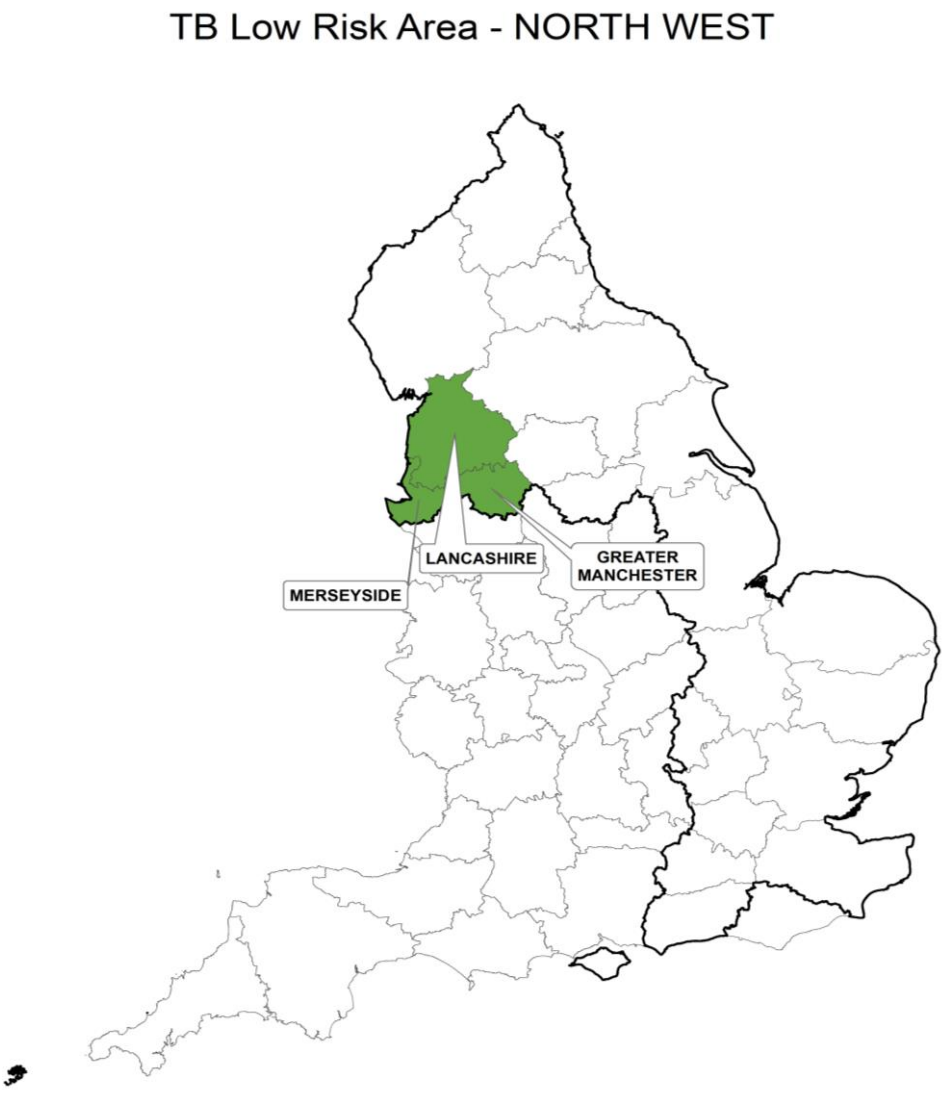
Animal & Plant Health Agency

Year-end descriptive epidemiology report:

Bovine TB in the Low Risk Area of England

County coverage: North West of England (including Lancashire, Merseyside and Greater Manchester)

Year-end report for: 2019



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Executive summary

Reporting area

The North West of England (including the counties of Lancashire, Merseyside and Greater Manchester) is part of the Low Risk Area (LRA) that was established in 2013. The following year, the bovine tuberculosis (TB) surveillance strategy for this area was incorporated into the Government's strategy to achieve Officially Tuberculosis Free (OTF) status for England by 2038. Overall the LRA has a very low and stable incidence of infected herds. This end of year report describes bovine TB in the North West of England.

Local cattle industry

The majority of the cattle herds are found in Lancashire with relatively few herds in Merseyside and Greater Manchester. Larger dairy herds predominate in west and central Lancashire, whilst smaller beef herds form the majority in Merseyside and Greater Manchester.

New incidents of TB

In Lancashire in 2019 there were a total of 13 new TB incidents, of which only one led to the withdrawal of OTF herd status (OTF-W) following identification of typical lesions of TB and culture of *M. bovis* in the laboratory. In 2018 in Lancashire there were 10 TB incidents, none of which was OTF-W. Merseyside had no new incidents in 2019 and two in 2018 of which one was OTF-W. Greater Manchester had five new incidents in 2019, of which four were OTF-W, compared with four new incidents in 2018 of which none were OTF-W.

Potential or confirmed TB hotspot areas

There were no active TB Hotspot Areas in Merseyside or Greater Manchester. There is an active potential TB hotspot area currently in North Yorkshire, known as HS27, which encroaches slightly into East Lancashire. This hotspot is described in the Yorkshire and Humberside Epidemiological Report.

Unusual TB incidents

There has been an increase in TB incidents in Greater Manchester concentrated in an area to the south-east of the city of Manchester (Stockport). This area borders the Edge Area of Cheshire and it is very likely that there has been spread of *M. bovis* from this Edge Area into the LRA.

There was one confirmed case of *M. bovis* infection in a cat from Greater Manchester during 2019.

Suspected sources and risk pathways for TB infection

The main risk pathways are the purchase or movement of undetected infected cattle from the Edge Area and Higher Risk Area (HRA) into Lancashire and Merseyside and the apparent spread of *M. bovis* from the Cheshire Edge Area into Greater Manchester. Details of the methodology used to calculate the weighted contribution of the different suspected sources of *M. bovis* infection for all new incidents can be found in the main body of the report and in the Explanatory Supplement for England 2019.

Disclosing tests

In Lancashire, of the 13 new TB incidents in 2019, the single OTF-W incident was disclosed by slaughterhouse surveillance. Out of the remaining 12 OTF-S incidents, four were disclosed at routine herd tests, three were disclosed during radial testing, two each from post incident testing and trace testing of animals from OTF-W incident herds and one from a pre-movement test.

In Greater Manchester, from the five new TB incidents in 2019, four OTF-W incidents were each disclosed at a check test, radial test, routine herd test and a post movement test. The remaining OTF-S incident was disclosed at a routine herd test.

Reactor numbers

In the period 2014-2019 in Lancashire, there were a total of 395 reactors removed, of which 257 (65%) were skin test reactors and 138 (35%) were identified as infected by the interferon gamma (IFN-γ) blood test. In 2019, there were 17 (94%) skin test reactors and one (6%) IFN-γ test positive animal.

In the same period in Merseyside there were 18 reactors removed of which 13 (72%) were skin test reactors and five (28%) were identified by the IFN-γ test. There were no reactors at all disclosed in 2019.

In Greater Manchester in the period 2014-2019, there were a total of 57 reactors disclosed of which 47 (82%) were skin test reactors and 10 (18%) were identified by the IFN-γ test. In 2019, there were 11 (64%) skin test reactors and six (36%) positives on the IFN-γ test.

Risks to the reporting area

The cluster of OTF-W cases in the south-east of Manchester and on the boundary with Cheshire, share a common genotype 25:a. This cluster is most likely associated with wildlife infection and poses a risk of TB spread into the LRA. The majority of incidents in Lancashire and Merseyside can be attributed to the introduction of undetected TB-infected cattle. Many farms in Merseyside in particular have links to Cheshire, with cattle moving regularly between the two counties.

Risks posed by the reporting area

As the level of TB infection is both very low in Lancashire and Merseyside, the risk to the surrounding areas can be considered to be low. Greater Manchester is more likely to be at risk from disease spreading northwards from the adjoining Edge Area counties than the reverse situation.

Forward look

In order to preserve the low incidence of disease in these three counties, it is vital that farmers purchase cattle carefully, taking into account the prevalence of TB in the area of origin.

Introduction

This report describes the level of bovine tuberculosis in cattle herds in the North West of England (including the counties of Lancashire, Merseyside and Greater Manchester) in 2019. Bovine TB is caused by the bacterium *Mycobacterium bovis* (*M. bovis*), and will subsequently be referred to as TB. This report explores the frequency and geographical distribution of TB in cattle herds. It examines what is likely to be driving TB in the North West of England, and the risks the disease in these counties may pose to neighbouring cattle. Although other sources may refer to TB 'breakdown(s)', this report will use the term 'incident(s)' throughout. This report is intended for individuals involved in the control of TB, both in the local area and nationally. This includes, but is not limited to: farmers, veterinarians, policy makers and the scientific community.

In 2014, the Government published its Strategy to achieve Officially TB Free (OTF) status for England by 2038. A key action was to recognise the different amount of TB in different parts of the country and to vary the approach to control accordingly. To this end, three management areas were established (Appendix 1). The North West of England forms part of the LRA. Overall, the LRA has a very low and stable incidence of infected herds. The current strategy seeks to rapidly control infection when it arises through high sensitivity testing of affected herds and temporarily enhanced local surveillance (radial and hotspot testing). Compulsory pre- and post-movement testing of cattle entering the LRA from higher risk areas of the UK is also performed to reduce the risk of TB introduction. The aim is to preserve the favourable disease status of this county so that it can be declared OTF as soon as possible.

Cattle industry

Approximately 75% of cattle herds in the area contain less than 100 animals, with the smaller herds tending to be beef. The majority of farms are family-run traditional businesses with winter housing and summer grazing. There are several salt marshes located on the west coast of Lancashire that graze limited numbers of cattle during the spring and summer from a number of farms in the locality. Lancashire has predominantly dairy herds accounting for 59% of the total number. Merseyside and Greater Manchester have a higher percentage of beef herds than dairy, accounting for 53% and 61% respectively of their total number of herds (Figure 1).

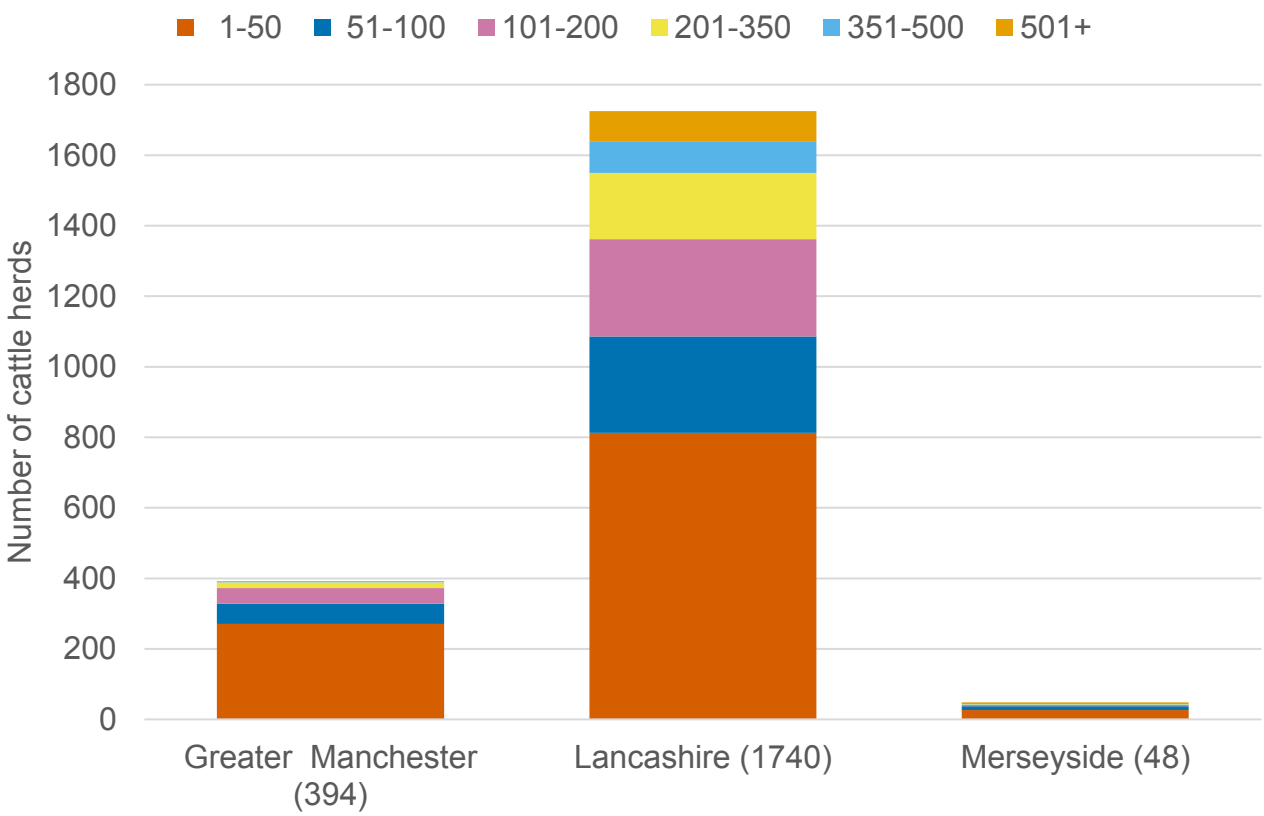

Figure 1: Number of cattle holdings in the North West of England, by herd size and county in 2019.

Markets

There are currently four livestock markets operating in the area, all of which are located in the Northern part of Lancashire. As a result, farmers in Merseyside and Greater Manchester will tend to purchase stock from livestock markets to the south of this area, potentially exposing their herds to a higher risk of TB. There are two collection centres both situated in Lancashire which handle slaughter cattle.

Finishing units

There is one Licensed Finishing Unit (LFU), located in Lancashire.

Descriptive Epidemiology of TB

Temporal TB trends

Unless otherwise specified, this report includes all new TB incidents detected during the reporting period. This includes Officially Tuberculosis Free Status Withdrawn (OTF-W) incidents and Officially Tuberculosis Free Status Suspended (OTF-S) incidents. OTF-W incidents are those in which at least one animal was identified with typical lesions of TB at post mortem (PM), and/or positive for *M. bovis* on culture from tissue samples. OTF-S incidents are those with one or more reactors to the Single Intradermal Comparative Cervical Tuberculin (SICCT) skin test, but without full confirmation of *M. bovis* infection by PM or bacterial culture.

Greater Manchester has had a similar number of new TB incidents disclosed each year (Figure 2). The majority had been attributed to the introduction of undetected TB-infected cattle into the affected herds. However, the incidence of both OTF-S and OTF-W incidents has increased in the Stockport area to the south-east of Manchester in recent years, although it is still very low compared with Cheshire and other parts of the Edge Area. The genotype 25:a of *M. bovis* has been isolated from all these OTF-W incidents, which matches that in the bordering Edge Area of Cheshire.

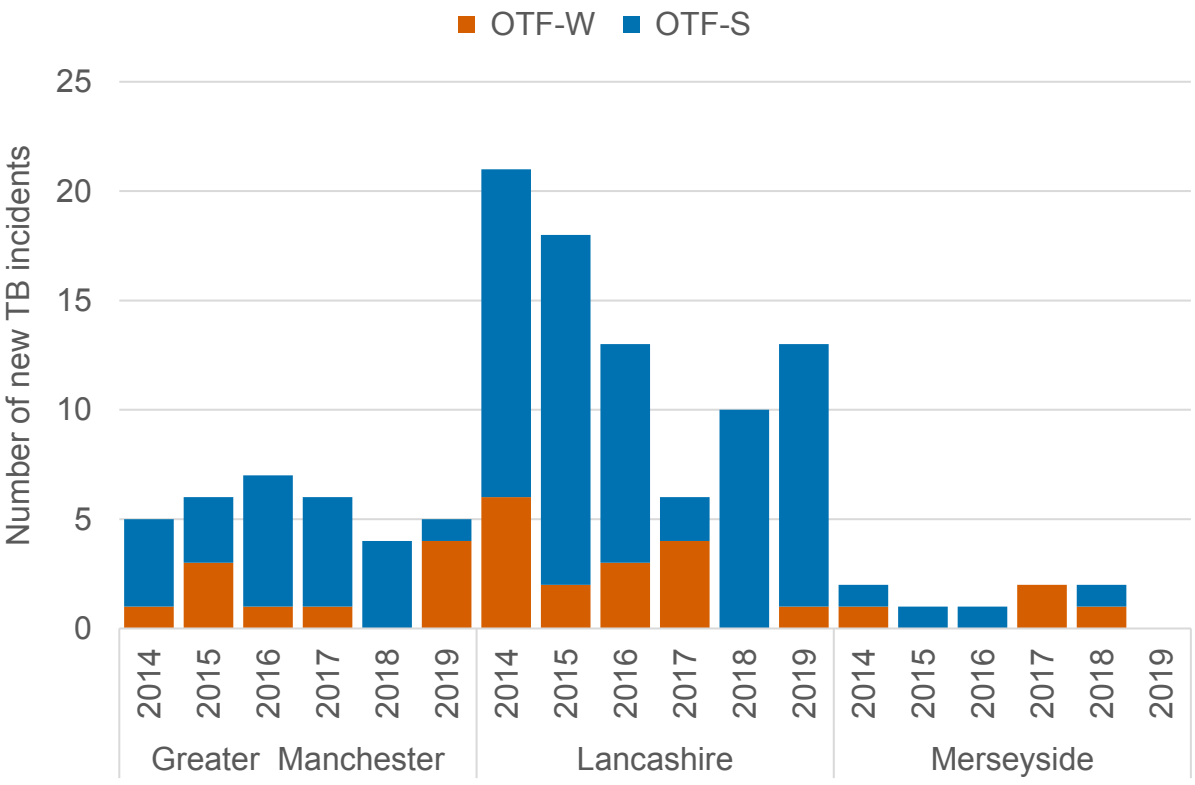

Figure 2: Annual number of new TB incidents the North West of England by county, 2014 to 2019.

The apparent spike in new TB incidents in Lancashire in 2014 can, in the majority of cases, be attributed to movements of undetected infected cattle. This in turn led to an increase in radial testing around these OTF-W farms, which then resulted in a subsequent increase in both OTF-W and OTF-S incidents being disclosed over the subsequent 18 month period. All these farms have since regained OTF status. More recently, the single OTF-W incident in 2019 in Lancashire was again due to introduction of TB-infected cattle.

The incidence of new TB incidents in Merseyside remains at a very low level and can be attributed to the purchase or movement of infected animals from other areas of the country, such as Cheshire.

Geographical distribution of TB incidents

In the reporting area, all but one of the TB incidents in Lancashire and Greater Manchester occurred in the areas of higher animal density (Figure 3). In Lancashire, the vast majority of the 12 OTF-S incidents were due to singleton reactors and the affected herds regained their OTF status within several months. Most of these incidents (seven) were in the east of the county.

The majority of Merseyside has a very low cattle density. The one OTF-S premises shown on the map was a very small beef unit which was surrounded by mostly arable farms and quickly regained its OTF status.

There is an active potential hotspot area (HS27) currently in North Yorkshire which encroaches slightly into East Lancashire. This Hotspot is described in the Yorkshire and Humberside Epidemiological Report. There were four OTF-W radial surveillance zones initiated in 2019 in Greater Manchester and Lancashire which are currently active. One radial zone remains active in Merseyside from an OTF-W incident in 2018 and one remains active in Lancashire (Figure 4).

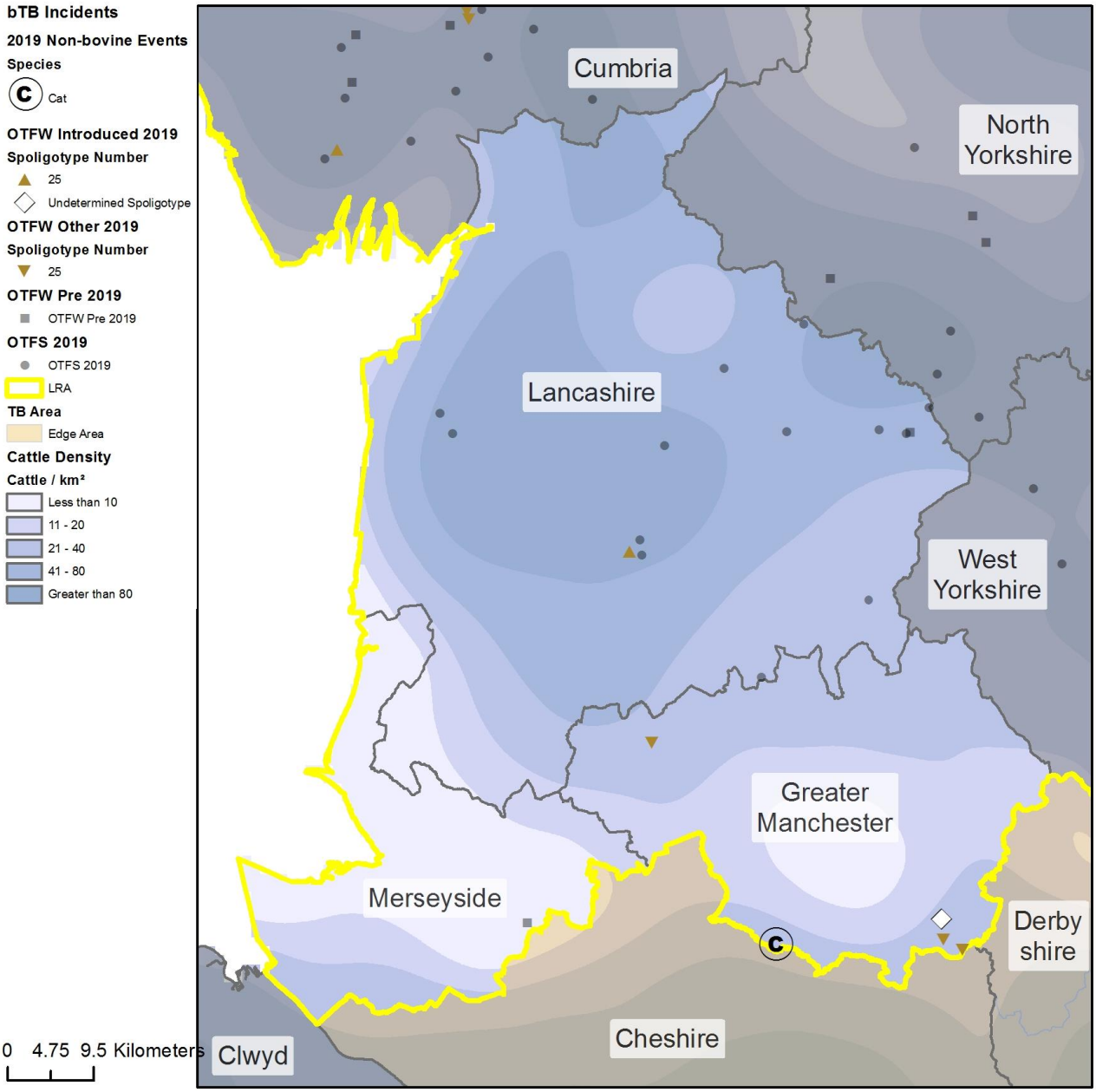

Figure 3: Location of cattle holdings in the North West of England with new TB incidents (OTF-W and OTF-S) in 2019, and cattle holdings with pre-2019 OTF-W incidents still ongoing at the end of 2019, overlaid on a cattle density map.

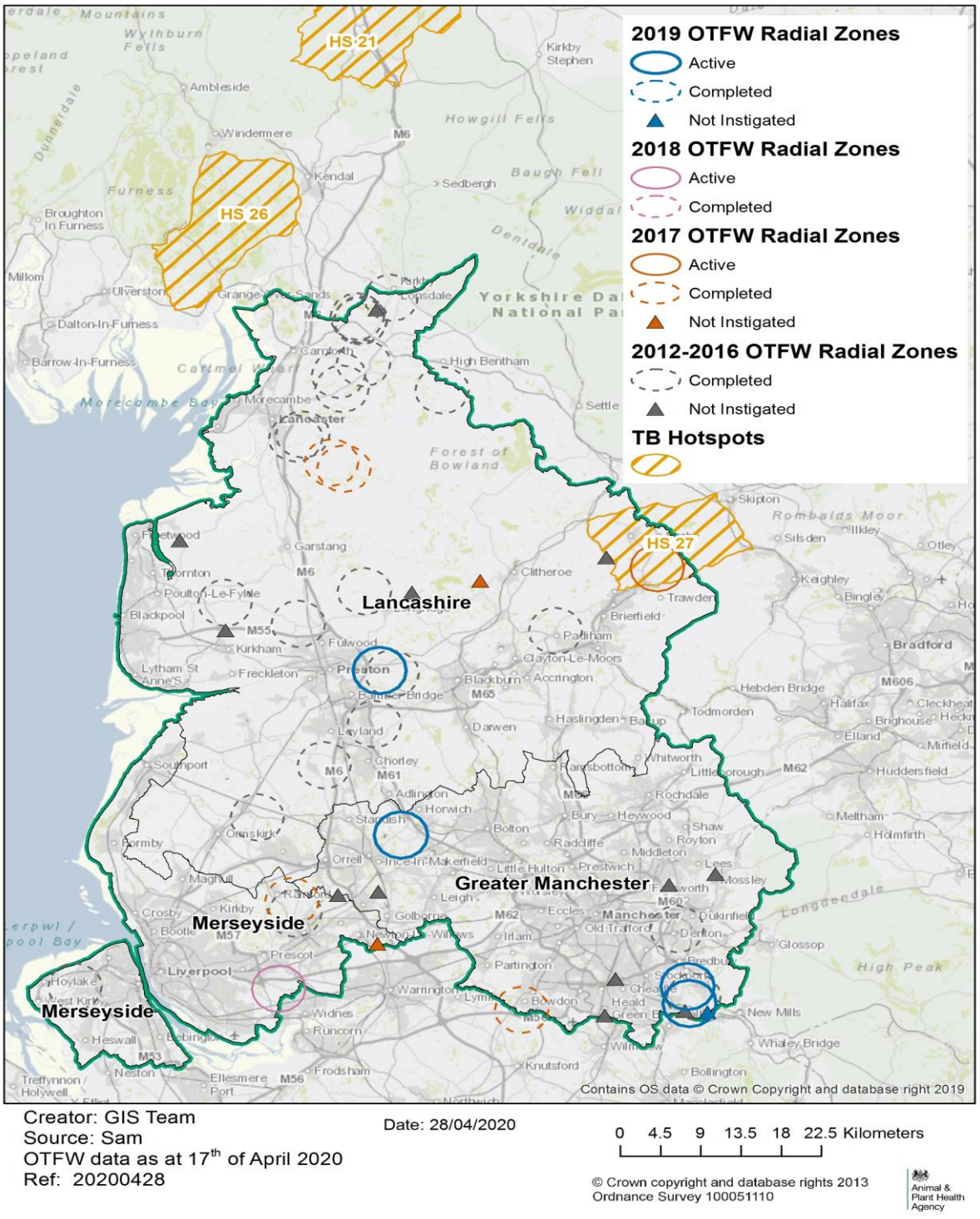

Figure 4: Potential hotspot areas and OTF-W radial surveillance zones that were active, completed or not instigated in the North West of England during 2019, by year of initiation.

Other characteristics of TB incidents

Duration of incidents

As shown in Figure 5, most incident farms regain their OTF status relatively quickly in this area, usually within five months of disclosure of the first positive animal(s). When radial testing is instigated around an OTF-W incident, the impact of TB will be felt financially by the surrounding neighbours as they may be required to undertake additional (pre-movement) testing at their own expense as well as receiving lower prices for their stock for the duration of their radial testing regime until they revert back to routine herd testing every 48 months. In an area such as south-east of Manchester, it is not uncommon for a farm to finish one radial testing regime and then to initiate another one in close succession.

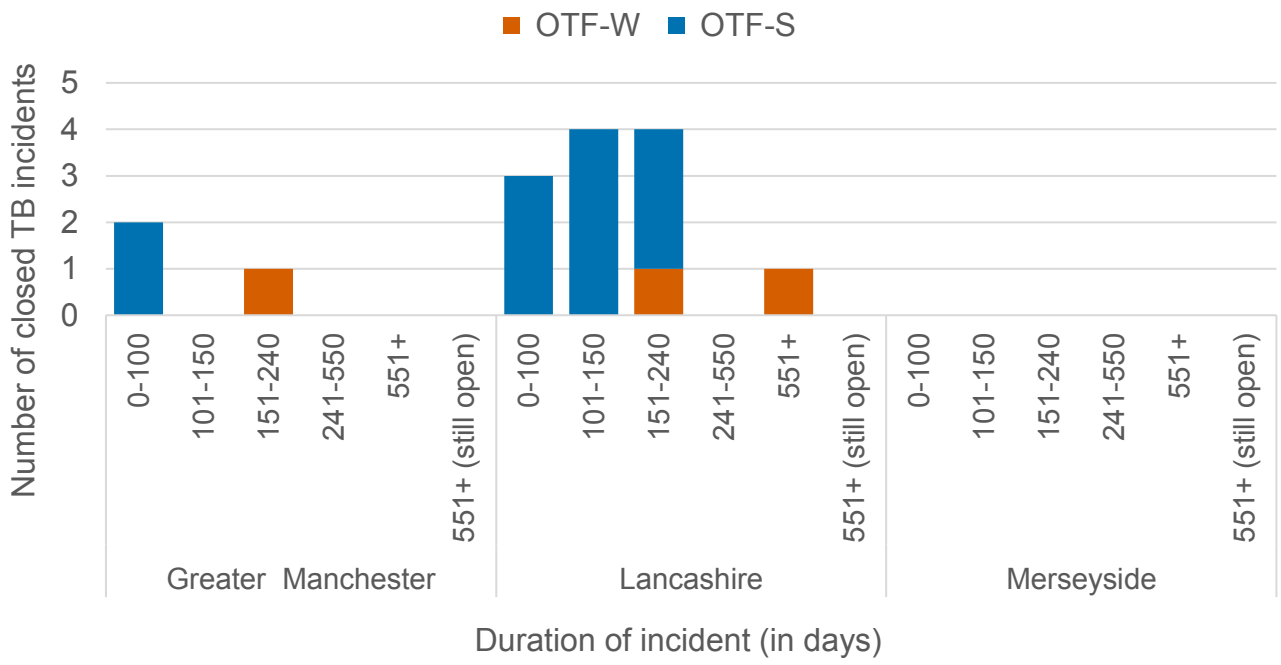

Figure 5: Duration of all TB incidents (OTF-W and OTF-S) that ended in 2019, and the number of persistent TB incidents (551+ days) that were unresolved at the end of 2019 in the North West of England. There are no data displayed for Merseyside as no incidents ended in 2019 and ongoing incidents are less than 551 days. Note that Licensed Finishing Units (LFUs) have been excluded.

Genotypes of *M. bovis* isolated

In 2019, the only TB genotype identified was 25:a (Figure 6).

In Greater Manchester, the finding of three 25:a genotypes of *M. bovis* is likely to have been caused by lateral spread from the bordering Edge Area of Cheshire in two of the incidents, whilst the third incident's origin is undetermined at present. However, this third premises, although located some distance away from the Cheshire Border, also has abundant wildlife in the vicinity, which can come into direct contact with the cattle so cannot be discounted as a possible source of infection. In the fourth OTF-W case, the genotype was not determined.

In Lancashire, the single OTF-W premises was confirmed in a purchased animal in a dealer's herd who had frequently sourced cattle outside of the LRA.

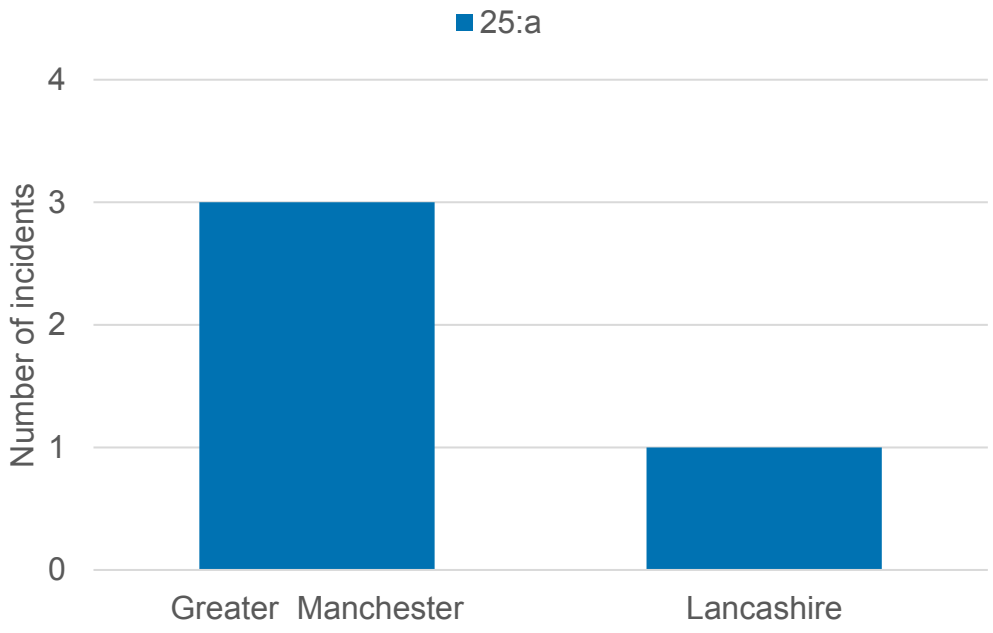

Figure 6: Genotypes of *M. bovis* identified in OTF-W incidents in the North West of England in 2019, by county. Note that Merseyside is not represented as there were no incidents reported in this county in 2019.

Suspected sources, risk pathways and key drivers for TB infection

The key drivers of the TB incidents detected within the reporting area were as follows:

- Purchase/movement of undetected TB-infected cattle from outside the LRA
- Risk of lateral spread from the Edge Area of Cheshire into Greater Manchester
- Use of livestock markets sourcing cattle from the HRA and Edge Area

It can be challenging to retrospectively establish the route of infection for a TB incident herd. The Animal and Plant Health Agency (APHA) aims to complete an epidemiological assessment for all TB incidents in the LRA (both OTF-W and OTF-S). This includes a thorough on-farm investigation and scrutiny of routinely collected data; such as cattle movement records, and the results of molecular analyses where available.

During the assessment up to three risk pathways of infection are selected for each herd. Each risk pathway is given a score that reflects the likelihood of that pathway bringing TB into the herd. The score assigned has been updated this year to reflect developing understanding of how likelihood is being assessed in practice. It is recorded as either definite (score 8), most likely (score 6), likely (score 4) or possible (score 1). The source(s) for each incident are weighted by the certainty ascribed. Any combination of definite, most likely, likely or possible can contribute towards the overall picture for possible routes of introduction in to a herd. If the

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

The weight of infection outputs in Appendix 4 are produced by combining the data from multiple herds and providing the proportion of pathways in which each source was identified, weighted by certainty that each source caused the introduction of TB. The outputs do not show the proportion of herds where each pathway was identified (this is skewed by the certainty calculation). Genotyping of *M. bovis* isolates can be a powerful tool in identifying a likely source of infection, however genotypes are not determined for OTF-S herds. The inclusion of OTF-S herds in these calculations increase the uncertainty in the outputs. As a result, the relative proportions of each risk pathway is very approximate and only broad generalisations should be made from these data. A more detailed description of this methodology is provided in the Explanatory Supplement to the 2019 bovine TB epidemiology report for England (https://www.gov.uk/government/publications/bovine-tb-epidemiology-and-surveillance-in-great-britain-2019).

As shown in Figure 7, in central Lancashire the OTF-W incident has been attributed to purchased animals, as was the OTF-S case which was triggered by a test reactor directly purchased from a farm in Cumbria that later had confirmed TB infection.

Three OTF-S incidents in East Lancashire were situated close to the active potential hotspot area in North Yorkshire. These premises have all since regained their OTF status, but the situation will be monitored closely in order to identify any possible spread of disease.

The area to the south-east of Manchester is at risk of lateral spread of TB from the Edge Area of Cheshire and Derbyshire. Wildlife in this area is abundant and pilot studies of road killed badgers undertaken in recent years, have confirmed *M. bovis* infection in badgers. In addition, this was further identified to be genotype 25:a, which is the same genotype which is currently seen infecting the cattle herds in this area.

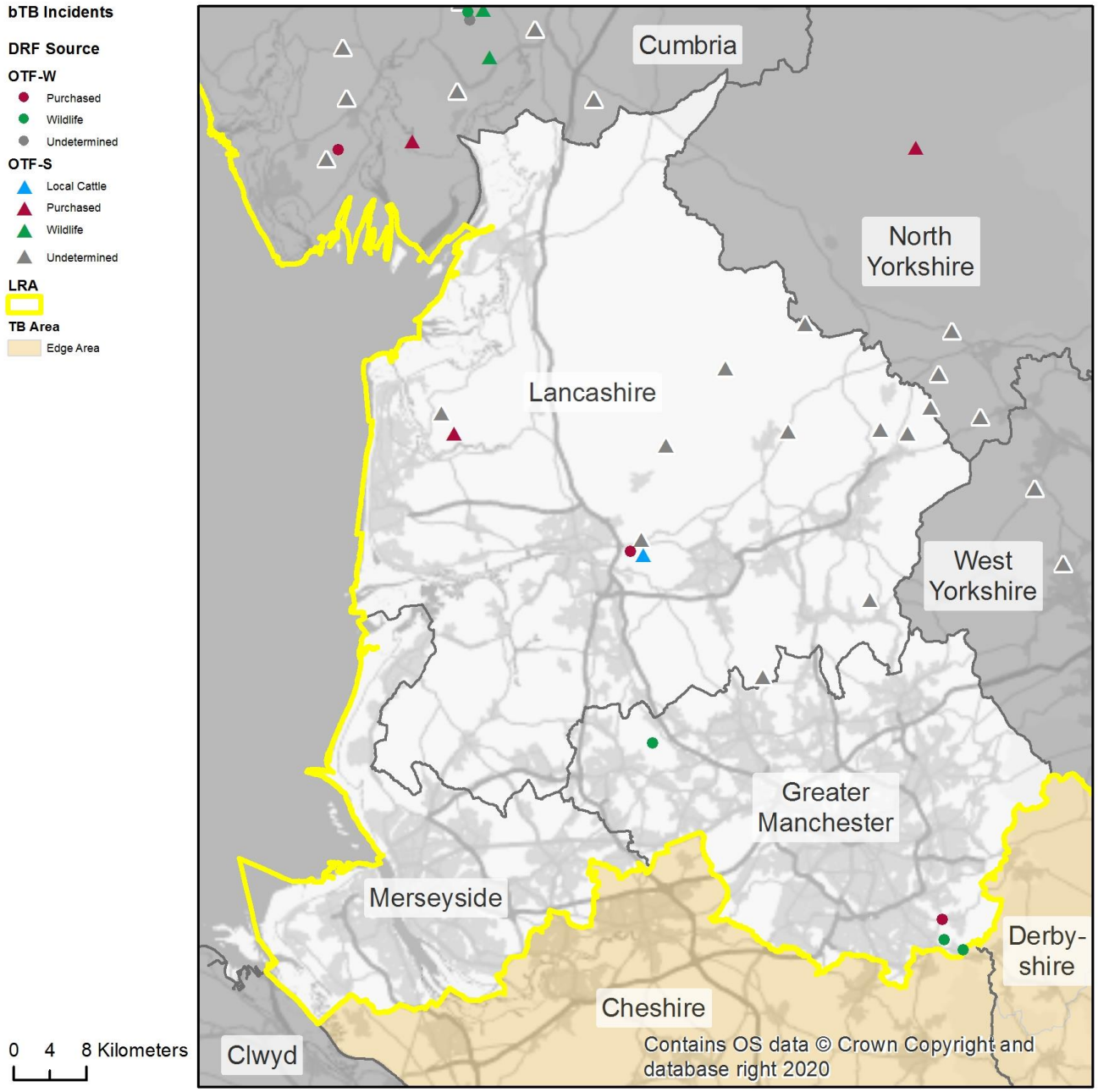

Figure 7: Map of the source of infection pathway recorded with the highest level of certainty for all TB incidents (OTF-W and OTF-S) in the North West of England, which started in 2019.

TB in other species

M. bovis infection was confirmed in a domestic cat in Greater Manchester in 2019. The origin of the infection is undetermined at present, as the particular genotype of the bacterium isolated from the cat's tissues (10:a) has not been identified in the reporting area before and its homerange is in East Gloucestershire, Warwickshire, Berkshire and Oxfordshire. This case was one of a nationwide cluster of genetically related isolates of *M. bovis* found in cats in 2019.

Detection of incidents

In Greater Manchester, of the five new TB incidents in 2019, four OTF-W incidents were each disclosed at a check test, radial test, routine herd test and a post movement test (Figure 8). As two of the OTF-W incidents are considered to be due to TB spread from the bordering Edge Area of Cheshire, more incidents in this area may be expected. The remaining OTF-S incident was disclosed at a routine herd test.

In Lancashire from the 13 new TB incidents in 2019, the single OTF-W incident was disclosed by slaughterhouse surveillance in a beef finishing herd and the index slaughterhouse case was a purchased animal originating from the LRA. However, a number of other animals in this herd had been purchased previously from the Edge Area and HRA and it is probable that the infection originated undetected from one of these animals.

Out of the remaining 12 OTF-S incidents in Lancashire, four were disclosed at routine herd tests, three were disclosed during radial testing, two each from post movement testing and trace testing of animals from OTF-W herds and one from a pre-movement test. All these herds have since regained their OTF status indicating that to date, there has been no apparent spread of TB infection within these herds. However, ongoing post incident testing over the next 12 months will confirm if this continues to be the case.

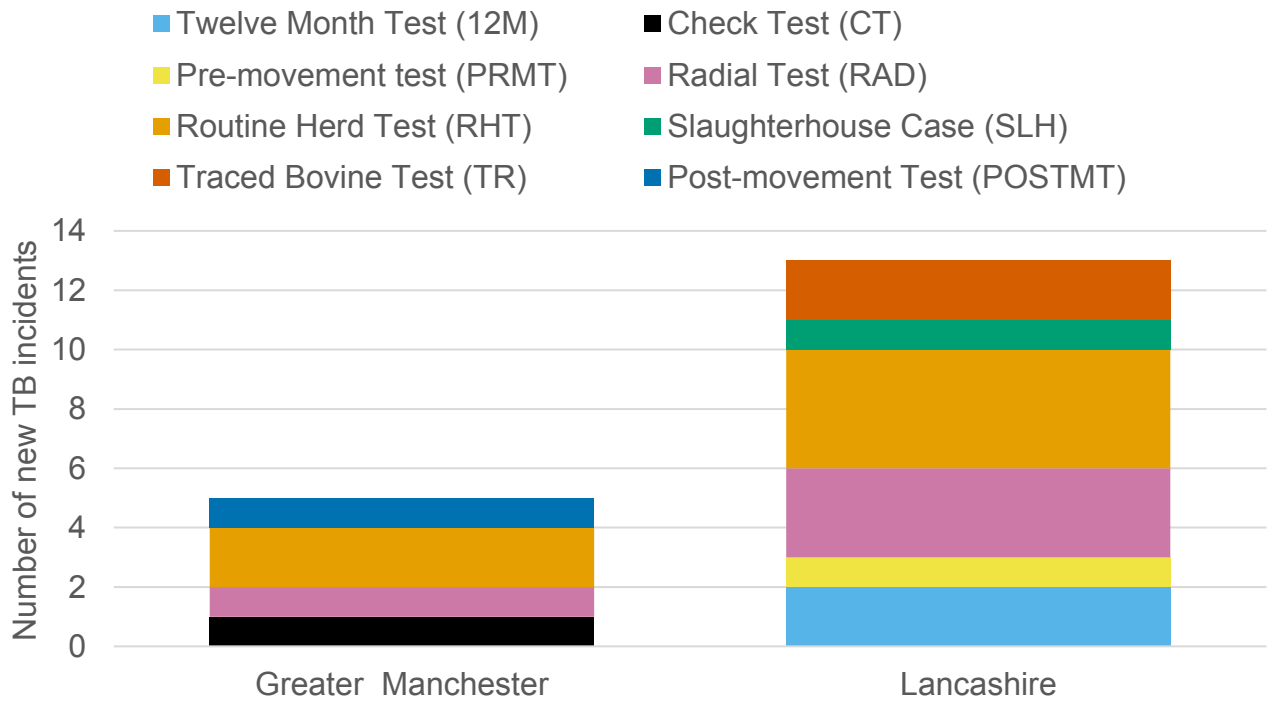

Figure 8: Number of TB incidents (OTF-W and OTF-S) in 2019, disclosed by different surveillance methods in each county. Note that Merseyside is not represented as there were no incidents reported in this county in 2019.

Skin test reactors and interferon gamma test positive animals removed

The impact of TB infection at the animal level in Greater Manchester has remained low and stable during the last six years from 2014 until 2019 (Figure 9). However, there does appear to be an increase in incidents associated with farms that lie close to the boundary of the Edge Area of Cheshire to the south-east of the county. There is known infection in the wildlife in this area and the spread of infection is likely to be from this source to the cattle in the affected farms. Most farms in this area are small family-run premises and are unable or unwilling to instigate more biosecurity measures to prevent exposure of their herds to wildlife reservoirs of TB, either directly or indirectly. Reactor numbers remain low probably due to the small size of many of the affected farms.

In Lancashire in 2014, two herds accounted for the majority of the test reactors removed. One herd had 156 reactors disclosed during the course of the incident and the other had 36 reactors disclosed. Both these herds subsequently regained OTF status within the year and have remained OTF since. The radial testing regime instigated around just these two farms necessitated a further 201 other cattle premises undertaking additional testing as required over the subsequent 18 months. This radial testing is funded by the government with any additional testing (e.g. bespoke pre-movement tests) funded by the farmer.

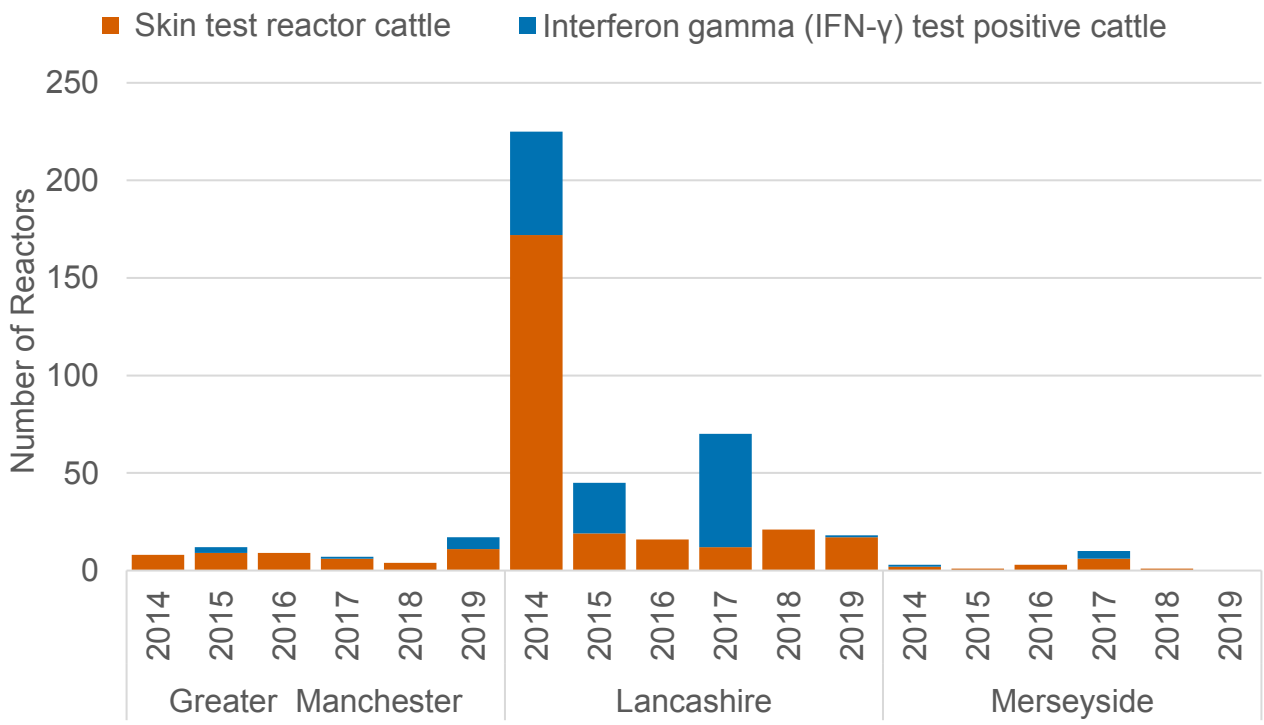

Figure 9: Number of skin test reactors and interferon gamma (IFN-γ) test positive cattle removed by APHA for TB control reasons, in the North West of England, 2014 to 2019.

In 2017 in Lancashire, a single, very large dairy herd accounted for the majority of reactors disclosed that year. Of the 43 reactors in that herd, 90% were IFN-γ test positive animals with no lesions suggestive of TB seen at slaughter. Due to the size of the herd, this number of reactors represented only 1.4% of the herd. This herd regained its OTF status seven months after the incident started and has also remained OTF to date. Following a veterinary risk assessment, permission was given not to instigate a radial testing regime around this herd due to there being no perceived risk of outward spread of infection.

Summary of risks to the North West of England

The incidence of TB infection in Lancashire is low and stable. Recent incidents in this county have in the main been attributed to the introduction of undetected infected animals. The radial testing regime that has been instigated around these OTF-W farms has not demonstrated (to date) any spread of infection to neighbouring premises. Towards the Fylde coast in the west, the high water table and the flat non-forested land does not lend itself to a high population of potential wildlife reservoirs of TB (badgers and wild deer).

In Merseyside, where there is a very small number of cattle farms, few incidents have been reported in recent years. Of those, again the majority were due to purchased or moved animals, in particular, from Cheshire. It is common for cattle to be housed over the winter in Merseyside and move to Cheshire for the grazing period where pasture is more abundant before returning to Merseyside in the autumn. The majority of farms in Merseyside are arable, growing potatoes and root vegetables for example and often surround a cattle unit which greatly reduces the risk of cattle to cattle infection between premises.

Livestock farms in Merseyside and in the south of Greater Manchester often purchase stock from markets outside the LRA, traveling southwards to Shropshire for example, rather than attending the markets in Lancashire. This appears to be for their own convenience as well as perceived price difference of the stock on sale.

Greater Manchester borders the Edge Area counties of Derbyshire to the south-east, and of Cheshire to the south-west. Studies of road killed badgers since 2014 collected from the south eastern area around Stockport into Cheshire, demonstrated that a significant proportion of them were infected with TB. There is the potential for transmission of infection from badgers to any cattle herds that they may come into contact with, either through contact at grazing or indirectly, for example, by accessing a cattle feed store.

The city of Manchester, extensive motorway network and the Manchester ship canal form an effective barrier to any wildlife-driven spread of TB infection from this area further north and west into Lancashire.

In summary, the greatest risks to this part of the LRA are from cattle movements from higher TB risk areas of the country and from wildlife spread along the Cheshire and Derbyshire borders into Greater Manchester.

Summary of risks from the North West of England to surrounding areas

As the level of TB infection is both very low in Lancashire and Merseyside, the risk that they pose to the surrounding areas can be considered to be low.

As mentioned previously, motorway networks and the heavily populated city of Manchester act as an effective barrier to the spread of infection from these two counties.

Greater Manchester is more likely to be at risk from disease spreading northwards from the adjoining Edge Area counties of Cheshire and Derbyshire than the reverse situation.

Assessment of effectiveness of controls and forward look

Historically, the number of TB incidents is very low in Lancashire and Merseyside. The source of infection in recent incidents has been identified, in the majority of cases, as being caused by the purchase or movement of cattle and the farming community must be encouraged to source their stock responsibly both for their own benefit and that of their farming neighbours to prevent jeopardising this current situation

The introduction of compulsory post-movement testing of cattle moving into the LRA from higher risk areas of Great Britain has been an important factor in encouraging locally sourced cattle, as the costs of this testing are borne by the farmer. It additionally serves as an obvious indication of the potential origin risk.

There is a high likelihood that these two counties will achieve OTF status.

Greater Manchester too has historically a very low level of TB. As mentioned previously, the south-east area around Stockport and Manchester Airport is an area of concern due to its proximity to the Cheshire Edge Area. This may affect the likelihood of achieving OTF status for Greater Manchester if the situation deteriorates here.

The importance of implementing farm biosecurity measures to prevent transmission of TB between farming neighbours and preventing contact with wildlife reservoirs of *M. bovis* cannot be overstated. These measures need not be prohibitively expensive to be effective e.g. the raising of feed and water troughs off the ground, ensuring cattle feed store doors are kept shut and the fencing off of known badger sets and latrines. This is especially of value where it is known that there is infected wildlife in the vicinity.

Appendices

Appendix 1: overview of risk and surveillance areas of England and Low Risk Area objectives and controls

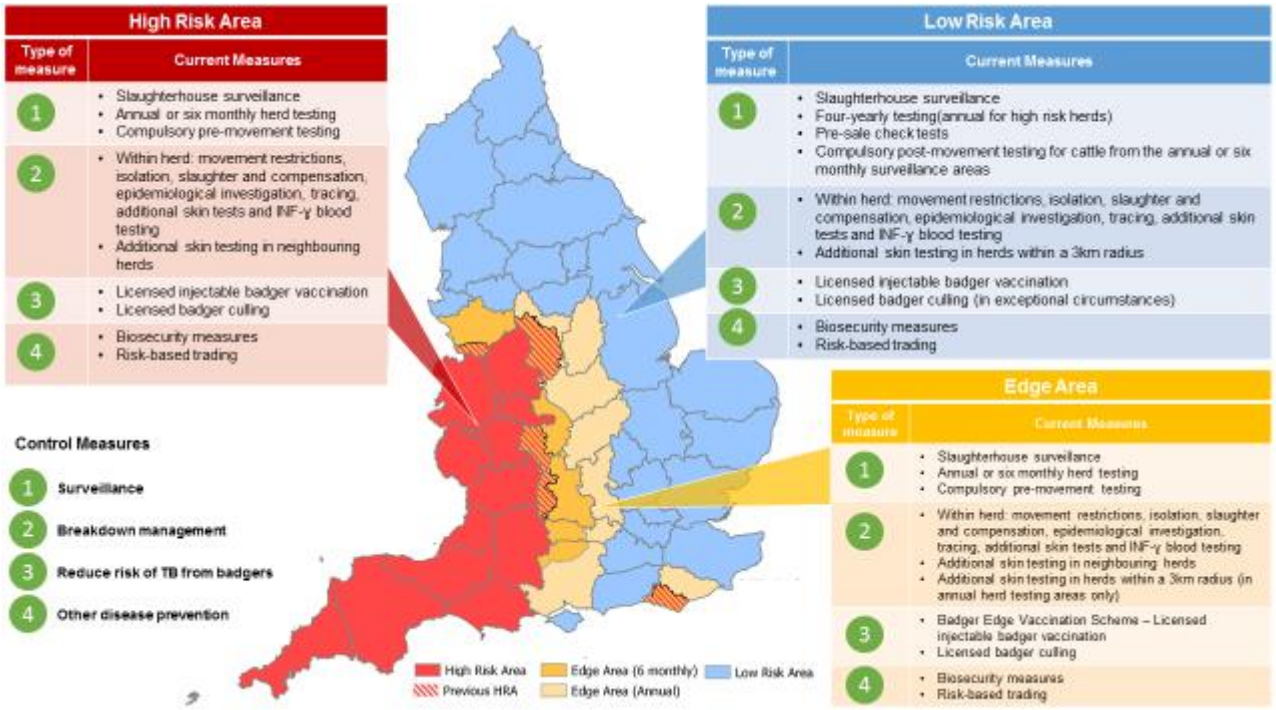

Figure A1: TB risk and surveillance areas of England effective since January 2018, as set out in the Government's Strategy for Achieving Officially Tuberculosis-Free Status for England. Map based on information published on www.tbhub.co.uk.

Policy objectives for the Low Risk Area

Progressive attainment of OTF status for individual counties (or groups of counties) within the current LRA, with the declaration of OTF status for all LRA counties by 2025. For more information about the government's strategy for achieving Officially Bovine Tuberculosis Free status for England, published in 2014 and independently reviewed in 2018, see:

https://www.gov.uk/government/publications/a-strategy-for-achieving-officially-bovine-tuberculosis-free-status-for-england

https://www.gov.uk/government/news/government-sets-out-next-phase-of-strategy-to-combat-bovine-tuberculosis

Key control measures in the Low Risk Area

Surveillance:

- default four-yearly routine surveillance (skin) testing of cattle herds, with annual testing for a small proportion of high risk herds
- voluntary pre-sale skin check tests
- compulsory pre and post-movement testing for cattle entering farms in the LRA (to live) from the annual or six monthly surveillance areas of England and Wales
- additional targeted surveillance (radial testing) of cattle herds located within a 3km radius of new incident herds with OTF status withdrawn (OTF-W) following the detection of lesion-positive test reactors and/or culture-positive animals
- slaughterhouse (SLH) surveillance (through PM meat inspection) of all cattle slaughtered for human consumption

Management of incidents:

- herd movement restrictions, isolation and rapid slaughter of TB test reactors and any direct contacts with statutory compensation payments to farmers, epidemiological investigation, tracing tests (at severe interpretation), and short interval skin testing supplemented in all herds affected by OTF-W incidents with mandatory interferon gamma (IFN-γ) blood testing

TB controls in the wildlife reservoir (badgers):

- licensed injectable badger vaccination
- licensed badger culling in exceptional circumstances, where *M. bovis* infection has been confirmed in badgers and it has a clear epidemiologically link with a local cluster of TB in cattle (e.g. East Cumbria TB hotspot)

Other measures:

- biosecurity measures
- promotion of responsible sourcing of cattle (e.g. through the use of the ibTB online (www.ibtb.co.uk) mapping application)

Summary of enhanced TB control measures in the North West of England

Surveillance

- default four yearly routine surveillance testing of herds, with annual testing for a small proportion of high risk herds
- voluntary pre-sale skin check tests
- compulsory pre and post-movement testing for cattle entering farms in the LRA (to live) from the annual or six monthly surveillance areas of England and Wales
- additional targeted surveillance (radial testing) of cattle herds located within a 3km radius of new OTF-W incidents
- slaughterhouse (SLH) surveillance (through PM meat inspection) of all cattle slaughtered for human consumption

Management of cases (‘incidents’):

- herd movement restrictions, isolation, slaughter and compensation, epidemiological investigation, tracing tests (at severe interpretation), and short interval skin testing supplemented by mandatory IFN-γ blood testing in all herds affected by OTF-W incidents

Other measures:

- biosecurity measures
- risk-based trading

Regular regional meetings have been held with farmers and Official Veterinarians (OVs). These have been well attended by the local farming community. In addition to discussing the local disease picture, speakers from the scientific and farming community have been invited to give presentations.

Liaison meetings have also taken place with National Farmers Union (NFU) representatives and local APHA veterinary staff.

Appendix 2: cattle industry in the North West of England

Table A2.1: Number of cattle premises by size band in each county at 1 January 2019. (RADAR data)

Size of Herds	Un*	1-50	51-100	101-200	201-350	351-500	501 +	Total Number of Herds	Mean Herd Size	Median Herd Size
Number of Herds in Lancashire	15	813	273	276	188	90	85	1740	129	56
Number of Herds in Merseyside	0	26	11	4	2	1	4	48	107	50
Number of Herds in Greater Manchester	2	271	57	44	17	2	1	394	54	25

*The number of herds with an undetermined size.

Table A2.2: Number of animals by breed purpose in each county at 1 January 2019.

Breed Purpose	Beef	Dairy	Dual purpose	Unknown	Total
Number of Cattle in Lancashire	77,894 (34%)	134,313 (59%)	12,581 (5%)	5 (<0.01%)	224,793
Number of Cattle in Merseyside	2746 (53%)	2245 (43%)	129 (2%)	0	5120
Number of Cattle in Greater Manchester	13,186 (61%)	7611 (35%)	478 (2%)	18 (<0.01%)	21,293

Appendix 3: summary of headline cattle TB statistics

Table A3.1: Herd-level summary statistics for TB in cattle in 2019.

Herd-level statistics	Lancashire	Merseyside	Greater Manchester
(a) Total number of cattle herds live on Sam at the end of the reporting period	2075	71	487
(b) Total number of cattle herds subject to annual TB testing (or more frequent) at the end of the reporting period (any reason)	167	10	52
(c) Total number of whole herd skin tests carried out at any time in the period	597	18	155
(d) Total number of OTF cattle herds having TB whole herd tests during the period for any reason	546	18	136
(e) Total number of OTF cattle herds at the end of the report period (i.e. herds not under any type of TB2 restrictions)	2051	71	469
(f) Total number of cattle herds that were not under restrictions due to an ongoing TB incident at the end of the report period.	2071	71	484
(g) Total number of new TB incidents detected in cattle herds during the report period	13	0	5
OTF status suspended (OTF-S)	12	0	1
OTF status withdrawn (OTF-W)	1	0	4
(h) Of the new OTF-W herd incidents, how many:			
• could be considered secondary to a primary incident based on current evidence?	1	0	1
• were triggered by skin test reactors or 2xIRs at routine herd tests?	0	0	1

Herd-level statistics	Lancashire	Merseyside	Greater Manchester
• were triggered by skin test reactors or 2xIRs at other TB test types (forward and back-tracings, contiguous, check tests, post-movement, etc.)?	0	0	2
• were first detected through routine slaughterhouse TB surveillance?	1	0	0
(i) Number of new incidents revealed by enhanced TB surveillance (radial testing) conducted around those OTF-W herds			
• OTF-S	3	0	0
• OTF-W	0	0	1
(j) Number of OTF-W herds still open at the end of the period (including any ongoing OTF-W incidents that began in a previous reporting period)	0	0	3
(k) New confirmed (positive *M. bovis* culture) incidents in non-bovine species detected during the report period (indicate host species involved)	0	0	1 (Cat)

Table A3.2: Animal-level summary statistics for TB in cattle in 2019.

Animal-level statistics (cattle)	Lancashire	Merseyside	Greater Manchester
(a) Total number of cattle tested in the period (animal tests, blood and skin)	82,854	2,624	10,913
(b) Reactors detected in tests during the year:			
• tuberculin skin test	17	0	11
• additional IFN-γ blood test reactors (skin-test negative or IR animals)	1	0	6
(c) Reactors detected during year per incidents disclosed during year	1.38	0.00	3.40
(d) Reactors per 1000 animal tests	0.22	0.00	1.56
(e) Additional animals identified for slaughter for TB control reasons (DCs, including any first-time IRs)			
• DCs, including any first-time IRs	0	0	0
• Private slaughters	0	0	1
(f) SLH cases (tuberculous carcases) reported by the Food Standards Agency (FSA) during routine meat inspection	3	0	0
(g) SLH cases confirmed by culture of *M. bovis*	1	0	0

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

Table A4.1: Suspected sources of *M. bovis* infection for all of the new OTF-W and OTF-S incidents identified in the North West LRA counties covered in this report, in 2019.

Source of infection	Possible (1)	Likely (4)	Most likely (6)	Definite (8)	Weighted contribution
Badgers	2	1		1	14.4%
Cattle Movements	5	1	1	2	21.2%
Contiguous	2	1			5.9%
Residual Infection					0.0%
Domestic Animals					0.0%
Non-specific Reactor	1				1.0%
Fomites	1				1.0%
Other Wildlife	2				5.9%
Other or Unknown Source		1			50.7%

Please note that each TB incident could have up to three potential pathways so totals may not equate to the number of actual incidents that have occurred. Details of the methodology used to calculate the weighted contribution of the different suspected sources of *M. bovis* infection for all new incidents can be found in the main body of the report and in the Explanatory Supplement for England 2019 (https://www.gov.uk/government/publications/bovine-tb-epidemiology-and-surveillance-in-great-britain-2019).

Appendix 5: assessment of the origin of (and potential for spread of infection from) all of the new OTF-W incidents identified in the report period

A risk matrix was used to identify isolated incidents that were likely to have been introduced to the LRA by cattle movements, while not causing any onward local spread. The following two questions were considered for each incident, and a score attributed. TB incidents with a score of 1A, 1B or 2A may be removed from the county TB incidence calculations during an application for OTF status (but remain in the incidence calculations in this report).

What is the probability of *M. bovis* infection being introduced to the LRA via infected cattle movements?

1. Definite - for example, traced reactors found in the LRA OTF-W incident herd in question as a result of spread tracings from another TB incident herd, genotype/WGS linked.

2. Likely - for example, a Reactor or IR originated from a previous incident herd (and the genotype does not suggest otherwise), other cattle were moved into the herd from previous incident herd (but were subsequently slaughtered without testing), or the trading practice of herd provides likely evidence (purchasing large numbers of cattle from High Risk Area (HRA), or Edge Area, High and Intermediate TB areas of Wales, or from the island of Ireland).

3. Possible - not a closed herd, but cattle are purchased from the LRA, Scotland and/or EU Member States.

4. Not likely - indigenous infection is known in the locality, closed herd, genotype/WGS has been identified in local wildlife.

What is the probability of this being an isolated, sporadic ('one-off') incident, without secondary local spread from the index case?

A. Likely - no secondary incidents have been detected. There are **no** further incidents as a result of spread tracings anywhere and **no** genotype/WGS linked OTF-W incidents within 3km radial zone around the LRA OTF-W incident herd in question (or the 3km radial surveillance zone was not triggered).

B. Possible - no secondary incidents have been detected, but the dataset is incomplete. For example, incidents have occurred in the 3km radial zone, but only OTF-S ones, or, if OTF-W, they were of an unknown/different genotype.

C. Not likely - secondary spread from the index case, or exposure to a common wildlife source has occurred. For example, OTF-W incidents have occurred in the 3km zone linked by genotype or WGS, or there is known wildlife infection in the area with this genotype/close WGS.

Table A5.1: Risk matrix of the veterinary assessment of the origin of, and potential for spread of infection from, all the new OTF-W incidents identified in 2019.

	Probability of isolated, sporadic ('one-off') incident, without secondary local spread from the index case (A, B, C)		
Probability of *M. bovis* infection introduced through cattle movements (1, 2, 3, 4)	A. Likely	B. Possible	C. Not likely
1. Definite			
2. Likely	2		
3. Possible			
4. Not likely			3

Appendix 6: herd incidence of TB in England

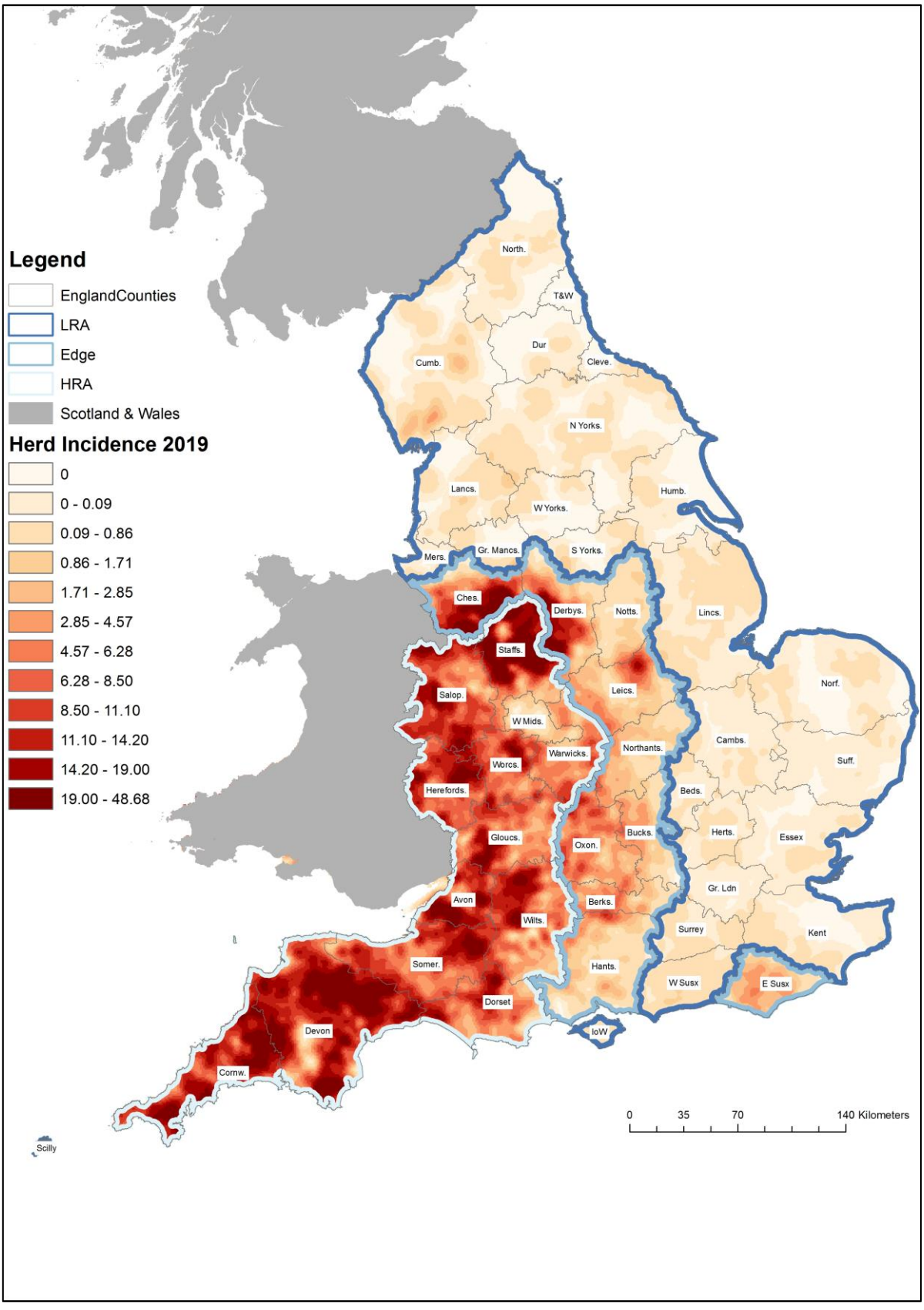

Figure A6.1: Herd incidence of TB in 2019 (incidents per 100 Herd Years at Risk), represented as a spatial kernel of the 100 closest herds per km^2.

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