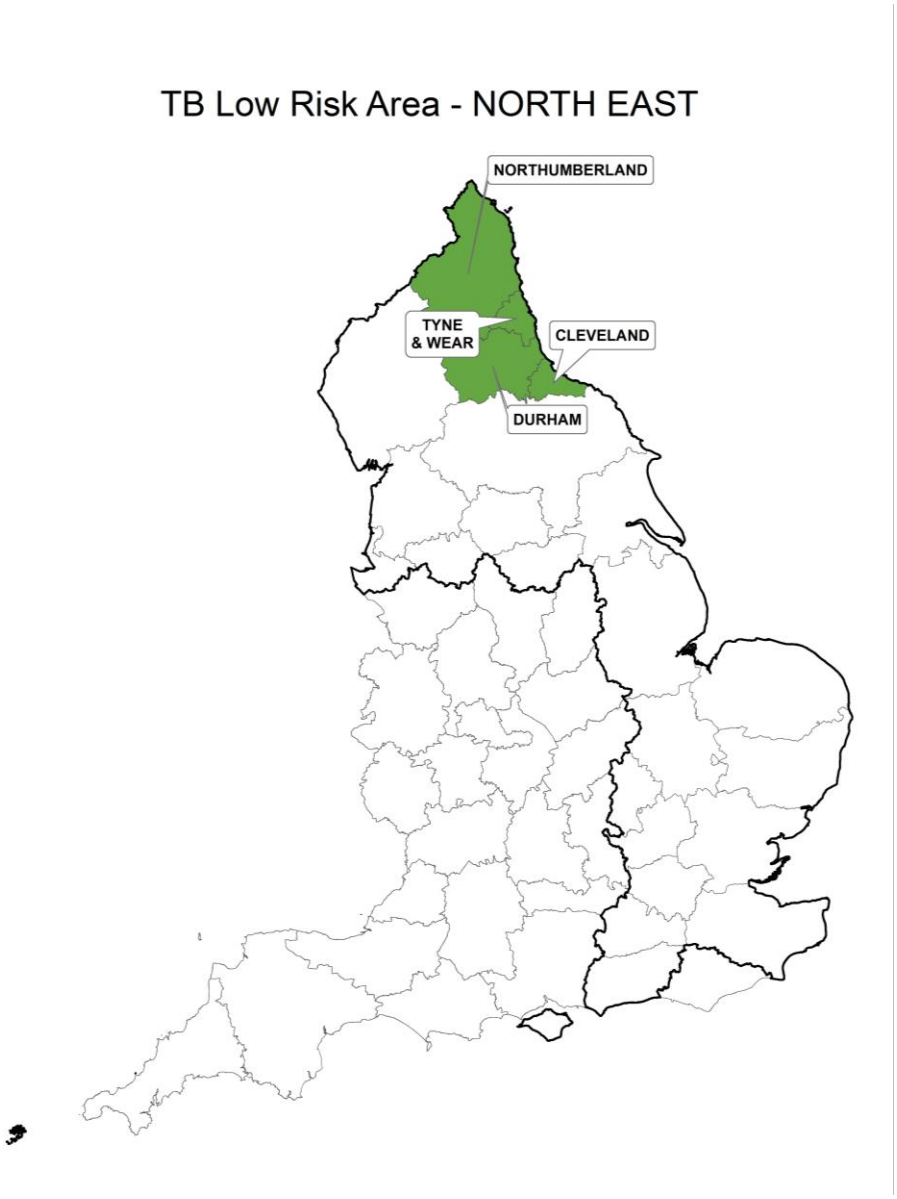
Animal & Plant Health Agency

Year-end descriptive epidemiology report:

Bovine TB in the Low Risk Area of England

County coverage: North East of England (including Northumberland, Durham, Cleveland and Tyne & Wear)

Year-end report for: 2019



TR397 (Rev. 03/20)

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Executive summary

Reporting area

The North East of England (including the counties of Northumberland, Durham, Cleveland and Tyne & Wear) 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 East of England.

Local cattle industry

The North East of England has over 240,000 cattle in approximately 2,000 registered herds, of which 85% are beef production, mainly suckler breeding herds plus fattening units. Over 90% of the cattle in this region are in Northumberland and County Durham.

Local movement of breeding/fattening animals is important, but there are also large numbers of fattening animals bought in from the west of England and Wales. A relatively small number of breeding cattle are brought in from Scotland, Northern Ireland and the Republic of Ireland. Outward trade in cattle of all classes to Scotland is important, particularly slaughter and fattening animals.

New incidents of TB

Northumberland reported six new incidents in 2019, one OTF-W incident and five OTF-S. This is an apparent increasing trend from three OTF-S incidents reported in 2018 and two OTF-S incidents in 2017. Durham reported no incidents in 2019, compared with one OTF-S incident in 2018 and three incidents, two OTF-W and one OTF-S, in 2017. Cleveland has had no incidents since 2017, when one OTF-S incident was recorded. Tyne & Wear has reported no incidents since the 1990s.

Potential or confirmed TB hotspot areas

There were no active TB hotspot areas in any of the counties in the North East of England in 2019.

Unusual TB incidents

There are no unusual TB incidents reported in 2019.

Suspected sources and risk pathways for TB infection

The only OTF-W case detected in the region in 2019 was attributed to purchase of infected cattle from the High Risk Area (HRA) or the Edge Area of England. No clear source of infection could be identified for three OTF-S incidents, which were classified as undetermined origin. The other two OTF-S incidents were attributed to cattle movements. 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

The majority of the incidents in 2019 were detected by enhanced surveillance testing: two incidents were detected by new herd testing (CT-NH), one incident by post-movement testing (POSTMT), and two incidents detected by radial surveillance testing (RAD). Only one incident was detected by routine herd testing (RHT).

Reactor numbers

In Northumberland eight skin test reactor cattle and one interferon gamma (IFN-γ) test positive animal were identified and removed in 2019. That is an increase in comparison with the four reactors disclosed in 2018 in this county. No test reactors were disclosed in Durham, Cleveland and Tyne & Wear in 2019.

Risks to the reporting area

The TB risk to the North East of England from adjoining areas in the LRA is assessed as low. The most likely risks of TB introduction come from movements of undetected infected cattle into the area either directly from farms or via animal gatherings from the higher risk areas of the UK.

Risks posed by the reporting area

The TB risk from the North East of England to the adjacent LRA and Scotland is currently very low. This is due to the small number of annual cases in the region, the low number of reactors found annually, the speed with which the few TB herd incidents are resolved and the effectiveness of enhanced surveillance in each incident.

Forward look

Due to the higher number of TB incidents detected in Northumberland in 2019 relative to the previous two years, the National Farmers' Union (NFU) organised regional meetings in

this area involving local Official Veterinarians (OVs), the county TB Eradication Group and APHA in order to raise awareness of TB and encourage careful sourcing of cattle to prevent more TB incidents in this area. In order to further reduce TB incidence and maintain LRA status, enhanced surveillance measures need to be continued, together with the implementation of safer cattle purchasing policies.

Introduction

This report describes the level of bovine tuberculosis in cattle herds in The North East of England (including the counties of Northumberland, Durham, Cleveland and Tyne & Wear) 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 East 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 East 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

This area is highly diverse, from the urban centres at the coast, with arable production on lower ground, to extensive hill ground in the western boundaries. There are around 2,000 registered cattle herds in the North East of England region, 47% of the cattle are in Northumberland, 44% in Durham, 6% in Cleveland and only 3% in Tyne &Wear. The number of herds in the region is stable in comparison with previous years.

As illustrated in Figure 1, there is a wide range of cattle herd sizes ranging from small herds of under 50 head to large herds of over 500 cattle and there is some variation between counties. Northumberland has 33% of herds under 50, 9% over 350 with a mean herd size of 144, Durham has 50% under 50, 4.7% over 350 with a mean herd size of 96. Cleveland has 48% under 50, 7.2% over 350 with a mean herd size of 112, Tyne & Wear has 51% under 50, 1.7% over 350 with a mean herd size of 80.

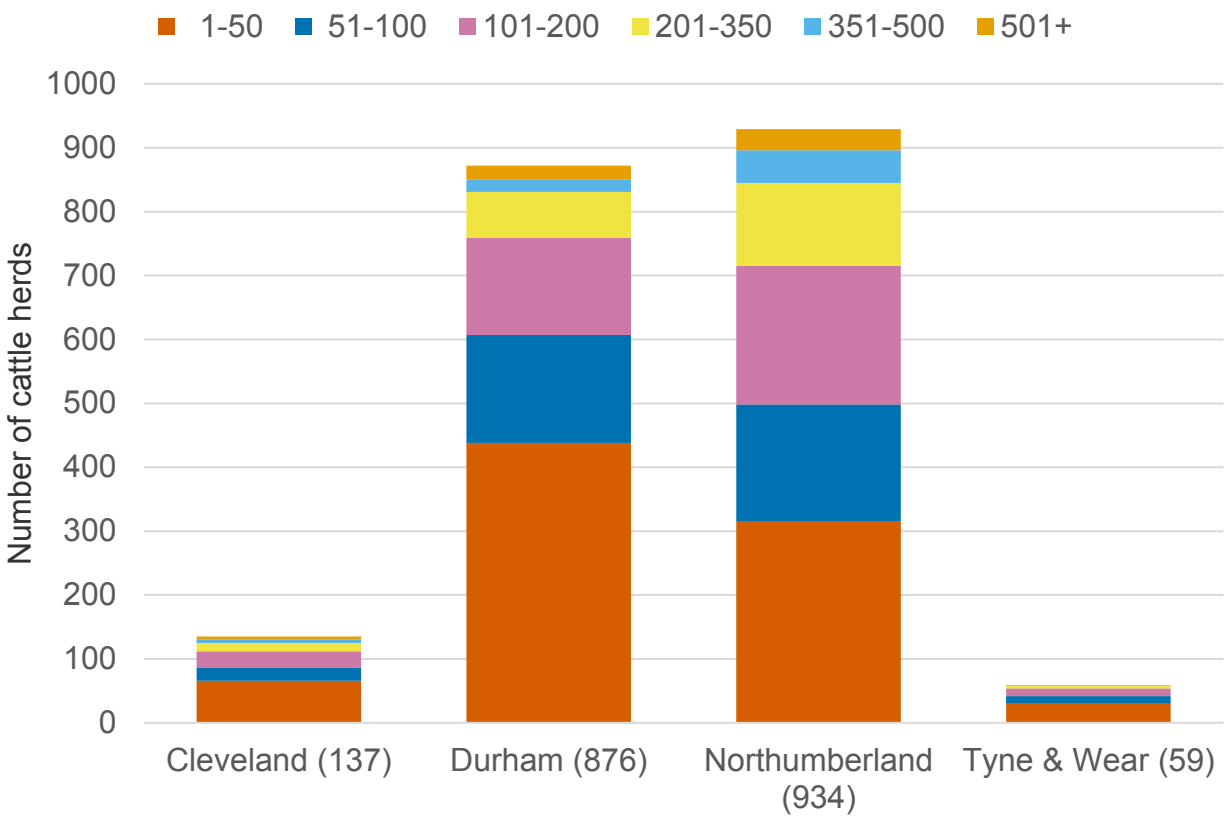

Figure 1: Number of cattle holdings in the North East of England, by herd size and county in 2019

The majority of this population is beef by breed definition (85% on average) and are usually breeding suckler herds. However, there are also many finishing herds which rely on the continuous supply of store cattle sourced both locally and from outside the region. Dairy units account for a very small percentage (15% on average) in the area with the highest percentage in Cleveland with 24%, which probably accounts for the higher than expected mean herd size.

Cattle movement practices

Local movement of breeding and fattening animals is important, but there are also large numbers of fattening animals brought in from the higher risk areas of the West of England, Wales and Northern Ireland. A relatively small number of breeding cattle are brought in from Scotland, Northern Ireland and the Republic of Ireland.

Outward trade in cattle of all classes to Scotland is important, particularly slaughter and fattening animals. These move relatively freely due to the whole region being on background four-yearly TB testing.

Markets

Although there are six small markets in the region, two of which are mixed and seasonal markets. One of the main livestock markets is in Darlington, County Durham, which has both green (regular) and red (TB dedicated slaughter gathering) status sales. It is the main slaughter market for fattening herds and also holds slaughter gatherings accepting cattle from TB restricted holdings destined for slaughterhouses. Hexham Market in Northumberland only holds green sales, which include slaughter cattle.

Finishing units

There are seven Licensed Finishing Units (LFUs) in the region, which provide an outlet for finishing cattle from OTF herds. These units are licensed by APHA and require that the cattle must be kept housed, and strict biosecurity conditions and wildlife proofing measures must be met and adhered to. Cattle must be sourced from unrestricted herds and be subject to pre-movement testing when required, but there is no requirement for post-movement testing or tracing testing in LFUs.

Grazing practices

Traditional farming practice in the North East of England region is for cattle to graze from April until late October and then to be housed for the remainder of the year.

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 confirmed by lesions identified at Post Mortem (PM), or *M. bovis* cultured from tissue samples. OTF-S incidents are identified by the Single Intradermal Comparative Cervical Tuberculin (SICCT) skin test, without confirmation by PM or bacterial culture.

As illustrated in Figure 2, Northumberland reported six incidents in 2019, one OTF-W incident and five OTF-S. This is an increasing trend from three OTF-S incidents reported in 2018 and two OTF-S incidents in 2017. Durham reported no incidents in 2019, with a decreasing trend from one OTF-S incident in 2018 and three incidents, two OTF-W and one OTF-S, in 2017. Cleveland has had no incidents since one OTF-S in 2017. Tyne & Wear has reported no incidents since the 1990s.

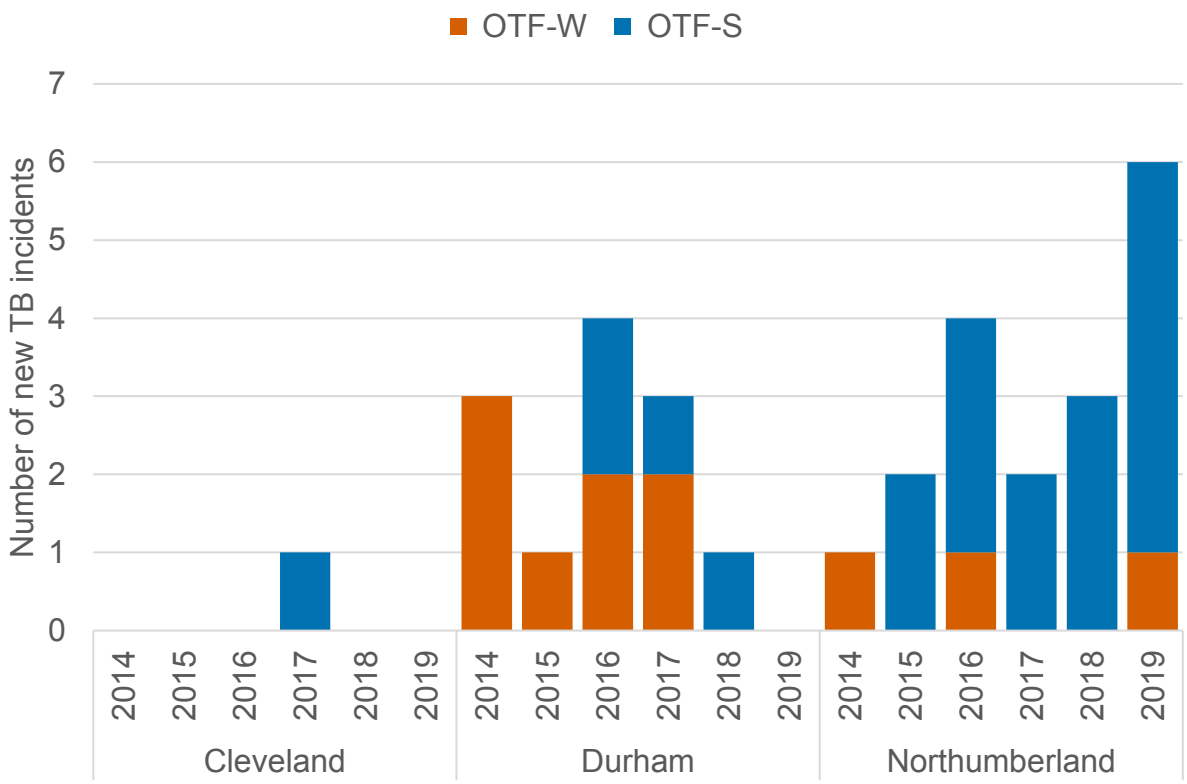

Figure 2: Annual number of new TB incidents in Cleveland, Durham and Northumberland, 2014 to 2019. Note Tyne & Wear is not shown as there are no data to display (no incidents since the 1990s).

Geographical distribution of TB incidents

All incidents reported in 2019, one OTF-W incident and five OTF-S incidents were located in Northumberland (Figure 3).

The single OTF-W incident involved two separate locations under the same ownership and management. Due to the regular cattle movements between the two premises, for disease control purposes this was deemed to be a single incident. Statutory radial TB surveillance zones and enhanced surveillance testing were established around both locations (Figure 4). The test reactor was disclosed at the premises in the Bellingham area with the main premises located in the Longwitton area. This enhanced surveillance is still ongoing with no further OTF-W incidents identified in the reporting period.

However, two OTF-S incidents were disclosed from this radial testing, one in Bellingham and another in Longwitton, with a total of three reactors identified. The Longwitton incident was in a 200 cattle fattening herd where the reactor was purchased from Scotland and this case had a direct epidemiological link to the OTF-W case. In both cases the post incident testing disclosed no more reactors.

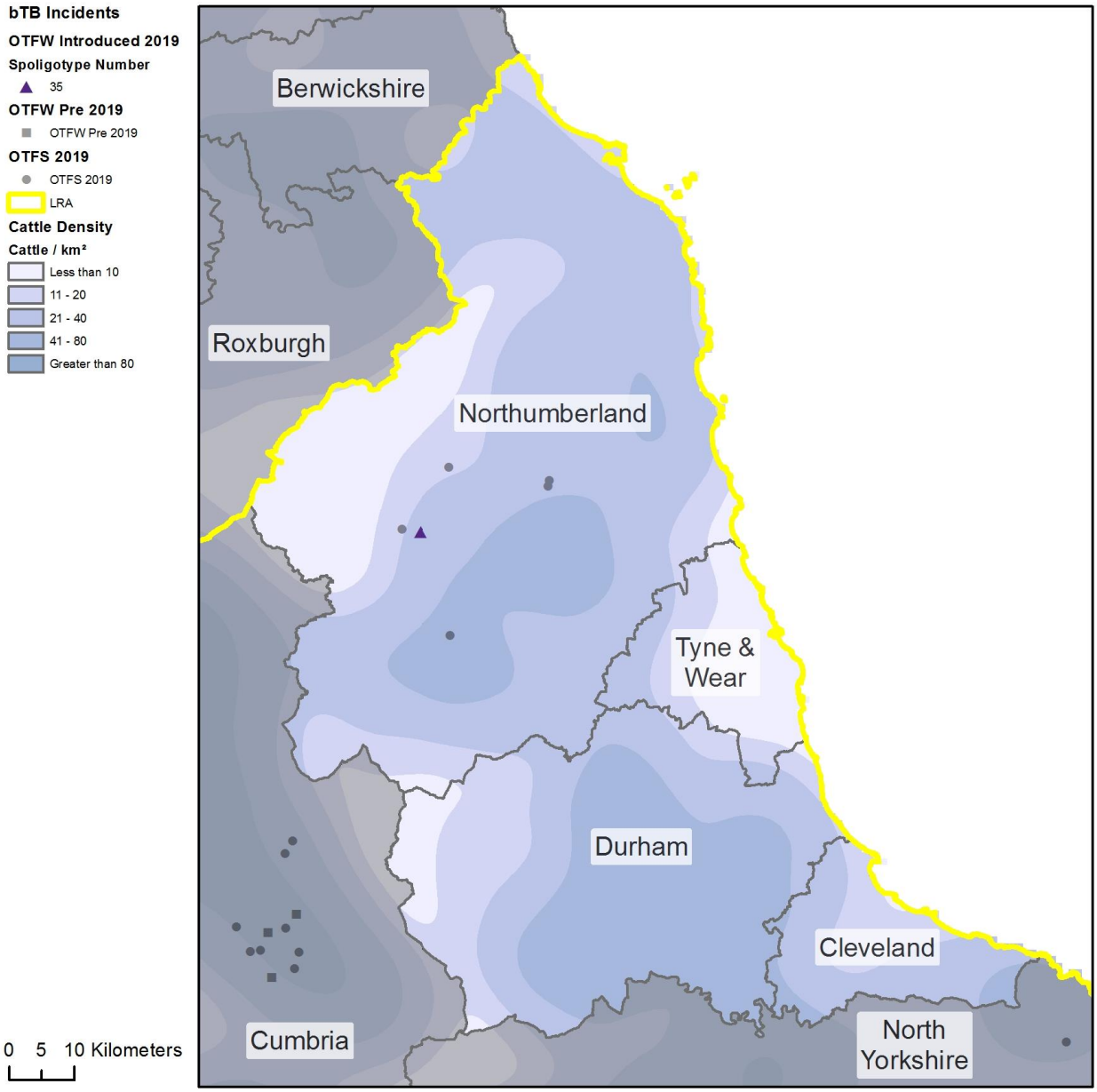

Figure 3: Location of cattle holdings in the North East of England with new TB incidents (OTF-W and OTF-S) in 2019, and cattle holdings with pre-2019 OTF-W incidents that are still ongoing at the end of 2019, overlaid on a cattle density map.

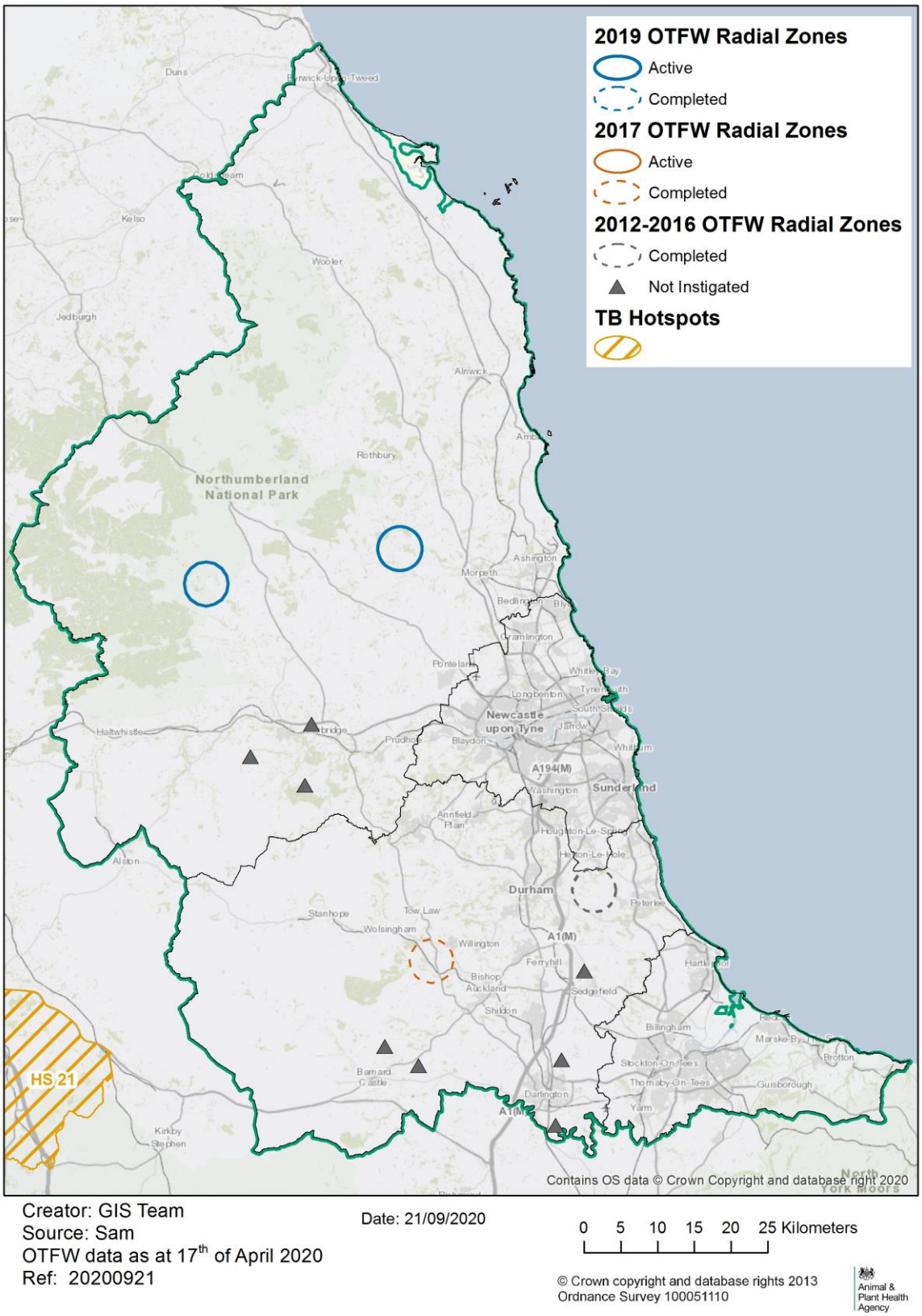

Figure 4: Potential hotspot areas and OTF-W radial surveillance zones that were active, completed or not instigated in the North East of England during 2019, by year of initiation. Note that there is no relevant radial zone data for 2018 so it has not been presented on the map.

Two OTF-S incidents are located close to each other in the map (Figure 3) in the Longwitton area, in the centre of Northumberland and include the OTF-S incident described above in the radial surveillance zone. The other incident which was outside the radial zone was in a 300 cattle suckler herd where the single test reactor originated from the Edge Area. The two herds are completely separate with different management and were detected at different times in the reporting year. Despite their close geographical proximity there have been no epidemiological links identified between the premises nor suspicion of wildlife involvement.

The OTF-S case located further south in the Hexham area is a 400 cattle suckler herd with a single reactor, born locally and disclosed at routine herd test. The holding where the reactor was born has no TB history. The origin of this case is undetermined. No more reactors were disclosed in the post incident testing afterwards and the herd regained its OTF status.

The other OTF-S incident located further north in Northumberland is a 90 cattle herd, which purchases a few calves from neighbouring farms and sells them as stores at the local livestock market. The reactor was born locally. No more reactors were found in the post incident testing and the herd regained its OTF status.

The number of TB incidents remain low and there is no geographical clustering of multiple cases which might raise suspicion of local transmission of infection between herds and possible undisclosed wildlife involvement.

Following disclosure of a cluster of TB cases, a TB hotspot (HS21) was established in 2016 in Cumbria, which lies to the west of Northumberland and Durham, but is geographically separated by the Pennine Mountains (Figure 4). Enhanced cattle and wildlife surveillance has been established and no epidemiological links between this hotspot and the incidents in Northumberland have been identified.

No incidents were found in Durham, Cleveland or Tyne & Wear in 2019.

Other characteristics of TB incidents

Duration of incidents

Figure 5 shows the number and duration of TB incidents that concluded in 2019, by county. Four cases located in Northumberland and one in Durham. The OTF-S incident in Durham started at the end of 2018 and concluded in 2019.

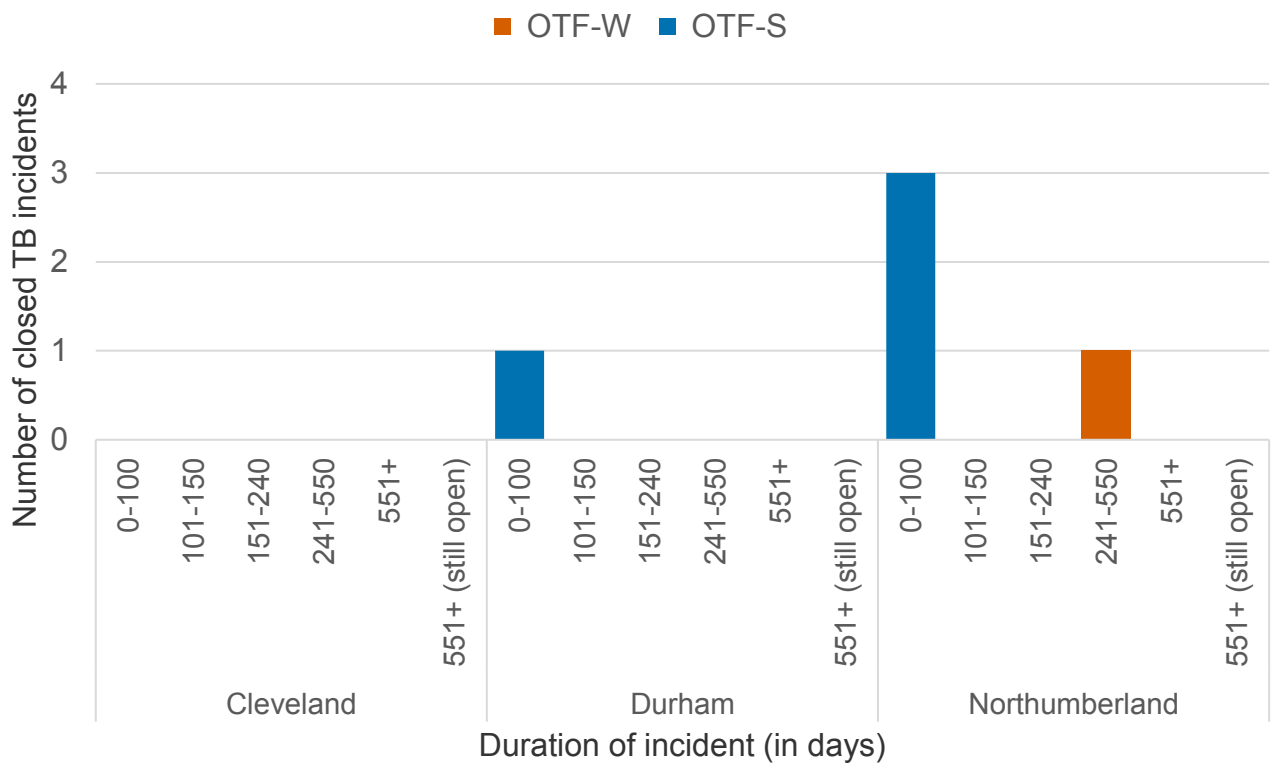

Figure 5: Duration of all TB incidents (OTF-W and OTF-S) that ended in 2019, and the number of persistent TB incidents (551+ days) that were unresolved at the end of 2019 in the North East of England. Note Tyne & Wear not shown as there are no data to display (no incidents since the 1990s). There are no data displayed for Cleveland as no incidents ended in 2019 and ongoing incidents are less than 551 days. Note that Licensed Finishing Units (LFUs) have been excluded.

It can be seen from Figure 5 that all OTF-S incidents lasted less than 100 days, which accounts for the mandatory single Short Interval Test (SIT) required in most herds with OTF-S incidents in the LRA, plus any time elapsing for reactor removal incident. The only OTF-W incident in Northumberland lasted between 241-550 days, which is attributed to the compulsory post-incident testing comprising two successive SITs with negative results, supplemented by an IFN-γ test carried out in such herds. The duration of the incidents were short due to the small numbers of reactors found and little/no cattle-to-cattle spread of infection within herds, resulting in the minimum possible number of tests required to resolve the incident.

There were no persistent incidents (those lasting 551+ days) in any county for this reporting period.

Genotypes of *M. bovis* isolated

Genotype 35:a of *M. bovis* was isolated from the single OTF-W case detected in Northumberland. The homerange for Genotype 35:a is in Shropshire and this is the first time that this genotype 35:a has been detected in Northumberland. This incident affected a

suckler herd and the only reactor, a 10 year old cow, was born locally and disclosed as an inconclusive reactor (IR) in a routine herd test in 2014 and was subsequently clear when retested. During a routine skin test in 2019 the cow was disclosed as a reactor with no visible lesions of TB at post mortem but a culture positive result. The incident herd currently purchases cattle mainly from the LRA, but historically cattle were purchased from higher risk areas such as the HRA and Edge. Therefore, it is likely that the source of infection was lateral transmission via contact with an undisclosed infected purchased animal within the herd, but in the absence of additional evidence there is an important degree of uncertainty associated to this assumption.

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 infected cattle within LRA and from the Edge Area and HRA

Cattle movements were considered to be responsible for three of the six incidents in 2019. In the other three incidents the origin of infection could not be determined. Most cattle replacements in the region are sourced from other parts of the Low Risk Area. There is higher level of uncertainty in the risk pathways of OTF-S incidents, where by definition, *M. bovis* cannot not be cultured in the laboratory.

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 6, the only OTF-W case in the region in 2019 was attributed to purchase of infected cattle from the HRA or Edge Area. A single skin reactor initiated this incident and the strain of *M. bovis* isolated by laboratory culture had a genotype with a homerange in Shropshire. The compulsory post incident testing was carried out in the affected herd comprising two SIT tests and an IFN-γ test. One IFN-γ reactor and no further skin reactors were disclosed. The incident herd currently purchases cattle mainly from the LRA but historically cattle were purchased from higher risk areas such as the HRA and Edge.

One OTF-S incident affected a 200 cattle fattening herd which buys six month old animals and keeps them for a year. A reactor was found at radial testing, this animal originated from a Scottish holding with no TB history. However, there was a direct epidemiological link with the OTF-W incident herd, in that some of its cattle grazed on this premises. Although the cattle were kept separate, there was a risk of lateral spread of infection. No further reactors were found in subsequent testing.

One OTF-S incident was attributed to the direct movement from the Edge Area as the reactor was disclosed at a post-movement test.

The other three OTF-S incidents in Northumberland had an uncertain origin of infection. None were closed herds, so inward movements of infected cattle into those herds cannot be ruled out.

There is a higher level of uncertainty in the sources of infection for the OTF-S incident herds, where by definition, the genotype of *M. bovis* could not be determined and where very small numbers of reactors are identified. The majority of the incidents reported disclosed no more reactors at subsequent testing. It is reassuring that there appears to be minimal lateral spread of infection within herds and there is no evidence of wildlife involvement in the area, but this risk cannot be fully dismissed.

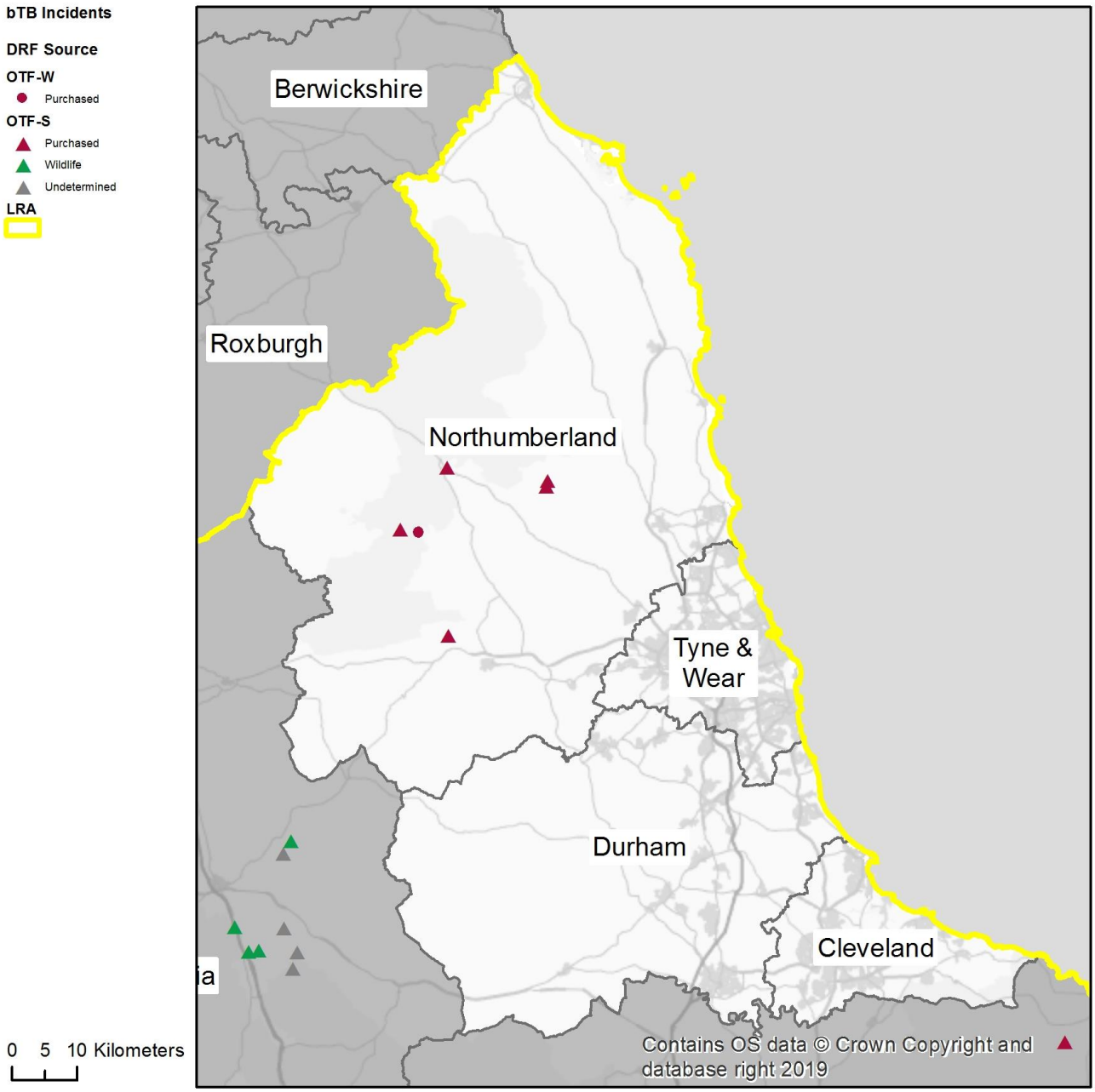

Figure 6: Map of the source of infection pathway recorded with the highest level of certainty for all TB incidents (OTF-W and OTF-S) in the North East of England, which started in 2019.

TB in other species

Within the region there were no reported cases of TB (*M. bovis* infection) in any other animal species, including domestic non-bovine farm animals (camelids, goats, sheep, pigs), pets, zoo animal collection, captive (farmed/park) deer holdings and captive wild boar farms within the reporting period. Additionally there were no known cases of suspected or confirmed zoonotic (human) *M. bovis* infection.

Detection of incidents

Figure 7 shows that the majority of the incidents in 2019 were detected by some form of enhanced TB surveillance testing. Two incidents were detected by new herd tests (CT-NH). One of these cases refers to a new beef suckler herd disclosing an inconclusive reactor that failed at retest and became a reactor. The other (OTF-W incident) case is referring to an established herd where due to changes in CPH allocation the test was recorded as a new herd test when it was in fact a routine herd test.

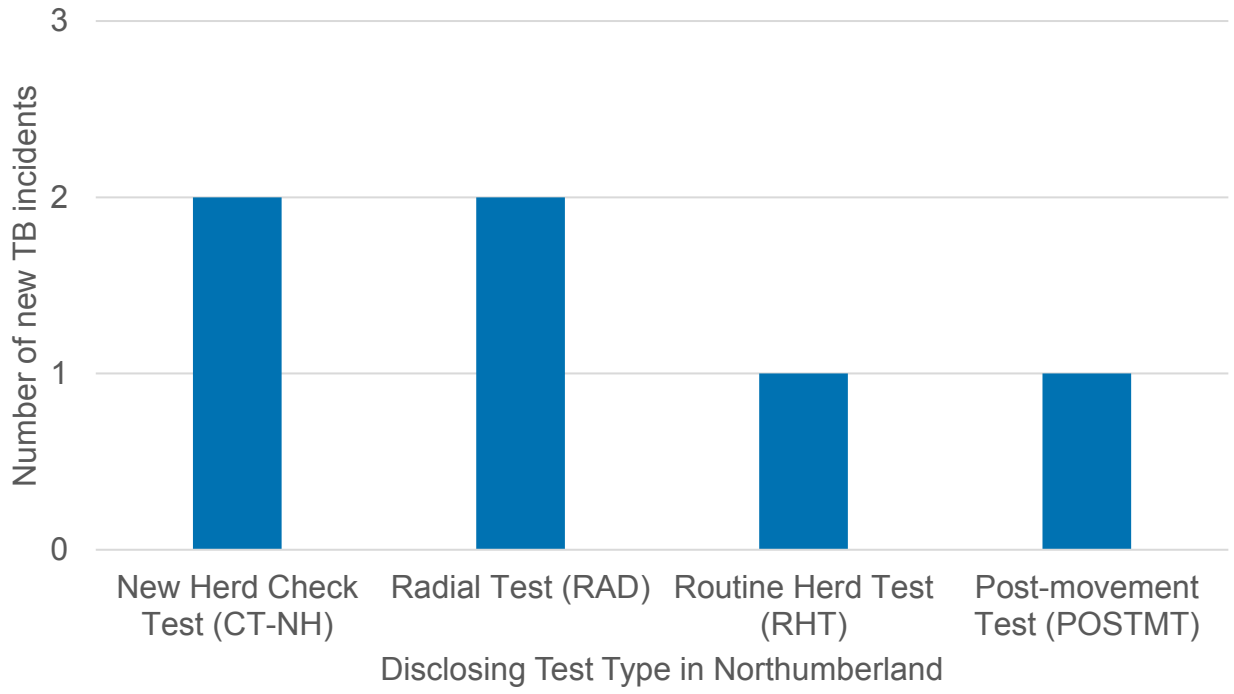

Figure 7: Number of TB incidents (OTF-W and OTF-S) in Northumberland in 2019, disclosed by different surveillance methods in each county. Note Cleveland, Durham, and Tyne & Wear are not shown due to no incidents reported in 2019 and therefore no data to display.

One OTF-S incident was detected by post-movement test (POSTMT) from an animal originating from the High Risk Area. Two OTF-S incidents were detected by radial testing (RAD). There was only one OTF-S incident detected by routine surveillance testing (RHT) in 2019, this was the first incident in a 400 cattle suckler herd. This is strong evidence of the efficacy of the additional control measures applied, addressing specifically more timely detection of residual and recently introduced infection.

All incidents in 2019 occurred in herds with no previous history of TB. This is of particular concern and highlights that the LRA remains under threat of disease introductions. Additionally, a significant proportion of all first-time incidents were considered to be as a result of infected cattle movements, which could be an early indication of disease ingress

within the LRA. It also highlights the need to raise awareness within the industry of the TB risk of purchasing cattle and the importance of careful sourcing of cattle replacements.

Skin test reactors and interferon gamma test positive animals removed

As shown in Figure 8, in Northumberland there were eight skin reactors and one IFN-γ test positive animal removed in 2019. This is an increase from 2018, when four skin reactors were removed. However, this can be explained by the increase in the number of incidents from three in 2018 to six in 2019. The average number of reactors per incident in Northumberland remains very low at only 1.50 in 2019 compared to 1.33 in 2018. The OTF-W incident disclosed one skin reactor and one IFN-γ test positive animal. Four OTF-S incidents disclosed a single skin test reactor and one OTF-S incident disclosed two skin test reactors. There have been no incidents in the county with large number of reactors and provides reassurance that there has been little lateral spread of TB within herds.

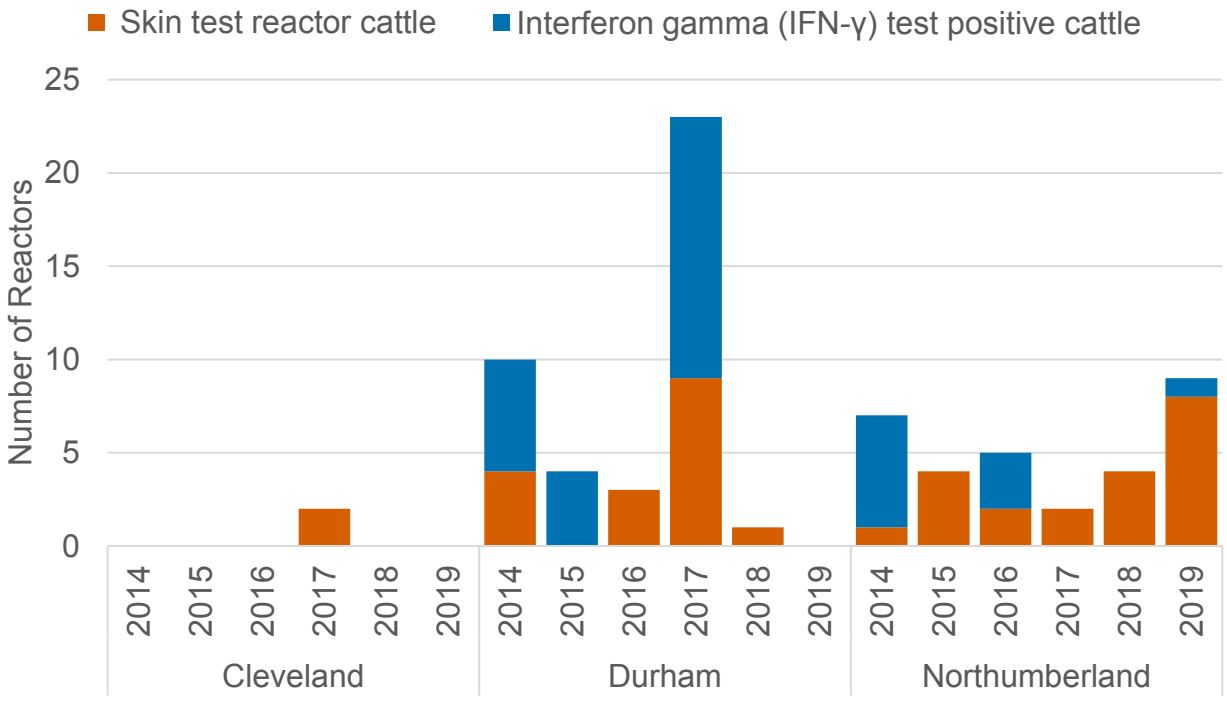

Figure 8: Number of skin test reactors and interferon gamma (IFN-γ) test positive cattle removed by APHA for TB control reasons, in the North East of England, 2014 to 2019. Note: Tyne & Wear not shown as there are no data to display (no incidents since the 1990s).

Durham had no reactors removed in 2019 since there were no incidents recorded. This is a decrease in number of reactors removed from one skin reactor in 2018 from one incident

and especially from 2017 when 23 reactors (nine skin reactors and 14 IFN-γ reactors) were removed from three incidents. The large number of reactors removed in 2017 was mainly attributed to one OTF-W incident which is now resolved with no evidence of lateral spread within the area.

No reactors were removed in Cleveland or Tyne & Wear as no TB incidents were recorded in 2019.

The number of reactors removed and the number of incidents detected gives an indication of the relative impact to the taxpayer in an area. The cost to the taxpayer is through the cost of compulsory government-funded post incident testing and payment of compensation for reactors removed.

There are also both direct and hidden costs and impacts to the farmers when an incident is detected. One of the main impacts of TB incidents is on the ability to move stock off the restricted premises, which can have consequences on the numbers of breeding animals, weaned beef calves, store cattle, etc. The same applies to sourcing stock to replace the TB reactors removed, or other replacements. This proves even more difficult for pedigree animals. Acquiring stock is not permitted until after the first incident test and it has to be carried out under a licence, which is only granted after a thorough veterinary risk assessment to ensure that mitigation measures are followed and the disease has not spread. Another consideration is that if cattle purchased during an incident become reactors at subsequent tests, there is a 50% reduction in the compensation paid to the farmer. There can be an alteration to normal trading practices and increased labour costs related to the increased testing requirements which is also applicable to farms which fall within a radial surveillance zone.

Due to the low number of reactors disclosed in every incident in the region and the relative short duration of each incident, the impact of TB for farmers and the taxpayer was relatively low in comparison with other areas of the country where more reactors are removed and persistent incidents are more frequent.

Summary of risks to the North East of England

Despite the slight increase in TB incidents in Northumberland in 2019, the North East of England is still one of the regions in the LRA with very low numbers of incidents. If the objective of achieving TB free status by 2025 in this region is to be achieved, a focus is needed on the farming community's attitude towards TB control and sourcing cattle to this area.

All of the incidents in 2019 have occurred in herds without previous TB history, often finding farmers relatively unaware of the risk of disease, the possible ways of controlling this risk and the consequences of an incident within their herd.

APHA farm visits at the time of a TB incident and their involvement in the local TB eradication group has provided an extremely good source of information for farmers. Local farmer meetings were held to raise awareness of TB and provide advice on safer and risk-based trading.

Local movement of breeding and fattening animals is important in this area, but there are also large numbers of fattening animals bought in from the West of England and Wales where TB is endemic, posing a potential risk to this area through undetected infected cattle movements. These movements may be direct or via local livestock markets where farmers may unwittingly buy these animals without being fully aware of their true origin and potential risk.

Every TB incident in the region is resolved relatively quickly. Enhanced surveillance through radial testing in every OTF-W incident provides reassurance that any potential lateral spread of TB infection or wildlife involvement would be identified rapidly.

Although there is a TB hotspot (HS21) in neighbouring Cumbria on the western boundary of Northumberland and Durham it is geographically separated by the Pennine Mountains and it is seen as a low risk to the reporting area. This area is not seen as a major source of cattle for the region and with the enhanced TB testing measures in place, including pre-movement testing, the risk of infected cattle leaving HS21 is seen as very low.

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

The LRA counties adjacent to the North East of England are North Yorkshire to the south and Cumbria to the west.

The TB risk from the North East of England to adjacent LRA counties is currently very low due to the number of annual cases in the region, the speed of resolving them and the effectiveness of enhanced surveillance in each incident. The compulsory pre-movement tests implemented in all TB restricted herds after restrictions are lifted and in all the holdings within the radial areas (until they revert to four-yearly routine herd testing) also helps to protect other surroundings areas.

Assessment of effectiveness of controls and forward look

Despite the fact that the overall number of incidents has increased, the North East of England is still one of the LRA regions with very low number of cases.

Timely detection of infected animals and subsequent removal is one of the key steps in infection control. This is very likely to have played a significant role in the protection of the remaining susceptible cattle population and keeping the region relatively free of TB.

It is therefore vital to maintain the passive and active surveillance within the LRA.

More local farmer meetings organised by the National Farmers' Union (NFU), with the involvement of the TB Eradication group, local Official Veterinarians and APHA could help to increase awareness of TB and encourage careful sourcing of cattle and reduce the risk of introducing TB into the region by movement of infected cattle from the HRA, Edge Area, the endemic TB areas of Wales, and from the Republic of Ireland and Northern Ireland. In order to further reduce TB incidence and maintain LRA status, enhanced TB surveillance measures need to be continued, together with the implementation of safer cattle purchasing policies.

Appendices

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

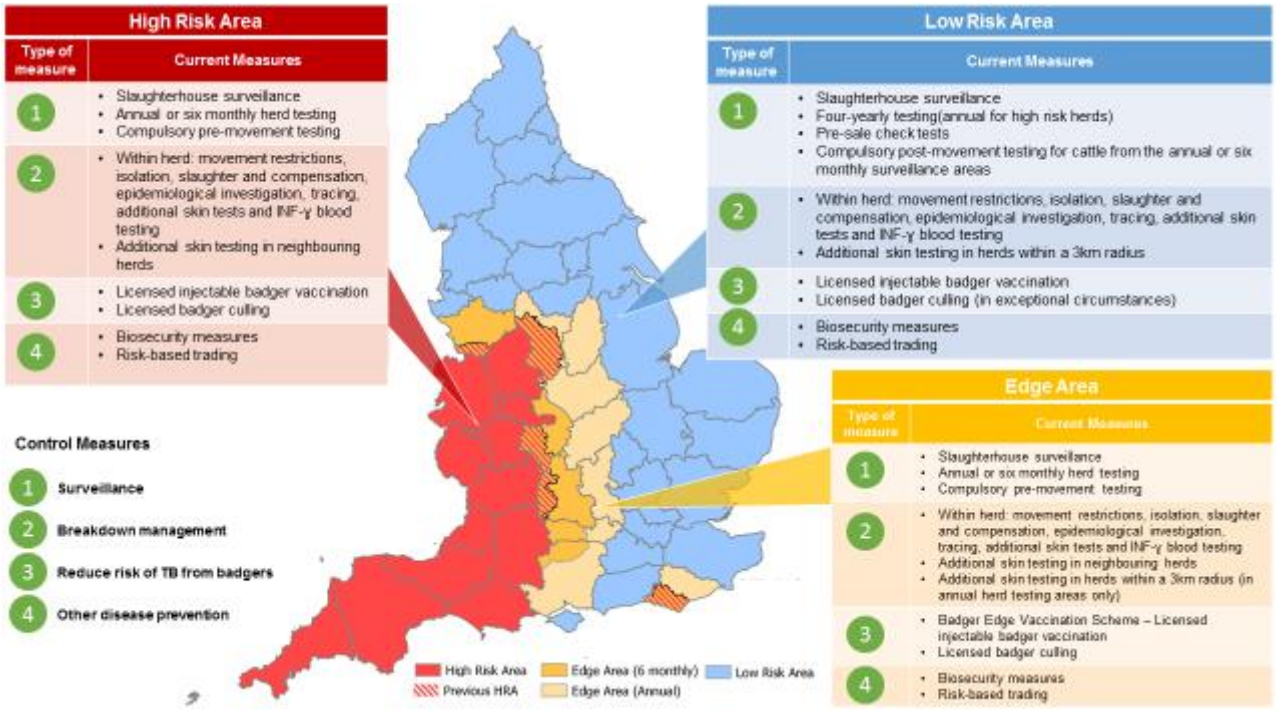

Figure A1: TB risk and surveillance areas of England effective since January 2018, as set out in the Government's Strategy for Achieving Officially Tuberculosis-Free Status for England. Map based on information published on www.tbhub.co.uk.

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 East of England

Radial zone applied in the only OTF-W incident that occurred in Northumberland.

No exemptions from the mandatory the deployment of the IFN-γ blood test.

Regional meetings held with farmers, NFU, TB Eradication Group, Official Veterinarians (OVs) and APHA to raise awareness of TB in Northumberland.

Local liaison with Local Authorities (Northumberland Trading Standards).

Appendix 2: cattle industry in the North East 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 Cleveland	2	66	20	26	13	5	5	137	112	51
Number of Herds in Durham	4	438	169	152	72	19	22	876	96	50
Number of Herds in Northumberland	5	316	182	217	130	51	33	934	144	90
Number of Herds in Tyne & Wear	0	30	12	12	4	1	0	59	80	49

*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 Cleveland	11,389 (74%)	3788 (24%)	155 (1%)	1 (<0.01%)	15,333
Number of Cattle in Durham	71,481 (84%)	11,075(13%)	1768 (2%)	7 (<0.01%)	84,331
Number of Cattle in Northumberland	122,433 (90%)	10,837 (8%)	1628 (1%)	6 (<0.01%)	134,904
Number of Cattle in Tyne & Wear	4267 (90%)	231 (4%)	198 (4%)	0	4696

Appendix 3: summary of headline cattle TB Statistics

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

Herd-level statistics	Northumberland	Durham	Cleveland	Tyne & Wear
(a) Total number of cattle herds live on Sam at the end of the reporting period	1139	1049	158	80
(b) Total number of cattle herds subject to annual TB testing (or more frequent) at the end of the reporting period (any reason)	77	13	3	3
(c) Total number of whole herd skin tests carried out at any time in the period	296	283	30	13
(d) Total number of OTF cattle herds having TB whole herd tests during the period for any reason	279	280	30	13
(e) Total number of OTF cattle herds at the end of the report period (i.e. herds not under any type of TB2 restrictions)	1129	1036	156	78
(f) Total number of cattle herds that were not under restrictions due to an ongoing TB incident at the end of the report period.	1137	1049	158	80
(g) Total number of new TB incidents detected in cattle herds during the report period	6	0	0	0
• OTF status suspended (OTF-S)	5	0	0	0
• OTF status withdrawn (OTF-W)	1	0	0	0
(h) Of the new OTF-W herd incidents, how many:				

• occurred in a holding affected by another OTF-W incident in the previous three years?	0	0	0	0
• could be considered secondary to a primary incident based on current evidence?	0	0	0	0
• were triggered by skin test reactors or 2xIRs at routine herd tests?	1	0	0	0
• 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	0	0
• were first detected through routine slaughterhouse TB surveillance?	0	0	0	0
(i) Number of new incidents revealed by enhanced TB surveillance (radial testing) conducted around those OTF-W herds				
• OTF-S	2	0	0	0
• OTF-W	0	0	0	0
(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	0	0
(k) New confirmed (positive *M. bovis* culture) incidents in non-bovine species detected during the report period (indicate host species involved)	0	0	0	0

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

Animal-level statistics (cattle)	Northumberland	Durham	Cleveland	Tyne & Wear
(a) Total number of cattle tested in the period (animal tests, blood and skin)	33,037	20,240	2396	343
(b) Reactors detected in tests during the year:				
• tuberculin skin test	8	0	0	0
• additional IFN-γ blood test reactors (skin-test negative or IR animals)	1	0	0	0
(c) Reactors detected during year per incidents disclosed during year *	1.50	0	0	0
(d) Reactors per 1000 animal tests	0.27	0	0	0
(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	0
• Private slaughters	0	0	0	0
(f) SLH cases (tuberculous carcases) reported by the Food Standards Agency (FSA) during routine meat inspection	1	1	0	0
(g) SLH cases confirmed by culture of *M. bovis***	0	0	0	0

* Note: reactors may be from incidents disclosed in earlier years, as any found through testing during the report year count here.

** Note: not all cases reported are submitted for culture analysis. All cases reported are from any period prior to or during restriction.

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 Northumberland, in 2019.

Source of infection	Possible (1)	Likely (4)	Most likely (6)	Definite (8)	Weighted contribution
Cattle movement (e.g. purchase) of infected animal(s)	1	5	1		75%
Local contiguous infection - lateral spread from neighbouring holdings					
Exposure to infected wildlife					
Exposure to other farmed species					
Residual infection from a previous TB incident					
Infected human source					
Fomite source					
Domestic animals					
Undetermined/obscure					25%
Other (explain)					

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		1	
3. Possible			
4. Not likely			

Appendix 6: herd incidence of TB in England

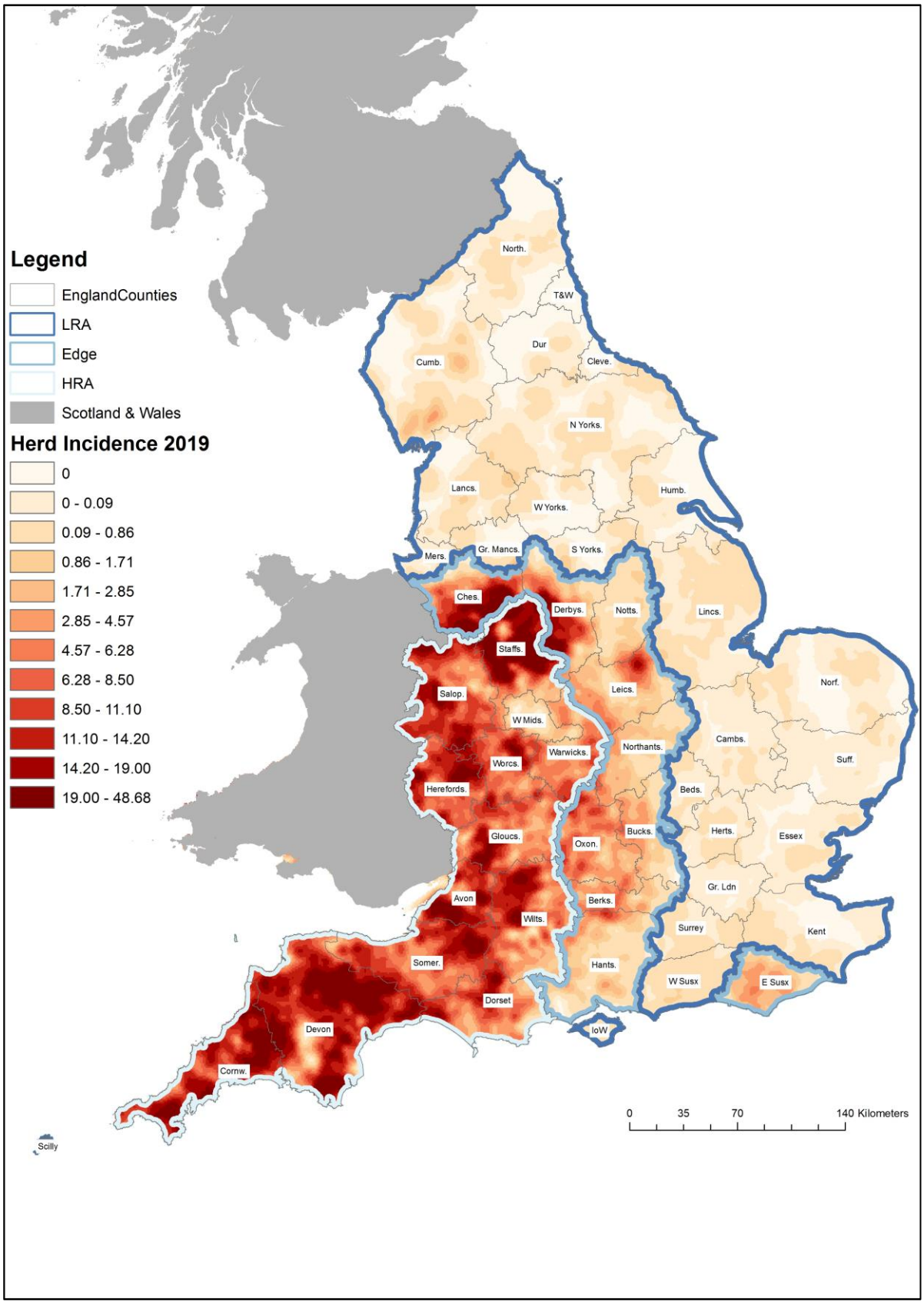

Figure A6.1: Herd incidence of TB in 2019 (incidents per 100 Herd Years at Risk), represented as a spatial kernel of the 100 closest herds per km^2.

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