdowns detected, but dataset incomplete): 2
    - Not likely (secondary spread has occurred): 0
- **Likely**
  - Probability of isolated, sporadic ('one-off') breakdown, without secondary cattle to cattle spread
    - Likely (no secondary breakdowns detected): 3
    - Possible (no secondary breakdowns detected, but dataset incomplete): 2
    - Not likely (secondary spread has occurred): 0
- **Possible**
  - Probability of isolated, sporadic ('one-off') breakdown, without secondary cattle to cattle spread
    - Likely (no secondary breakdowns detected): 3
    - Possible (no secondary breakdowns detected, but dataset incomplete): 2
    - Not likely (secondary spread has occurred): 0
- **Not likely (indigenous infection in the locality)**
  - Probability of isolated, sporadic ('one-off') breakdown, without secondary cattle to cattle spread
    - Likely (no secondary breakdowns detected): 3
    - Possible (no secondary breakdowns detected, but dataset incomplete): 2
    - Not likely (secondary spread has occurred): 0
Appendix 5: Overview of the bTB Control Programme in this Region of the Edge Area

5.1 Edge Testing Policy

- In 2017 all Edge Area breakdowns underwent a minimum of two short interval (60 day) tests at severe interpretation.
- From 1 January 2018 mandatory interferon-gamma test in new OTFW breakdowns has been extended to include the new England Edge Areas. The aim is to remove all infected animals at an early stage and therefore to protect the LRA and Edge Areas.
- No Derbyshire Edge Area OTFW herds have been eligible for exemption from triggering radial bTB surveillance.
- One exemption only has been applied to the deployment of the statutory parallel gamma-interferon testing in a OTFW herd; this was a fattening unit.
- There are no existing breakdowns which have become persistent (under TB2 restriction for more than 18 months because of disease). The longest duration breakdown to resolve in 2017 lasted 12 months.

5.2 Unusual bTB breakdowns

- No confirmed or suspected cases of zoonotic (human) *M.bovis* infection.
- No cases of fraudulent skin test reactors
- There were no breakdowns involving producer-retailers or cheesemakers in 2017.

5.3 Other Testing Measures

- Discretionary exemptions from annual routine surveillance whole herd testing have been approved for a small number of beef finishing units. The following criteria are required: all cattle move directly to the abattoir, no births are recorded for that holding, and all cattle are permanently housed or yarded (no grazing). Holdings are required to reapply for an exemption on an annual basis in order to ensure regular review of compliance.
  - There are no potential hotspots (ie areas of temporarily enhanced TB surveillance triggered by any new OTFW breakdowns that could not be attributed to purchase of infected cattle since the last negative herd test). There are areas which appear to have endemic infection and the results of the Defra-funded Found Dead Badger Survey should assist in determining presence of *M. bovis* in badgers in that area.
  - The frequency of overdue tests has diminished following the introduction of cross compliance penalties and movement restrictions on overdue herds. This however is an ineffective means of ensuring non-claimants or non-commercial herds complete testing on time. The compulsory slaughter of untested herds, recently introduced, is an alternative method of enforcement but difficult to progress.

5.4 Other Control Measures

1. Restriction of resolved IRs for life to the farm where first identified as an IR
2. Once in a breakdown situation any further testing is done at least 60 days post reactor removal rather than 60 days post reactor isolation. This measure ensures that, in cases where there may have been inadequate isolation of reactors, any animals which may have been exposed to disease while the reactor was awaiting removal will be allowed sufficient time to mount a detectable immune response to the tuberculin skin test.

Measures which have been implemented from 1st January, 2018 are:
1. Extension of the Edge Area to the whole county of Derbyshire. The original Edge Area of Derbyshire is to continue with existing annual whole herd surveillance testing. In new OTFW breakdown herds interferon-gamma testing will be applied, and those herds will trigger radial testing of herds in a 3 km radius around the breakdown holding. In the new Edge Area (former HRA) of Derbyshire annual whole herd surveillance testing will cease and six monthly whole herd surveillance testing will be applied. New OTFW breakdown herds will require interferon-gamma testing and those herds will continue to trigger contiguous testing of neighbouring herds.
2. Decoupling of the interferon-gamma test from the short interval skin test is the default position, the aim being to apply interferon-gamma testing as soon as a breakdown has been confirmed. This is to allow for any exposed/infected animals not detected by the disclosing test to be identified and removed earlier and reduce the duration of the breakdown.
3. Official Veterinarian TB skin testing quality control audits continue to be carried out by APHA in parallel with those being completed by the Veterinary Delivery Partners who are contracted to provide the statutory TB skin testing on behalf of APHA.

4. APHA maintains a presence at the NFU Regional Board meetings, reporting current trends and advising on the TB Eradication Strategy.

5. The Derbyshire TB Eradication Group continues to meet on an ad hoc basis, although the group has been less active in 2017. Attendees include representatives from local farmers, market operators, private veterinary surgeons, National Trust, Country Land and Business Association (CLA), Local Authority, NFU, APHA and Defra.

6. Local Authority liaison is maintained as necessary, especially regarding the enforcement of overdue TB tests, illegal movements, fraudulent skin test reactors, and with Public Health colleagues regarding open TB cases or the consumption of unpasteurised milk.

7. Vaccination of badgers is in abeyance as previously discussed. Prior to that the Derbyshire Wildlife Trust had been allocated grant funding via the Badger Edge Vaccination Strategy (BEVS) and had been vaccinating badgers in the north Derbyshire Edge Area. Close contact has been maintained with the NFU and APHA in order that vaccination can be targeted appropriately and that farmers are well-informed.

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.