Animal & Plant Health Agency

Regional Six-monthly Report of Descriptive Bovine TB Epidemiology for the Low Risk (Four Yearly Testing) Areas of England

Delivery Area: Northern
County: Lincolnshire

Mid-year (first six months) for 2018

1. Cattle Industry in the Region

The Lincolnshire cattle industry can be broken down (in order of significance) into four categories:

1. Finishing units – intensive and extensive
2. Beef suckler herds – pedigree and commercial
3. Dairy herds
4. Hobbyists

FINISHING UNITS

These form the most significant portion of the Lincolnshire cattle population in terms of cattle numbers. Most finishing units are managed intensively with a small proportion of units still operating a traditional extensive grass-based finishing system. A significant feature of the intensive finishing units in this, and other eastern counties, is that these units originally developed to cater for the need/opportunity to utilise both the products and the by-products of the Lincolnshire arable and vegetable units, and so the finishing enterprises have developed and grown as part of mixed arable/vegetable and cattle-finishing units.

Intensive units – Store cattle are primarily sourced from the stock-rearing areas of the Midlands, West of England, South-West of England and parts of Wales and moved to the Lincolnshire units for intensive finishing on arable/vegetable by-products. The main reason for the cross-country movement of cattle is that the county of Lincolnshire is not able to supply the number of cattle required by these finishers. This exemplifies the long-standing stratification of the British cattle industry, and thereby demonstrates the movement of the cattle to the feed, rather than movement of feed to the cattle.

These cattle are mainly sent direct to the abattoir on supermarket dead-weight contracts. Few will be sold through the live auction market system. These businesses rely on both the purchase and slaughter of large numbers of cattle on a weekly basis to ensure that supermarket/abattoir contracts for specific numbers of cattle at the specified weights and carcass classifications can be honoured. The intensive nature of these businesses means that the cattle are on farm for a length of time varying from a few weeks to 6 months.

Extensive units – store cattle primarily sourced from own suckler herd and finished at grass. These finished cattle will be sold through the live auction market (Louth, Newark, possibly Melton Mowbray). Some may be sold deadweight.

BEEF SUCKLER HERDS

Pedigree herds – of some importance to this county, with pedigree stock (+/- semen and embryos) being traded both nationally and internationally. Herds will tend to have controlled/sporadic on–movements of cattle – mainly to source new bloodlines.

Commercial herds – replacements are homebred or purchased. Cattle sold as stores through local markets as above or finished on farm for sale through live auction market or direct to slaughter.

DAIRY HERDS

Dairy herds (commercial and pedigree) are present throughout the county, tending to occur as isolated units rather than clustered in specific geographical areas. Most dairy herds are well-separated from other cattle herds by arable land.

HOBBYISTS

Small in number, but significant at times because of lack of owner awareness of TB risks (biosecurity) and occasional poor compliance with routine surveillance testing.

Usually beef sucklers (Dexter, Highland). Herds established for pet/ornamental/pasture control purposes. Buying and selling both privately and through live markets.

Markets – Louth Livestock Market, LN11 9HF

Abattoirs - 5

Licensed Finishing Units (LFUs) - 5

Number of cattle premises by size band in the division at 1 January of the reporting year.

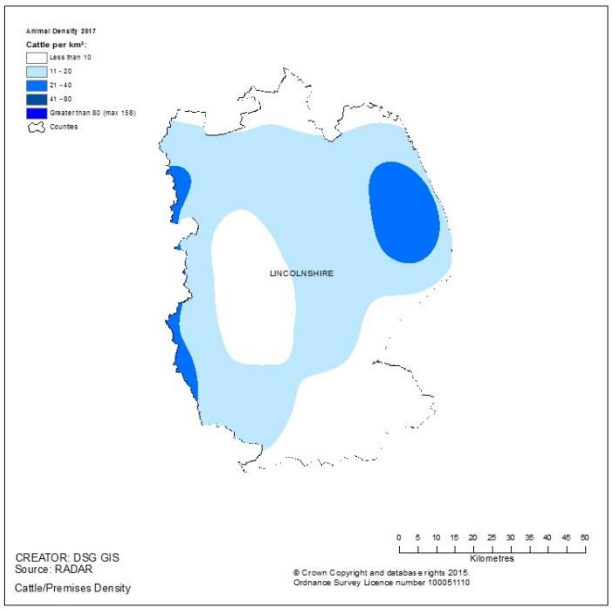
Cattle per premises	0	1 - 50	51 - 100	101 - 200	201 - 350	351 - 500	501+	All	Mean	Median
Number of premises	7	401	149	126	89	23	22	817	104	51

Cattle breed purpose - numbers and percentages at 1 January of the reporting year.

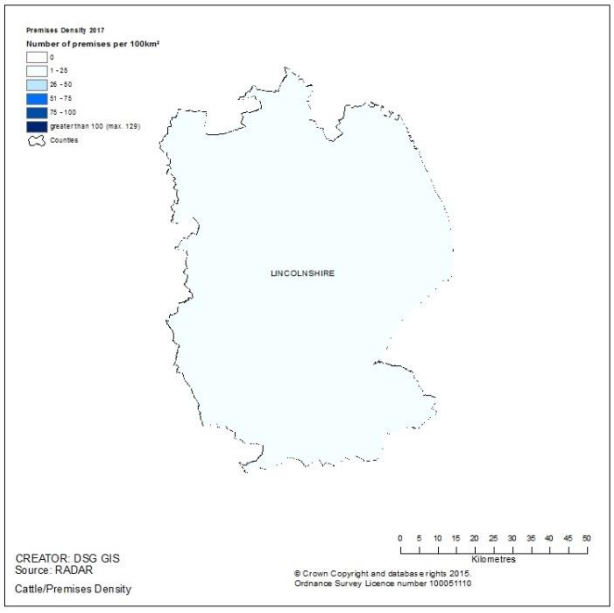
	Beef	**Dairy**	**Dual purpose**	**Unknown**	**Total**
Number of cattle	67184 (78.9%)	16281 (19.1%)	1667 (2.0%)	8 (0.0%)	85140

Density of cattle and cattle premises at 1 January of the reporting year.

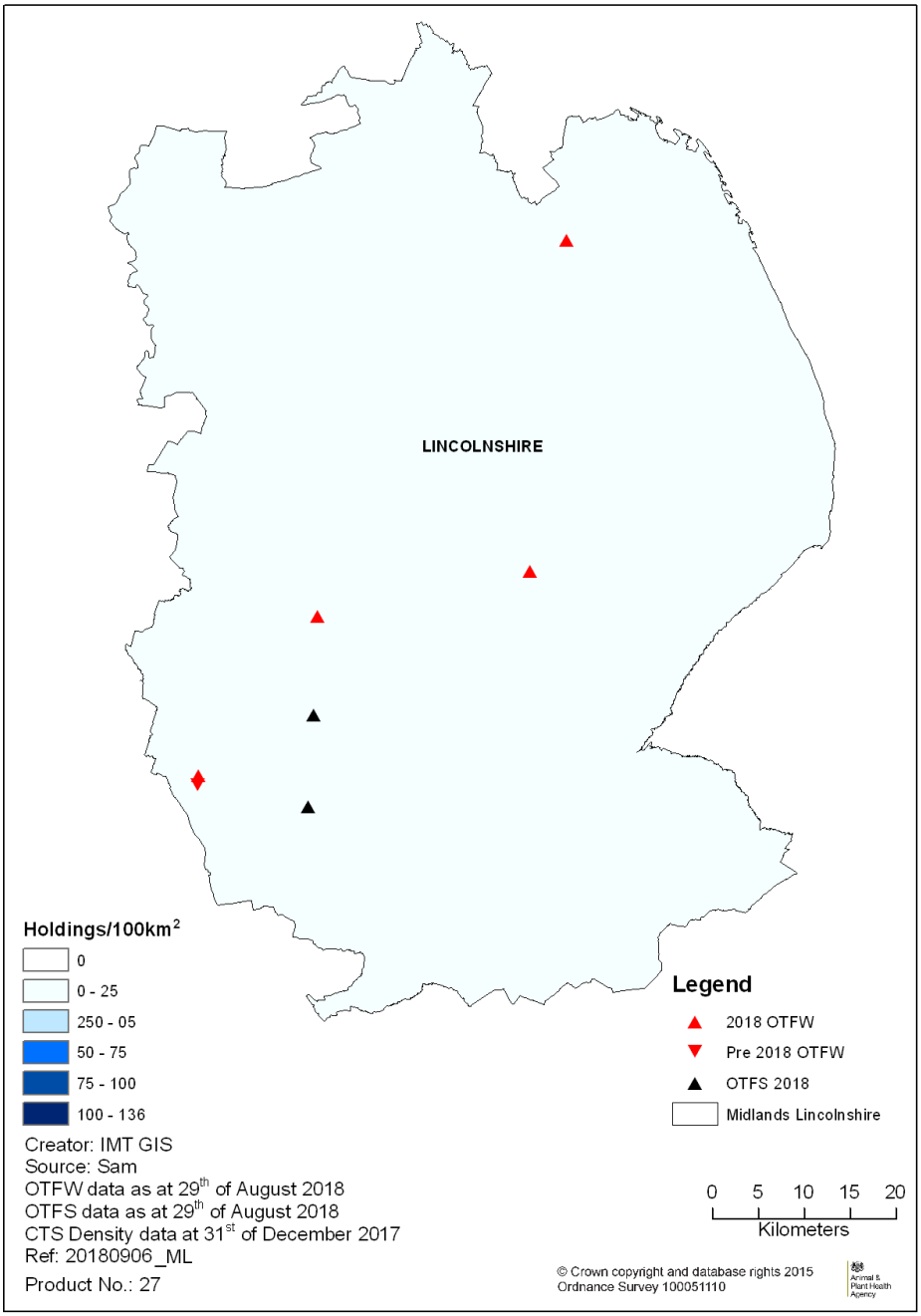
Map - Cattle per square km



Map - Number of premises per 100 square km



2. Geographical Distribution of Bovine bTB Breakdowns in the Region



3. Summary of the Regional Headline Cattle bTB Statistics

One ongoing OTFW case (genotype 25:a of *M. bovis*) of undetermined origin that was disclosed in December 2017 is being investigated as an indication of potential endemic infection in the area near the south west border with Leicestershire (Leicestershire is in the Edge Area, but several recent genotype 25:a breakdowns of obscure origin in north east Leicestershire have been attributed to contact with wildlife as the most likely source pathway). As a result, a potential bTB hotspot area was identified in June 2018 and additional surveillance measures are being implemented around this case (HS23).

Four new OTFW breakdowns have been disclosed in the first six months of 2018 (an increase compared to the total of three OTFW breakdowns during the whole of 2017). Only one out of those four was identified as likely to have a purchased origin, with the remaining three breakdowns identified as being of undetermined origin, and investigations into the origin are still ongoing. Nevertheless, the genotypes of two of these breakdowns (one 25:b and one 10:a) indicate that they are not likely to be related to the HS23 index case (25:a). The third OTFW breakdown of undetermined origin was disclosed as a result of 3km radial (RAD) testing in the HS23 area and epidemiological investigations are continuing (no genotype of *M. bovis* has been identified as the only VL test reactor in the herd was culture negative).

Two OTFS breakdowns were disclosed in the first six months of 2018; one of these is still ongoing. One of these was identified as being of purchased origin, with the remaining breakdown identified as being of undetermined origin due to unsufficient data.

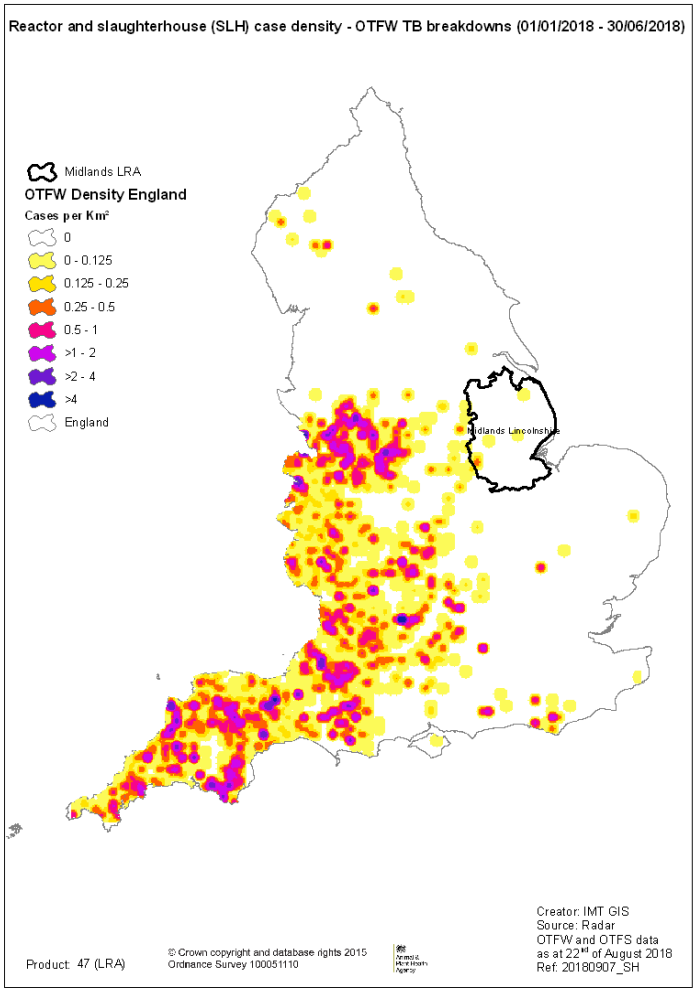
No incidents in non-bovine species have been detected during the report period.

Herd-level statistics	**Lincolnshire 24**
(a) *Total number of cattle herds live on Sam at the end of the reporting period*	940
(b) *Total number of cattle herds subject to annual TB testing at the end of the reporting period (any reason)*	64
(c) *Total number of herd tests carried out in the period*	309
(d) *Total number of OTF cattle herds TB tested during the period for any reason*	180
(e) *Total number of OTF cattle herds at the end of the report period (i.e. herds not under any type of TB2 restrictions)*	913
(f) *Total number of cattle herds that were not under restrictions due to an ongoing TB breakdown at the end of the report period.*	931
(g) *Total number of new TB breakdowns detected in cattle herds during the report period*	6
• *OTF status suspended (OTFS)*	2
• *OTF status withdrawn (OTFW)*	4
(h) Of the new OTFW herd breakdowns, how many:	
• occurred in a holding affected by another OTFW breakdown in the previous three years?	2
• could be considered secondary to a primary breakdown based on current evidence?	0
• were triggered by skin test reactors or 2xIRs at routine herd tests?	2
• were triggered by skin test reactors or 2xIRs at other TB test types (forward and back-tracings, contiguous, check tests, post-movement, etc.)?	3
• were first detected through routine slaughterhouse TB surveillance?	2
(i) Number of new breakdowns revealed by enhanced TB surveillance (radial testing) conducted around those OTFW herds	1
• OTFS	0
• OTFW	1
(j) *Number of OTFW herds still open at the end of the period (including any ongoing OTFW breakdowns that began in a previous reporting period)*	5
(k) New confirmed (positive *Mycobacterium. bovis* culture) incidents in non-bovine species detected during the report period (indicate host species involved)	0

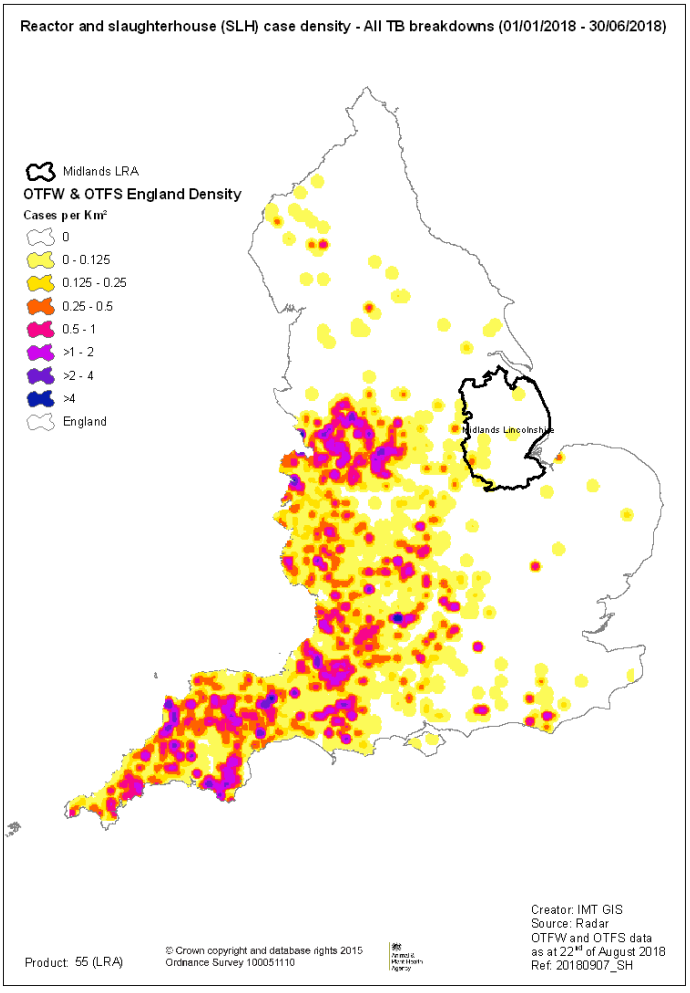
Animal-level statistics (cattle)	
(a) *Total number of cattle tested in the period (animal tests)*	9722
(b) *Reactors detected:*	25

• *tuberculin skin test*	20
• *additional IFN-gamma blood test reactors (skin-test negative or IR animals)*	5
(c) *Reactors per breakdown*	4
(d) *Reactors per 1000 animal tests*	2.57
(e) *Additional animals identified for slaughter for TB control reasons (DCs, including any first-time IRs)*	0
(f) *SLH cases (tuberculous carcases) reported by FSA*	3
(g) *SLH cases confirmed by culture of M. bovis*	1

Density of TB reactors and slaughterhouse cases in bTB breakdowns per km²



Density of skin test reactors, IFN-gamma test reactors and slaughterhouse cases in Officially bTB Free Status Withdrawn (OTFW) breakdowns per km² taken in the reporting period



Density of skin test reactors, IFN-gamma test reactors and slaughterhouse cases in OTFW and Officially bTB Free Suspended (OTFS) breakdowns per km² taken in the reporting period

4. Suspected Sources of *M. bovis* Infection for all the New OTFW Breakdowns Identified in the Report Period

Most likely origin	Provisional	Final
Introduction (e.g. purchase) of infected animal(s)		1
Local - lateral spread from neighbouring holdings:		
• exposure to infected wildlife e.g. badgers		
• other farmed species		
• recrudescence of residual infection from a previous TB breakdown		
• infected human source		
Undetermined/obscure	3	
Other (explain)		

Please attempt to categorise all new OTFW bTB breakdowns identified in your region 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). Enter the corresponding numbers of breakdowns in the relevant boxes. Any OTFW breakdowns falling in the greyed-in boxes may be removed from the county bTB incidence calculations for the purposes of EU reporting:

		Probability of isolated, sporadic ('one-off') breakdown, without secondary local spread from the index case		
		Likely (no secondary breakdowns detected)	**Possible (no secondary breakdowns detected, but dataset incomplete)**	**Not likely (secondary spread from the index case, or exposure to a common wildlife source has occurred)**
Probability of introduced *M. bovis* infection introduced via cattle movements	**Definite**		1	
	Likely			
	Possible		3	
	Not likely (indigenous infection in the locality)			

List the CPHs of those herds with OTFW breakdowns categorised as definite or likely introduced cases with no evidence of local spread (greyed-in boxes):

5. Overview of the bTB Eradication Programme in the Region

One ongoing OTFW case (genotype 25:a of *M. bovis*) of undetermined origin that was disclosed in December 2017 is being investigated as an indication of potential endemicity in the area near the south west border with Leicestershire (Leicestershire is in the Edge Area, but several recent genotype 25:a breakdowns of obscure origin in north east Leicestershire have been attributed to wildlife as most likely source pathway). Since June 2018 a potential bTB hotspot area is being implemented around this case (HS23).

Four new OTFW breakdowns have been disclosed in the first six months of 2018 (an increase compared to the total of three OTFW breakdowns during the whole of 2017). Only one out of those four was identified as being of likely purchased origin, with the remaining three breakdown identified as being of undetermined origin, and investigations into the origin are still ongoing. Nevertheless, the genotype of two of these breakdowns (one 25:b and one 10:a) indicates that they are not likely to be related to the HS23 index case (25:a). The third OTFW breakdown (no genotype identified as culture negative) of undetermined origin was disclosed as a result of RAD testing in the HS23 area and epidemiological investigations are continuing.

Two OTFS breakdowns were disclosed in the first six months of 2018, one of these still ongoing. The origin of one out of these was identified as being of purchased origin, with the remaining breakdown identified as being of undetermined origin due to unsufficient data.

- No *ad hoc* routine surveillance testing interval changes for specific herds or parishes
- New control measures since April 2016: compulsory post-movement testing for cattle entering the Low Risk Area from annual (or more frequent) testing areas of GB and voluntary 'pre-sale' bTB check test. One OTFW case was disclosed in a post-movement LRA test during the first six months of 2018
- There were no gamma test exemptions granted during the first six months of 2018
- Overall results of radial bTB surveillance: three breakdowns triggered RAD testing during the first six months of 2018, testing ongoing. One breakdown (OTFW) was disclosed in a RAD test during the first six months of 2018.
- No unusual breakdowns
- No confirmed or suspected cases of zoonotic (human) *M. bovis* infection
- No suspected cases of non-specific and fraudulent skin test reactors
- No breakdowns involving producer-retailers and unpasteurised cheese-makers, open farms, etc.
- Regular quarterly meetings are held with the NFU in the Midlands Region. APHA have given specific support and encouragement to the Lincolnshire branch of the NFU in their drive to keep bTB out of the LRA. Contact with Official Veterinarians (OVs) through OV newsletter, or direct one-to-one contact in areas such as changes to bTB policy and bTB testing protocol. Ongoing audit programme of OVs for compliance with TB testing protocol.
- Collaboration with local Trading Standards Departments on enforcement of bTB legislation. Contact on an as-needs basis regarding individual casework. Routine liaison with CCDC and PHE (public health authorities).
- No significant risks or issues concerning the delivery of TB eradication policies in the region.

6. Wildlife

Potential 'infection creep' from the Edge Area to the south west of Lincolnshire: one ongoing OTFW case (genotype 25:a) of undetermined origin that was disclosed in December 2017 in a cattle herd near the south west border with Leicestershire is being investigated as an indication of potential endemic TB in the area. As a result, a potential bTB hotspot area was identified in June 2018 and additional surveillance measures are being implemented in cattle herds and wildlife (badgers and wild deer) around this case (HS23).

Passive surveillance of hunted wild deer has continued in this area throughout the period and no suspect cases of bTB in wild deer have been notified during the reporting period.

No voluntary badger BCG vaccination known to have taken place.

7. Other Susceptible Species

No evidence of bTB (*M. bovis* infection) in any other animal species, including domestic non-bovine farm animals (camelids, goats, sheep, pigs), pets, zoo animal collections, captive (farmed/park) deer holdings and captive wild boar farms.

8. Individual summaries of new OTFW breakdowns detected in the region during the report period and ongoing breakdowns from previous years still open at the end of the report period, grouped by county

Harlaxton, GRANTHAM, Lincolnshire, NG

Incident disclosed at routine herd test in December 2017, ongoing at the end of the reporting period.

The previous RHT had been completed in 2013.

Disclosing test identified five reactors (all VL), with positive culture results for *M. bovis* and genotype 25:a of the bacterium isolated from the lesions. Several of these reactors were homebred.

First SIT with an interferon-gamma parallel test disclosed six skin reactors (2 VL, 3 NVL, one sent to Weybridge for research) and five additional interferon-gamma test positive animals (1 VL, 3 NVL and one sent to Weybridge for research). This cohort also included several homebred reactors.

The next SIT identified four inconclusive reactors (all clear at retest in the next SIT).

The following SIT disclosed one additional reactor (post mortem pending).

This is a medium-small suckler-finisher unit, that occasionally buys in animals (in the last five years: 16 in 2017 from Edge (Leics), 5 in 2015 (4 Lincs, 1 Notts), 1 in 2013 (Lincs), none from breakdown farms. One confirmed reactor was moved in 2012 from Derbyshire, from a farm with no history of bTB infection).

Pathway for introduction of disease remains undetermined and wildlife spread from a higher incidence area across the Leicestershire border cannot be ruled out, although due to the movement history of the affected herd, the introduction of infected cattle is a plausible risk pathway for this breakdown.

Application sent (response pending) for whole genome sequencing (in conjunction with cases in the Leicestershire neighbouring area) to aid determination of the origin and possible involvement of wildlife.

In addition this was identified as a potential bTB hotspot in June 2018 and additional surveillance measures are being implemented around this case (HS23). RAD test ongoing. The first set of RAD tests identified one new OTFW breakdown on a neighbouring cattle holding below.

Harlaxton, GRANTHAM, Lincolnshire NG
Breakdown disclosed as RAD test from (HS23). Previous clear RHT 2015.
Disclosing test identified 8 reactors (1VL, culture negative). Five of the reactors were homebred.
First SIT with parallel interferon-gamma test all clear.
Small suckler herd. Purchases cattle from Edge Area, including one reactor from a farm with a recent breakdown (genotype 10:a).
Pathway for origin undetermined (possible pathways being considered include wildlife as within HS23 and purchases of infected cattle.)

MARKET RASEN, Lincolnshire, LN
Heifer rearer unit (approximately 50 cattle) for sister farm, all cattle originate from that farm. Source CT pending
Disclosed at IR retest after NH CT (type of test due to split from sister farm)
First SIT and interferon-gamma test clear.
Second SIT clear. Homebred (in sister farm) reactor, genotype 10:a. Origin obscure, still under investigation.

GRANTHAM, Lincolnshire, NG
RHT disclosed 2 VL reactors, genotype 25:b. Subsequent CT clear
First SIT disclosed 1 Reactor and one IR. The reactor was also positive to the parallel gamma IFN test, which identified a second positive animal. Both were VL animals at post mortem inspection.
Origin obscure, still under investigation.

LINCOLN, Lincolnshire, LN
Slaughterhouse case confirmed by culture (Genotype 9) of *M. bovis*; out of range and typical from area of origin of the infected animal (Devon). No breakdown testing triggered as the holding is a biosecure Licensed Finishing Unit (LFU) under permanent restrictions. Identified as a case from purchased origin.

Glossary

- bTB – (bovine) Tuberculosis (infection of cattle with *M. bovis*)

- Edge Area (EA) – the annual TB testing area of England situated between the High and Low Risk Areas

- Epidemiology – the science that studies the patterns, causes, and effects of health and disease conditions in defined populations

- Genotype – the genetic makeup of a cell, an organism, or an individual usually with reference to a specific characteristic under consideration

- High Risk Area (HRA) – the annual testing area of England comprising the South West, West Midlands and part of East Sussex, in which *M. bovis* infection is endemic in cattle herds and in badgers

- IFN-γ – interferon-gamma test. A supplementary in vitro blood test for TB used by APHA in conjunction with the tuberculin skin test in some situations, usually to improve the overall diagnostic sensitivity in infected herds with OTF status withdrawn

- Low Risk Area (LRA) – the four-yearly TB testing area of the North and East of England in which *M. bovis* infection occurs only sporadically in cattle and is not considered endemic in wildlife. Although the default testing interval for routine TB surveillance is four years, some higher risk herds in the LRA are subjected to annual testing. There is also more intensive surveillance testing (radial testing) around any herds in the LRA (and parts of the Edge Area) that have their officially TB free status withdrawn due to a TB breakdown

- OTF – Officially Tuberculosis Free status. Herds that are not subjected to TB movement restrictions of any type are classified as OTF

- OTF-S – Officially Tuberculosis Free Suspended status. In England, an OTFS breakdown is a herd in which all the reactors removed had no visible lesions (NVL) on post-mortem examination and had negative culture results for *M. bovis*

- OTF-W – Officially Tuberculosis Free Withdrawn status. In England, an OTFW breakdown is a herd in which at least one test reactor with visible lesions (VL) and/or an animal with *M. bovis*-positive culture result have been disclosed

- Persistent herd breakdown – a herd that has been under TB movement restrictions for 18 months or longer due to infection with *M. bovis*

- Potential ‘Hotspots’ – a temporary area of enhanced TB cattle and wildlife surveillance that may be declared around some OTFW TB breakdowns of uncertain origin detected in a Region of historically low TB incidence

- SIT – short-interval test. A tuberculin skin test of all bovines in a TB breakdown herd, carried out 60 days after the removal of the last test reactor (or laboratory confirmation of a TB slaughterhouse case) in order to restore the OTF herd status. In the majority of cases, two successive SITs with negative results are necessary. The results can be read using standard or severe interpretation of the skin test. Calves under 42 days old are usually exempted.

- VRA – Veterinary Risk Assessment.