Bovine Tuberculosis in Northern Ireland 2020 Annual Report

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Veterinary Service Animal Health Group Communications Unit
Department of Agriculture, Environment and Rural Affairs (DAERA)
Dundonald House
Upper Newtownards Road
Ballymiscaw
Belfast
BT4 3SB

Email: VSAHG.Co-Ordination@daera-ni.gov.uk

Contents

1. Introduction

1.1 This report is intended to provide a summary of the Bovine Tuberculosis (bovine TB) eradication programme in Northern Ireland (NI) in 2020.

1.2 It includes a summary of the 2020 bovine TB disease statistics for NI. Further statistics are published monthly on the DAERA website: www.daera-ni.gov.uk/articles/tuberculosis-statistics-northern-ireland

1.3 While this is not designed to be a detailed technical report, it should provide a useful summary of the key components of the bovine TB Programme in NI in 2020.

2. Bovine TB - The Disease

2.1 Bovine TB is an infectious disease of cattle which is mainly caused by the bacterium *Mycobacterium bovis (M. bovis).*

2.2 *M. bovis* can also infect a wide range of other mammals including humans, deer, goats, camelids, pigs, cats, dogs and badgers as well as more exotic species.

2.3 Prior to the onset of bovine TB control measures, clinical disease in cattle was common and was a significant welfare and productivity concern. In cattle, bovine TB mainly manifests itself as a respiratory disease but clinical signs are now rare.

2.4 When symptoms do occur in cattle they can include progressive loss of body condition, enlarged lymph nodes and a chronic cough. Tuberculous mastitis is another symptom which is now very rarely seen.

2.5 TB in humans is usually caused by a very closely related infectious agent, *Mycobacterium tuberculosis*, but may also be caused by *M. bovis*.

2.6 Bovine TB is a zoonotic disease (i.e. potentially can be spread to humans from animals). Although it remains an important zoonotic disease in many developing countries it is now very rare in countries (such as the UK and Ireland) which have advanced control programmes and good systems of meat inspection and milk pasteurisation.

2.7 Skin testing for bovine TB began in NI in 1949 on a voluntary basis and was made compulsory in 1959. The introduction of testing initially led to a steady decrease in disease incidence which continued until the late 1990s.

2.8 In the late 1990s disease levels increased and since then, have been subject to periodic rises and falls but have not returned to the historically low levels seen prior to the 1990s.

2.9 Bovine TB is a complex, multifactorial and challenging disease that has proven difficult to eradicate worldwide. This is due to a number of complex and inter-related factors:

- The characteristics of the disease itself.
- The difficulties in diagnosis and testing.
- The existence of reservoirs of infection in other species (e.g. badgers in UK and Ireland and oppossums in New Zealand).
- The nature of the local farming industry (e.g. fragmented holdings / conacre and a large number of cattle movements).

2.10 Bovine TB is generally regarded as the most difficult and intractable animal disease challenge currently facing the UK and Ireland. Eradication will require a comprehensive range of controls to break the cycles responsible for maintaining infection. It is clear that there is no simple or cost effective "quick fix".

2.11 DAERA recognises that bovine TB and the associated testing and movement restrictions have significant adverse financial and emotional impacts on farming families in Northern Ireland.

3. DAERA's Bovine TB Goals

3.1 DAERA's ultimate goal is the eradication of bovine TB in cattle in NI but this is an ambitious and long-term objective. It is important to recognise that eradication will require a sustained long-term effort with constructive and determined, sustained co-operation between government, industry stakeholders and farmers. No single policy change or industry change can by itself drive eradication.

3.2 In the more immediate term the aims of DAERA's bovine TB policy are to:

(a) Maintain European Union (EU) approval for trade, and ensure that NI's bovine TB incidence does not impair our ability to develop trade deals with other countries.

(b) Reduce the transmission of disease between cattle, and therefore the number of reactor animals.

(c) Produce more effective and efficient ways of reducing the transmission of bovine TB between cattle and wildlife.

4. Outline of the Northern Ireland Bovine TB Eradication Programme

4.1 DAERA has a detailed bovine TB Eradication Plan which was submitted annually as part of the UK bovine TB Eradication Plan for approval by the EU Commission. Prior to April 2021, the plan had to comply with EU Trade Directive 64/432/EEC (as amended) but in April 2021, this was revoked and replaced by the introduction of the Animal Health Law, Regulation (EU) 2016/429.

4.2 EU approval of our bovine TB Eradication Plan allowed DAERA to claim EU co-funding and maximised our access to export markets for meat and dairy products. The NI Agri-Food Industry is heavily dependent on the export of meat and dairy products, and although 2020 was the last year in which EU co-funding was available to Northern Ireland, submission of the TB Eradication Plan will still be required to comply with the Animal Health Law and to help secure market access.

4.3 The 3 key pillars of the DAERA bovine TB Eradication Programme are:

1. Surveillance

This is achieved by a combination of:

- Skin and blood testing of live animals.
- Visual post mortem examination and laboratory testing of post mortem samples.

2. Removal of infection

This involves compulsory removal of reactor animals and in some cases other high-risk animals which are suspected of being infected. Occasionally in very severe breakdowns after detailed veterinary risk assessment, partial or full herd depopulations may also be carried out.

3. Preventing Spread

Through veterinary risk assessment and application of appropriate disease controls and movement restrictions.

This involves DAERA vets tracing likely sources of infection and identifying where it may have spread to. This is achieved by:

- Tracing the movement history of infected animals to identify where the infection may have come from.
- Tracing movements out of the infected herd to see where infection may have spread to.

- Identifying neighbouring herds which may also be infected or at risk.

After assessment of the above, additional testing is allocated as required for herds or animals that have been identified as being at risk. Each of these 3 elements will be considered in some detail in later sections of this report.

5. Internal Governance, Policy Development & Programme Implementation

5.1 Internal Governance

Veterinary Service Animal Health Group (VSAHG) is responsible for the development of bovine TB policy and for TB Programme implementation. TB Programme objectives are set, monitored and reviewed by a high-level TB Programme Implementation Board (TBIB) which meets quarterly, and the TB Operations Board (TBOT) then meets monthly to oversee and direct the practical and consistent implementation of TB Policy.

5.2 Stakeholder engagement

This is primarily conducted via the Animal Health and Welfare Stakeholder Forum and the TB Stakeholder Working Group. Both groups meet quarterly. Membership includes representatives from industry, veterinary and environmental organisations. The TB Eradication Partnership (TBEP) is a further key means by which stakeholders can raise issues and share their views (see 6.4 and 6.5 below).

5.3 Research

DAERA continues to work in partnership with its science provider, the Agri-Food and Biosciences Institute (AFBI), to identify knowledge gaps and to explore options for research and development to inform future policy. Further information on research that took place during 2020 is set out in Section 19.

5.4 Programme implementation

2020 was an extremely challenging year for the implementation of Northern Ireland's bovine TB Control Programme. When it became clear in March 2020 that Covid-19 was a significant threat to human life, DAERA had to develop contingency measures with regard to TB testing in keeping with guidance on social distancing measures from Northern Ireland's Public Health Agency (PHA).

5.5 On 30th March 2020,the Minister announced that TB testing should only take place under exceptional circumstances where it was deemed safe to do so in keeping with PHA guidance. Feedback from herd-keepers and Official Veterinarians, and the experiences of other jurisdictions were taken into consideration and updated guidance was implemented from 4th May 2020, recommending that TB testing should take place if it was safe to do so. This continued to be the key message throughout the rest 2020 and into 2021. A risk assessment was required to be carried out by the testing Veterinarian to determine if the test could be conducted safely while adhering to social distancing measures. Temporary easement measures were put in place on the application of restrictions to herds with overdue tests and referral for Cross Compliance breaches if the reason for testing delays was Covid-19. A temporary concession was also put in place to allow calves under 180 days of age to be omitted from herd tests when the risk assessment suggested that young calves could not be tested safely while adhering to social distancing guidelines. Although this concession was available, in most situations it was possible to test these animals safely during the herd test. When calves aged 42-180 days were omitted from testing they were restricted to that herd until such time that testing could be carried out on safely.

5.6 DAERA officials monitored the TB testing situation closely throughout the pandemic. Following the initial announcement that TB testing was to take place in exceptional circumstances only, the numbers of herds and animals being tested dropped significantly. DAERA were cognisant of the effect that reduced testing would have on disease incidence levels and worked with herd-keepers and testing vets to find solutions that would allow testing to resume, while keeping informed of developments in other jurisdictions. With the announcement that testing could take place following a risk assessment and without the need to test animals under 180 days of age, testing resumed at levels comparable to 2019 figures.

5.7 All easement measures were kept under constant review throughout 2020 and were updated regularly as the situation evolved. On 27th October 2020, the Minister announced that easements around applying restrictions to herds that could not carry out their TB test safely while adhering to social distancing measures introduced to facilitate trade would be repealed on a phased basis from 1st December. Following this announcement, testing levels accelerated sharply bringing herd and animal tests carried out in 2020 as a whole, favourably in line with testing in 2019.

6. Development of a new Bovine TB Eradication Strategy for Northern Ireland

6.1 Work on a proposed new TB Eradication Strategy for Northern Ireland continued throughout 2020. It is based upon the recommendations of the TB Strategic Partnership Group (TBSPG), which was set up in 2014 to develop a "long term strategy to eradicate bovine TB" from Northern Ireland. TBSPG published its recommendations in December 2016 and the Department's response to TBSPG's recommendations was subject to public consultation in late 2017 / early 2018. Further details can be found at: https://www.daera-ni.gov.uk/publications/tbspg-bovine-tb-eradication-strategy-ni

6.2 The proposed Strategy is intended to address all of the factors which contribute to the spread and endurance of bovine TB here, with its recommendations set out across 6 key areas:

- Management, oversight and partnership working
- Tools and processes
- Herd health management
- Finance and funding
- Research
- Wildlife

6.3 Some of the Strategy's proposed measures will require new legislation and further consultation. In January 2020, Edwin Poots MLA was appointed Minister of Agriculture, Environment and Rural Affairs. The Minister made clear that tackling bTB was one of his top priorities and throughout 2020 officials continued to work on the development of the Strategy including work on a business case to support the Strategy's recommendations.

The TB Eradication Partnership (TBEP)

6.4 In 2018, DAERA proceeded with the TBSPG recommendation to establish a TB Eradication Partnership - an independent group to advise the Department and any future Minister on the strategic direction of the Eradication Programme. The Group is chaired by Sean Hogan (who previously chaired the TBSPG) and other members are drawn from industry, science, veterinary and environmental backgrounds.

6.5 During 2020, TBEP continued to support DAERA in the development of the new bTB Strategy, liaising with stakeholders; the Minister; and officials.

7. Overview of Programme Delivery

Veterinary Service Animal Health Group (VSAHG)

7.1 Veterinary Service Animal Health Group (VSAHG) is responsible for the integrated delivery of the TB Programme in NI.

7.2 There are 10 Divisional Veterinary Offices (DVOs) in Northern Ireland based in regional DAERA Direct offices. Each DVO covers a specific geographic area and is overseen by a Field Divisional Veterinary Officer.

The 10 DVO Offices are:

- Armagh
- Ballymena
- Coleraine (also has a sub-office in Magherafelt)
- Dungannon
- Enniskillen
- Mallusk
- Newtownards
- Newry
- Omagh
- Strabane

7.3 Each DVO area is then further geographically divided into “Patches”. TB Programme tasks are allocated on a “Patch” basis with administrative, valuation, technical and veterinary staff being allocated designated Patches.

7.4 Each Patch has a nominated DAERA “Patch Vet”. Every TB breakdown is managed by the Patch Vet responsible for that Patch. Patch Vets are supported in their Patch management by administrative and technical staff. Staff may be responsible for multiple Patches.

Outline of the Key Elements of Programme Delivery

7.5 The TB Programme is complex through necessity and involves a wide range of people, tasks and roles, both within DAERA and outside it. The list below gives an overview of some of the elements integral to Programme Delivery:

✔ **APHIS database**

Records animal registration and movement / restriction information at herd and individual animal level. DAERA is currently working towards the replacement of APHIS with a new, custom built IT interface (NIFAIS) and this will in time become an integral part of the TB Programme.

- ✔ **On farm TB testing**
- ✔ **Post mortem / meat inspection**
- ✔ **Laboratory services (provided by AFBI)**
- ✔ **Valuation, removal and compensation**
- ✔ **Contract management for the removal and slaughter of infected stock**
- ✔ **Veterinary investigation and management of each breakdown**

  DAERA vets and technical officers are involved in mapping and breakdown management.

- ✔ **Tracing of movements into and out of infected herds**
- ✔ **Provision of disease control and biosecurity advice to herd keepers**
- ✔ **Monitoring / quality assurance of each element of programme delivery**
- ✔ **Investigation and enforcement action when necessary**

  In some cases this may include assessment of the requirement for Cross Compliance penalties.

- ✔ **Veterinary Epidemiology Unit (VEU)**

  Provide expert opinion and analysis of disease trends and statistics as well as provide expert advice on research and policy direction.

- ✔ **Stakeholder and herd keeper co-operation**

  Without the support and engagement of our stakeholders DAERA could not implement the TB Programme.

8. The Single Intradermal Comparative Cervical Test (Skin Test)

8.1 The main test used to detect bovine TB in live animals in NI remains the Single Intradermal Comparative Cervical Tuberculin test (SICCT) colloquially known as the "skin test". This test is approved by both the EU and the OIE (World Organisation for Animal Health).

8.2 All herds in NI are tested at least annually. When disease has been detected in a herd or an area, testing frequency is increased. Some herds and / or individual animals may also be subject to additional testing if they are deemed at risk after disease investigation of an outbreak in another herd.

8.3 Skin testing in NI is carried out by veterinary surgeons. The majority of routine testing is carried out by Private Veterinary Practitioners (PVPs) who carry out the testing under contract to DAERA. Private vets acting in this capacity are known as Approved Veterinary Surgeons (AVSs) in keeping with the Tuberculosis (Examination and Testing) Scheme Order (Northern Ireland) 1999 (as amended). **(See Section 9)**

8.4 DAERA vets also carry out a significant proportion of TB skin testing. The majority of this testing is focused on breakdown herds and individual high-risk animals, such as retesting of previously inconclusive animals or animals traced from breakdown herds.

8.5 The skin test involves the injection of 2 types of tuberculin (avian and bovine) into the skin on the side of the neck. The skin thickness at each site is measured before injection and again 3 days later.

8.6 Increases in skin thicknesses are compared against prescribed interpretation criteria. The animal is then classed as negative if it has passed the test. If the result is positive, the animal is declared to be a reactor. Skin reactors are subject to compulsory slaughter. If the animal yields a doubtful result the animal is restricted and classed as an inconclusive.

8.7 Pending final interpretation of test results by a DAERA vet, reactor and inconclusive animals are subject to an immediate isolation and restriction notice, issued on farm by the testing vet.

8.8 In some cases, such as in confirmed breakdown herds or high-risk situations, the results will be interpreted under "severe" interpretation, and inconclusive animals may be reclassified as reactors. In routine tests, animals with inconclusive results are risk assessed by the interpreting DAERA vet and in most cases are retested after a minimum of 42 days.

In 2020 a total of 3,241,888 animal skin tests were carried out of which 12,852 were positive / reactors. This equates to an animal incidence of 0.747%.

Individual Animal Tests

Table 1: Herd Test Statistics for 2019 and 2020

	2019	2020	Difference between 2019 and 2020 (%)
Total No. of herd tests completed (some herds will have been tested > once)	**37,700**	**36,379**	**-3.50%**
- Restricted herd tests	8,360	7,817	-6.50%
- Risk Tests	18,567	18,228	-1.82%
- Routine tests	10,773	10,334	-4.08%
Total No. of herds tested	**22,398**	**22,058**	**-1.5%**
Total No. of herd tests with at least 1 reactor disclosed	**3,106**	**3,107**	**0.03%**
- Restricted herd tests	1,695	1,654	-2.42%
- Risk herd tests	1,112	1,175	5.67%
- Routine Herd Tests	299	278	-7.02%
Total No. of animal tests	**3,241,888**	**3,097,617**	**- 4.45%**
Total No. of animals tested	**1,732,196**	**1,720,278**	**-0.69%**
Total No. of skin test reactors	**13,019**	**12,852**	**-1.28%**
Number of confirmed skin test reactors	**5,625**	**5,379**	**-4.37%**
Total No. of Negative In Contacts (NICs) removed	**673**	**714**	**+6.10%**
Confirmation rate of skin test reactors	**43.21%**	**41.85%**	**-1.36%**

Individual Animal Tests

8.9 In addition to whole herd skin tests, specific animal(s) may need to have an individual TB skin test. These tests are categorised according to the reason why the test was allocated. The most common reasons for setting individual tests are:

- **RI tests** - Retesting of an inconclusive animal.
- **CTT or CTQ tests -** tests allocated due to a link with a breakdown herd established by tracing of animal movements.
- **PNAs -** When an unauthorised move has occurred from a restricted herd.
- **PCTs -** Private tests requested by herd keepers usually for the purposes of export/ sale/movement to AI centre.
- **PNTs -** Private tests because an animal has not been tested for > 15 months and is restricted from moving other than to direct slaughter.
- **CTS -** Where an animal/s have an unknown TB status usually because it has missed a test.

8.10 PNAs / PCTs and PNTs are private tests carried out by AVSs and herd keepers are responsible for payment and arrangement. Other compulsory individual animal tests are carried out by DAERA staff at no cost to the herd keeper.

Table 2: Individual Animal Skin tests statistics for 2019 & 2020

Test Reason	2019			2020		
	Tests carried out	Reactors	% Positive	Tests carried out	Reactors	% Positive
RI	917	235	25.63%	856	248	28.97%
CTT	6,416	121	1.89%	6,427	119	1.85%
CTQ	628	5	0.80%	617	0	0.00%
CTS	393	4	1.02%	547	12	2.19%
PCT	878	1	0.11%	769	4	0.52%
PNA	347	7	2.02%	428	4	0.93%
PNT	89	0	0.00%	82	0	0.00%

9. The TB Testing Contract

9.1 A Contract for the Provision of Bovine Tuberculosis Testing, its Associated Services and Biosecurity Advice (the TB Contract), was introduced in April 2016. The TB Contract is a 5 year contract with an optional 2-year extension. This option has now been exercised by DAERA, therefore the current Contract will now finish in April 2023.

9.2 The TB Contract requires Private Veterinary Practices (the Contractors) to deliver TB testing at a standard set by DAERA. Under the TB Contract, veterinarians employed by Contractors who carry out TB testing on behalf of DAERA are termed Approved Veterinary Surgeons (AVSs).

Key Performance Indicators (KPIs)

9.3 Delivery of TB testing services by Contractors is measured against Key Performance Indicators (KPIs) covering notification of testing arrangements, submission of test results, TB testing performance, and standards of veterinary certification. The KPI thresholds were set at the start of the contract and the thresholds for KPIs 1, 2, 3, and 4, which relate to organisation of tests and submission of test results, were raised in April 2017, 2018 and 2019 as shown in **Table 3** overleaf.

Table 3: Thresholds for TB Contract KPIs 1-4 and 7

KPI	Area of Compliance	Threshold in 2016	Threshold from April 2017	Threshold from April 2018	Threshold from April 2019
KPI 1	Test appointments to be notified to DAERA by Wednesday 5pm of the week preceding.	80%	90%	90%	90%
KPI 2	Test reports with Positive Reactor animals to be notified to DAERA within 1 working day.	85%	90%	95%	100%
KPI 3	Test reports with inconclusive animals to be notified to DAERA within 2 working days.	80%	90%	90%	90%
KPI 4	Test reports with only negative animals to be notified to DAERA within 5 working days.	80%	90%	90%	95%
KPI 7	Test results and findings returned correctly via e-PVP such that it is unnecessary for the Contractor to ask the Authority to reopen the test for correction.	100%	100%	100%	100%

Contractor Performance

9.4 Figure 1 shows that over time there has been a general, consistent improvement for each parameter measured. KPI targets have been increased over time and Figure 2 shows Contractor Performance against the relevant KPI targets for that time period.

Figure 1: TB Testing Services Contract KPI performance Year 1 Quarter 1 to Year 5 Quarter 3.

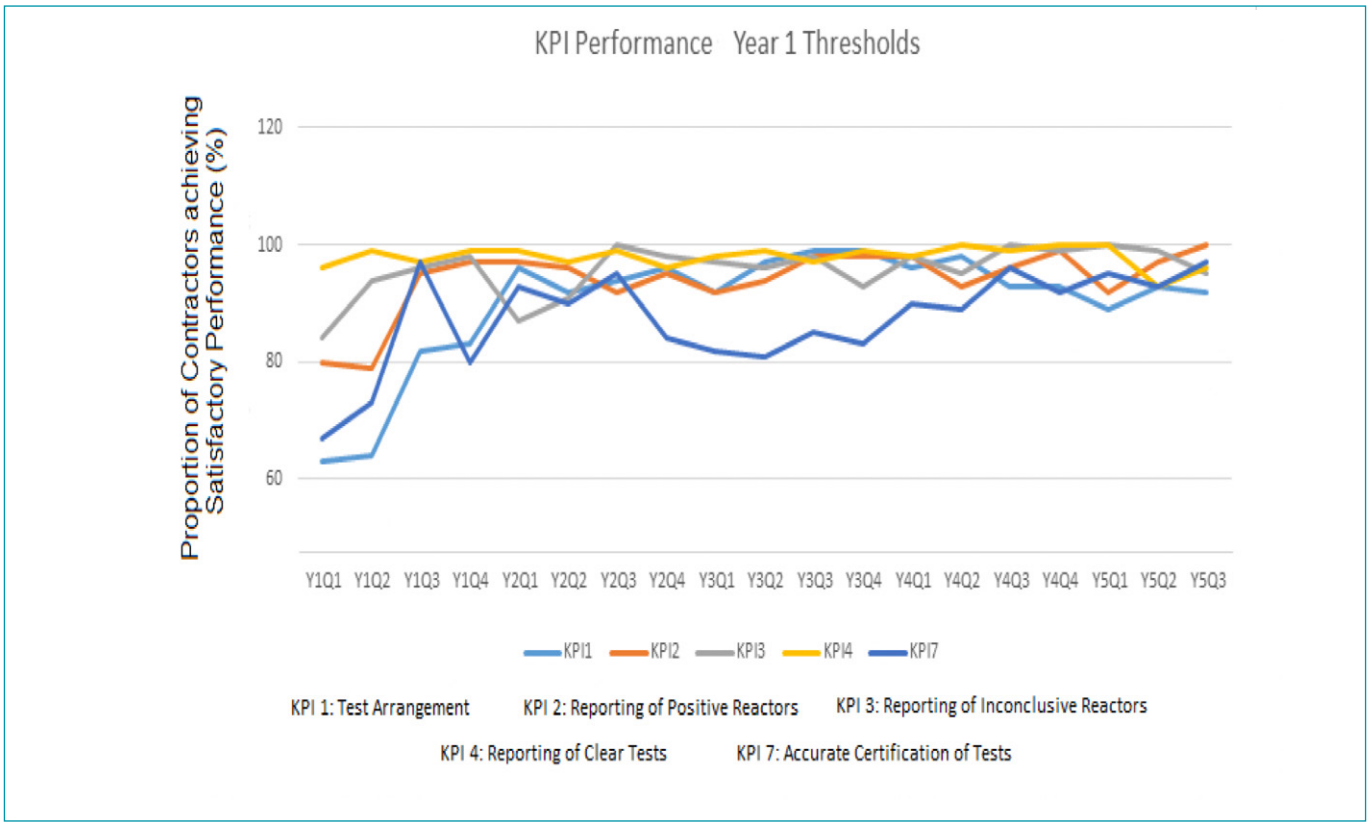
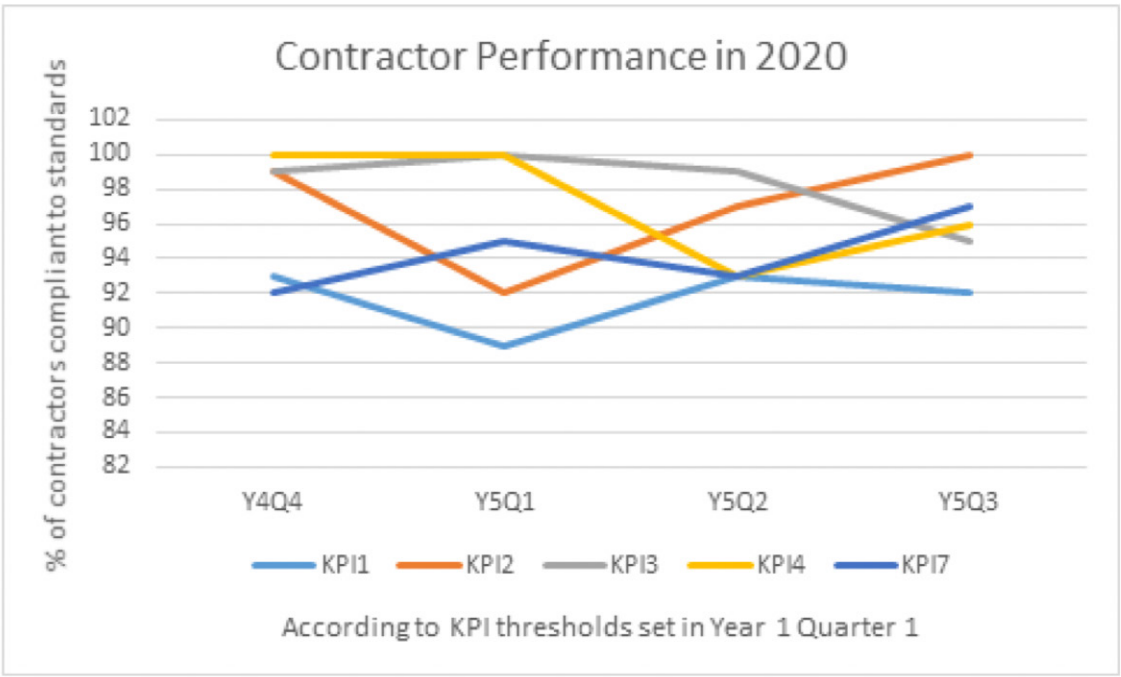


Figure 2: Contractor Performance for 2020



9.5 KPI 5 and 6 are not included in the above:

- KPI 5 relates to the performance of the TB test by the individual AVS. In 2020 Field Compliance Inspections were halted by issues related to COVID-19 and resource constraints. Consequently in 2020 there were no new instances where an AVS's approval to TB test was suspended due to a "not acceptable" performance during a Field Compliance Inspection.

- KPI6 relates to the application of DNA tags to reactors identified at TB tests. DNA tagging by AVSs was not introduced until 2021.

10. Interferon Gamma (IFNG) Blood Testing

10.1 The supplementary test which is used in live animals by the TB Programme is the IFNG (Interferon Gamma) blood test. There is evidence that the IFNG test can:

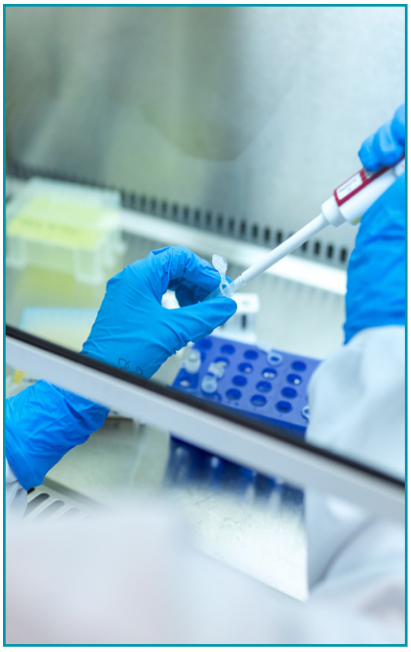
✔ Detect infected animals at an earlier stage of infection than the skin test.

✔ Identify some infected animals that are missed by the skin test.

10.2 The IFNG test is approved by the EU and OIE and is normally used in parallel testing i.e. in conjunction with the skin test. The IFNG test has a lower specificity and a higher sensitivity than the skin test.

This means that although it detects more infected animals, it also generates more 'false positives' (3-4 false positives per 100 disease free animals tested compared to one false positive per 5,000 disease free animals tested with the skin test).

10.3 DAERA Policy is that the IFNG test is only used in breakdown herds, as specificity is enhanced by using the test in higher disease prevalence situations. It is used in conjunction with the skin test and in accordance with certain pre-defined criteria. Parallel testing is used in this way to maximise early detection of infected animals. In 2020, the IFNG test was only offered on a voluntary basis (i.e. with the agreement of the herd keeper).



10.4 In 2020, when an animal had a positive IFNG test result, DAERA offered valuation and slaughter of the animal. This was again on a voluntary basis and the herd keeper did not have to surrender these animals (unless they were also skin reactors).

10.5 In 2020, when IFNG test positive animals were negative at the skin test and did not show visible bovine TB lesions at post mortem, they were not counted as reactors for the purposes of the herd status.

This meant that if there were no skin reactors identified at the parallel test, the herd test was counted as a clear test and the IFNG test positive result did not prolong the duration of the breakdown and associated movement restrictions.

10.6 Data clearly shows that if IFNG test positive animals are retained in the herd, they are much more likely to become skin test or post mortem positive in the future[1]. This supports the concept that IFNG testing is useful in picking up early infection in TB breakdown herds.

10.7 The TBSPG Eradication Strategy included specific recommendations on the use of IFNG testing. They proposed that IFNG testing should become compulsory rather than voluntary and that removal of IFNG test positives should also be mandatory. In the interim, DAERA has arranged increased laboratory capacity and is actively encouraging herd keeper IFNG test uptake.

10.8 Detailed information and statistics on IFNG testing figures for 2019 and 2020 are included in Table 4 overleaf. The key points to note are:

- In 2020 despite the impact of Covid-19 on herd testing and a temporary suspension of IFNG testing, there was less than a 1% decrease in numbers IFNG tested (compared with 2019).

- In 2020, 1036 animals were positive only on IFNG (i.e. were skin negative). 877 of these animals (approximately 85%) were removed solely on the basis of IFNG test results. Without IFNG testing these animals would have remained on farm and potentially contributed to onward spread of disease. This figure of 85% is a slight increase from approximately 81% in 2019.

- Since removal of IFNG test positives which were clear on the skin test was not compulsory in 2020, a substantial number (approximately 15 %) remained on farm because herd keepers did not agree to their removal.

- Approximately half of skin reactors will give negative IFNG test results and approximately three quarters of animals which test positive on the IFNG testing are negative on skin test. This explains why both tests are used in parallel in order to maximise the detection of infection.

- Since the IFNG test can often detect infection at a much earlier stage than the skin test, animals which are blood test positive but skin test negative are much less likely to have detectable lesions at post mortem. This explains why the lesion rate

of these animals is much lower than that for skin reactors. The absence of grossly visible lesions at post mortem does not indicate that the animal was not infected but is more likely to be an indicator that the infection was at an early stage.

- The visible lesion rate at slaughter for animals removed solely on the basis of blood results was 8.43% in 2020. There is no submission of samples to the AFBI laboratory for further testing for these animals.

Table 4: IFNG Tests and Animals Tested in 2019 and 2020

	2019	2020
No. of herd tests where IFNG testing was carried out *	255	236
No. of herds which had IFNG testing at least once	241	230
No. of animals IFNG tested	22,438	22,242
No. of animals with valid IFNG results	22,395 (99.81%)	22,217 (99.89%)
No. of animals with valid results positive on IFNG	884 (3.95%)	1,351 (6.08%)
No. of animals positive on both skin and IFNG	219 (0.98%)	315 (1.42%)
% of IFNG positives which were also skin positive	24.77%	23.32%
% of skin positives which were also IFNG positive	48.88%	59.32%
No. of animals positive on IFNG but skin negative	665	1,036
% of animals with valid test results which were IFNG positive	2.96%	4.66%
% of IFNG positives which were negative on skin tests	75.23%	76.68%
No. of animals voluntarily removed as IFNG positives	538	877
% of IFNG skin negative animals for which were removed	80.90%	84.65%
No. of voluntarily removed IFNG positives which had visible lesions at slaughter	63	74
Overall visible lesion of ALL slaughtered IFNG positives	24.74%	20.16%
Visible lesion rate of voluntarily removed IFNG positives	11.71%	8.43%

(*some herds may have been tested with IFNG more than once in the year at separate herd tests).

11. Valuation, Removal and Disposal of Infected Cattle

Valuation

11.1 Skin test reactors and Negative in Contact (NIC) animals are subject to compulsory removal and slaughter. Animals are valued by DAERA Livestock Valuation Officers (LVOs) at 100% of "market value". If valuation cannot be agreed, the herd keeper is entitled to go through a process of independent valuation. If valuation is still not agreed, removal proceeds and a Valuation Appeals Process is commenced. Three herd keepers had independent valuations agreed in 2020. DAERA valuation was agreed for all other cattle which were valued in 2020 for compulsory removal under the TB Scheme.

11.2 During 2020, when an animal positive only on the IFNG test was voluntarily surrendered, valuation was also at 100% of market value but the herd keeper had no option for independent valuation. If valuation was not agreed, the animal remained on farm (see 10.4).

Removal of Animals from Farms

11.3 After valuation is agreed, animals are slaughtered at an abattoir under DAERA contract. Haulage from farm to factory is provided by approved hauliers sub-contracted by the abattoir.

11.4 Alternatively, herd keepers are at liberty to arrange the slaughter and transport of reactor animals themselves at any abattoir that agrees to accept the animal(s). This is very rarely done as animals with a TB status are generally slaughtered at "owner's risk", meaning that the herd keeper risks significant deductions or even zero payment from the factory if the animal fails ante mortem or post mortem examination.

11.5 DAERA aims to have reactor cattle removed from the farm within 15 working days of the test result. In 2020 despite the pandemic, this target was met for 93.66% of TB reactors, only a slight decrease on the 2019 figure of 94.52%.

Salvage Value of Carcasses

11.6 When DAERA removes an animal(s), the herd keeper receives 100% of the agreed valuation of the animal regardless of whether or not the carcase passes meat inspection and is eligible for human consumption. Under the terms of the Haulage and Slaughter Contract (and subject to satisfactory ante and post mortem examination) the Contractor may sell on into the food chain any meat fit for human consumption. The Contractor must then pay to DAERA a "salvage value". The salvage price is set per kg of meat fit for human consumption.

12. Post Mortem Examination (PME) and Meat Inspection

Routine Meat Inspection

12.1 All cattle slaughtered for human consumption are subject to Post Mortem Examination (PME). The primary purpose of this examination is for public health assurance. As part of the PME, the carcase is examined for visible signs of bovine TB. TB manifests itself at PME in the form of granulomas which are generally referred to as “lesions”.

12.2 Disclosure of visible lesions suggestive of TB infection will, subject to veterinary risk assessment, result in either partial or full condemnation of the carcase. It also triggers the application of herd restrictions and instigation of TB breakdown procedures on the herd which presented the animal for slaughter.

12.3. It is important to note that bovine TB is a slowly progressive disease. This means that particularly in the early stages of the disease, lesions may not be grossly visible. In addition, as the primary reason for PME is public health assurance, logistical and time constraints mean that it is not a forensic post mortem. Lesions may also be located in an area of the carcase that is not routinely examined **The absence of TB lesions therefore does not mean that the animal was not infected with bovine TB.**

TB Lesions Found at Routine Slaughter

12.4. When non-reactor reactor animals are found to have lesions on PME that resemble bovine TB, these animals are known as Lesioned at Routine Slaughter (LRS). The number and distribution of LRS animals is a useful indication of the underlying disease levels and trends in the cattle population and therefore routine meat inspection procedures represent an important independent sampling system outside live animal surveillance.

12.5 It is also important to note that other conditions such as actinobacillosis (timber tongue) can manifest as granulomas that are grossly indistinguishable from bovine TB lesions. For this reason, samples are taken from LRS animals for laboratory testing to confirm if there could be an alternative diagnosis. If actinobacillosis is confirmed, any herd restrictions and herd testing changes that were triggered by the LRS are reversed. In cases of other alternative diagnoses, restrictions remain in place until a negative bacteriological culture result for TB is obtained.

Table 5: Herd Breakdowns triggered by detection of LRS animals.

	2019	2020	% change
Total Number of LRSs (excluding direct imports)	2,096	2270	8.30%
Number of cattle slaughtered in NI meat plants (excluding direct imports)	439,656	434,934	-1.07%
Number of LRS per 1000 animals slaughtered (excluding direct imports)	4.78	5.20	8.79%
Number of confirmed LRSs (excluding direct imports)	1,270	1,467	15.51%
Confirmation Rate of LRSs	60.59%	64.63%	4.04%

12.6 Each year a large number of cattle are imported for direct slaughter in NI meat plants. These imports are mostly from the ROI although some are from GB. Since these cattle didn't come from NI herds, if they present as LRS animals this is not reflective of disease levels in NI. When such cases do occur, DAERA inform the country of origin and they will follow up accordingly.

12.7 In 2020, 2270 LRS animals were identified in NI meat plants (figure excludes direct slaughter imports). This compares with a figure of 2096 in 2019 (an increase of 8.3%).

Table 6: Herd Breakdowns triggered by detection of LRS animals.

	2019	2020
Number of herds restricted as a result of detection of an LRS(s) (including those with an alternative diagnosis)	724	665
- Number of these herds where follow up lab testing confirmed bovine TB in LRS animal	408	363
- Number of these herds where follow up skin testing identified at least 1 skin reactor	246	248

Confirmation rate of Skin Test Reactors

12.8 Samples taken at post mortem for laboratory examination are submitted for histology and culture testing in the laboratory. Histology is the process of staining the sample and analysing it under a microscope to see if TB-like bacteria are present. Culture is the process of attempting to grow bovine TB bacteria in the laboratory. A positive culture is regarded as the gold standard / definitive confirmation of disease.

12.9 It is important to recognise the fact that failure to confirm infection does not mean that an animal was not infected. False positives are relatively rare for the TB skin test. Published studies suggest that approximately 99.98% of non-infected animals will correctly test negative[2]. This explains why the TB Programme cannot regard skin test positives as non-infected, even if there is no PME or laboratory confirmation. In fact, recent research has also shown that the number of reactors in a breakdown is predictive of the future TB risk regardless of whether or not those animals are confirmed as infected3[3,4,5].

12.10 Since neither post mortem examination or culture will pick up on all cases, from a TB Programme perspective, a skin test reactor animal is considered to be a confirmed TB case if it also has **either** TB like lesions at post mortem **or** is positive on subsequent laboratory testing.

The confirmation rate for skin test reactors in 2020 was 41.85% (a decrease of 1.36% on 2019 figure of 43.21%).

13. Veterinary Management of TB Breakdowns

TB herd statuses

13.1 Every herd in NI must have an Official Tuberculosis (OT) status attributed to it on APHIS at all times. Herd statuses can be affected by test results or non-compliance with testing or movement rules. The minimum requirements for the application and removal of OT statuses are prescribed by legislation. The TB Programme also has detailed instructions for the management of overdue tests etc.

13.2 There are 3 OT TB status categories:

- ✔ **OTF (Officially Tuberculosis Free)** - This status is for herds up to date with testing and with no suspicion of disease.
- ✔ **OTS (Officially Tuberculosis Suspended) -** When applied for disease reasons this status means the herd is suspected to have disease but is not being treated as a confirmed breakdown.

- ✔ **OTW (Officially Tuberculosis Withdrawn) -** When applied for disease reasons this status means that the herd is being treated as a confirmed TB breakdown.

13.3 OTS and OTW statuses may also be applied in some other circumstances where the TB status of a herd is uncertain e.g. a lack of compliance with identification and movement requirements or when a TB test becomes overdue.

TB Movement Restrictions

13.4 As soon as bovine TB is suspected in a herd, OT statuses are amended and movement restrictions are applied at herd level. TB statuses are also applied at individual animal level for animals which require specific movement restrictions. This includes animals which are reactors, animals where the skin test result is inconclusive, or animals of unknown TB status due to movement through infected herds.

13.5 When a herd loses its OTF status, movement restrictions are applied in accordance with legislation and programme rules.

Movement out of all breakdown herds is restricted, except for movement directly to abattoirs in NI. In some cases, when the disease risk is very high or testing is very overdue, movements into the breakdown herd may also be restricted.

13.6 DAERA recognises that in some circumstances the impact of movement restrictions may cause intolerable financial, health or welfare issues for the restricted herd or herd keeper. For this reason, there is a procedure where in some limited circumstances, after full veterinary risk assessment and approval by senior VSAHG management, a one-off exceptional move into an already restricted herd may be permitted.

OTS vs OTW Breakdowns

There are 2 categories of TB Breakdowns:

13.7 **OTS breakdowns**
Breakdown herds which have had an LRS or singleton skin reactor where disease either has not been confirmed, or has not yet been confirmed, have OTS status applied. OTS breakdown herds require at least ONE full clear herd test a minimum of 60 days after the reactor / LRS has left the herd to regain OTF status.

13.8 **OTW breakdowns**
This means the herd has either had multiple skin reactors, more than 5 animals lesioned but unconfirmed at routine slaughter or a singleton skin reactor was confirmed as infected. These herds require at least TWO full herd tests at least 60 and 120 days after the last reactor / LRS has left the herd to regain OTF status.

13.9 Breakdowns which are OTW are subjected to more rigorous disease controls than OTS breakdowns. The additional measures applied to OTW breakdowns include:

- ✔ Skin tests are read and interpreted under severe interpretation. This means the threshold is lower for an animal to be declared a reactor and also that there is no inconclusive category - all animals are declared as either positive or negative.
- ✔ 2 consecutive, clear herd tests are needed before the herd can be derestricted.
- ✔ Movement tracing is carried out for movements in and out of the herd.
- ✔ Neighbouring herds will be subject to veterinary risk assessment and may have their testing frequency increased. This is known as “Lateral Check” or LCT testing.

13.10 A DAERA Patch Vet oversees the management, risk assessment and decision making for each breakdown. Technical staff perform some tasks under veterinary supervision.

13.11 Breakdown management includes:

- Tracing of movements into and out of infected herds to identify other animals / herds that may be at risk and require restriction and testing.
- Ensuring compliance with statutory notices for isolation and cleansing and disinfection.
- Mapping and risk assessment to identify if other local herds may be at risk and need to undergo increased testing.
- Liaison with herd keeper to discuss all aspects of the breakdown and provide specific advice which may be relevant to the breakdown (e.g. biosecurity advice).
- Ensuring all requirements are met for de-restriction.

13.12 Following a veterinary risk assessment and in accordance with prescribed procedures, DAERA vets may decide to apply additional control measures in some cases. Some examples may include:

- Stricter interpretation of test readings in very high risk animals / groups.
- Use of IFNG blood testing in conjunction with the skin test.
- Removal of very high risk animals with negative test results. Typically these would be small numbers of animals with a clear test result in a heavily infected group or animals with previous inconclusive readings. These animals are known as NICs (Negative in Contacts).

- Partial or full herd depopulations.

- Area based controls - When there is a severe disease problem in a local area, it may be designated as a "High Incidence Area" (HIA) and all herds in that zone will be subject to increased testing requirements.

14. Overview of 2020 Bovine TB Statistics

TB Incidence Figures

14.1 The primary measures we use to quantify bovine TB levels in NI are the "animal incidence" and the "herd incidence" (see Glossary). We use the 12-month moving average in all our routine TB statistics because this gives the clearest indication of long term trends.

This adjusts for short term variations which may be due to other factors such as seasonality of TB testing rather than changes in disease levels.

14.2 Annual herd incidence increased during the year from 7.84% at the end of December 2019 to 8.44% at the end of December 2020.

14.3 Annual animal incidence decreased during the year from 0.752% at the end of December 2019 to 0.747% at the end of December 2020.

14.4 The total number of TB reactors decreased from 13,019 in 2019 to 12,852 in 2020.

Table 7: Herd and Animal Incidence statistics for last 5 years

Year	2016	2017	2018	2019	2020
Annual animal incidence	0.697%	0.911%	0.879%	0.752%	0.747%
Annual herd incidence	7.45%	9.61%	9.22%	7.84%	8.44%

Figure 3: Graph showing trends in NI Herd and Animal TB Incidence over time

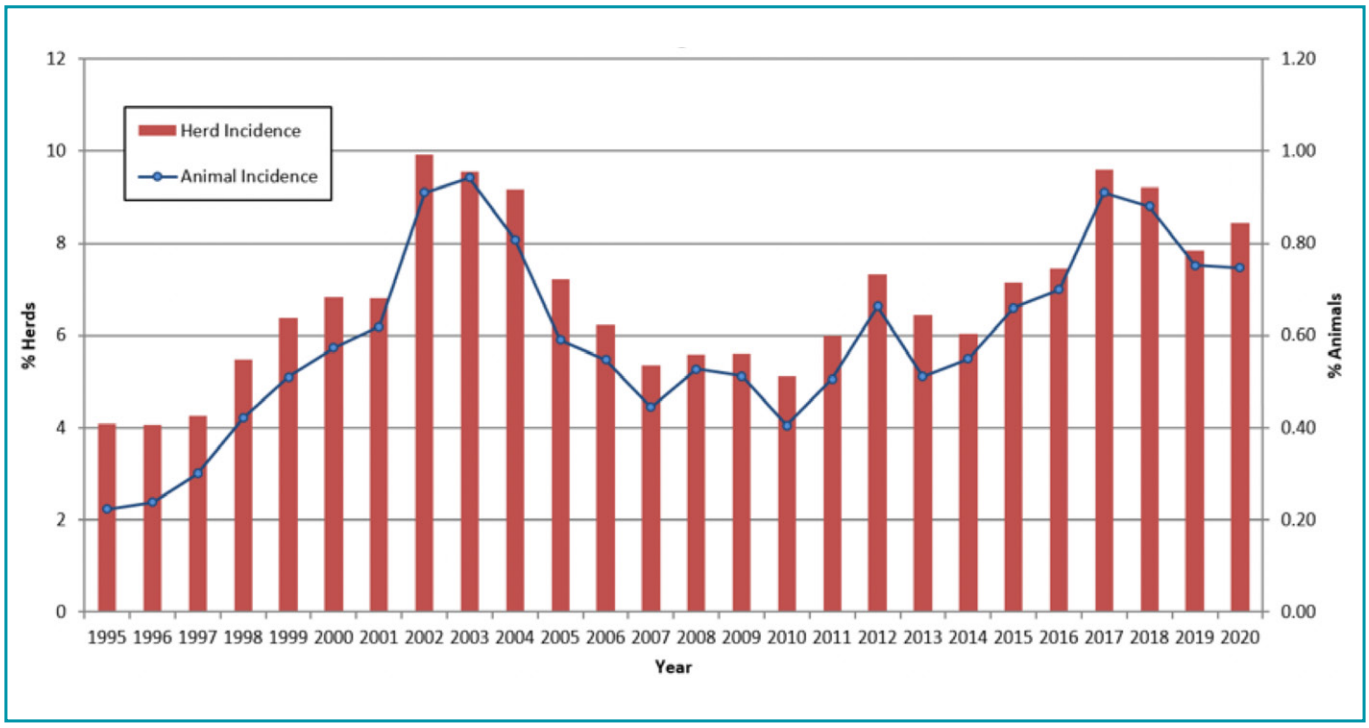
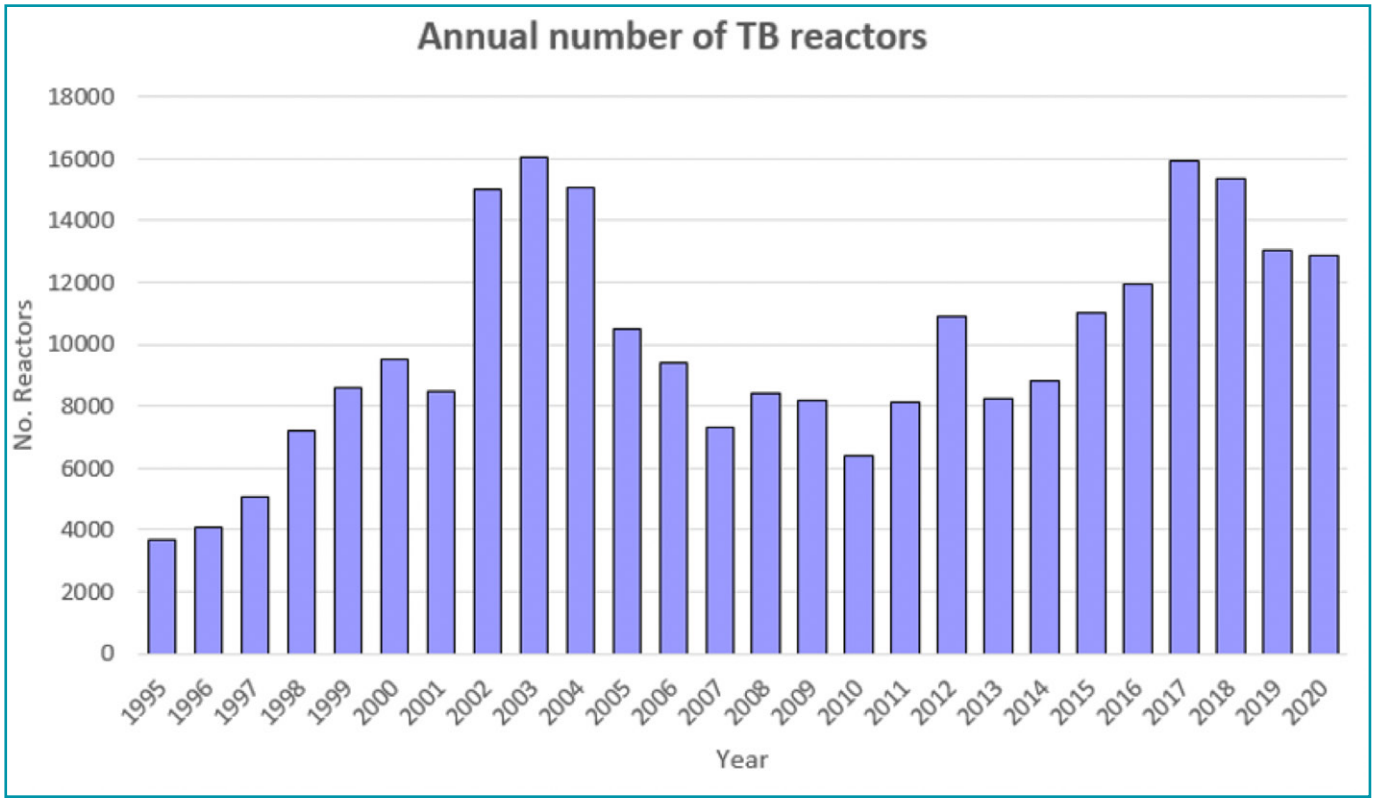


Figure 4: Graph showing trends in number of confirmed TB reactor herds and animals in NI over time



Geographical Distribution of TB

14.5 Certain DVO areas have always tended to have higher disease levels than others. As would be expected, generally the areas with highest density of cattle herds have the highest disease incidence. See Figures 5 and 6 below:

Figure 5: Herds with TB reactors: 1 January 2020 - 31 December 2020

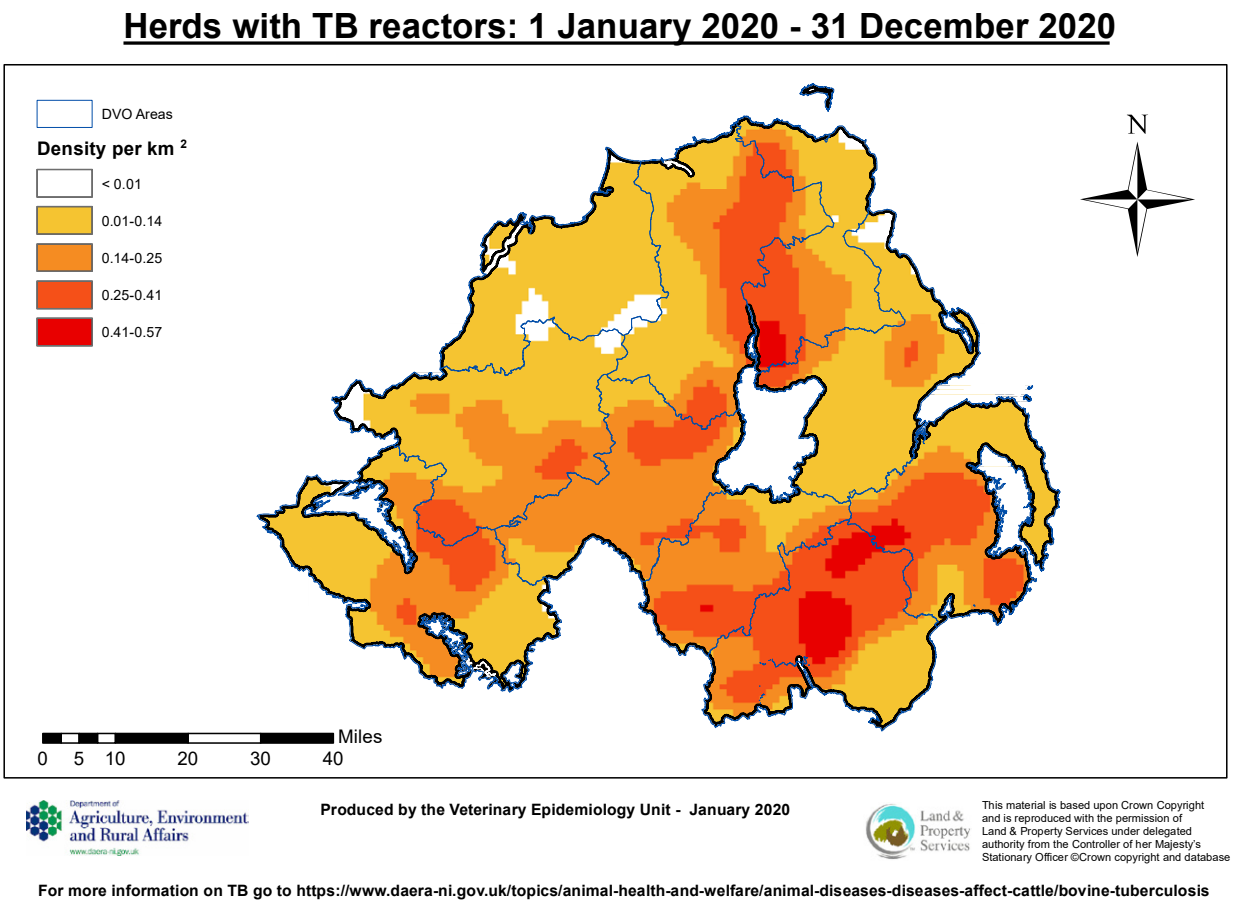
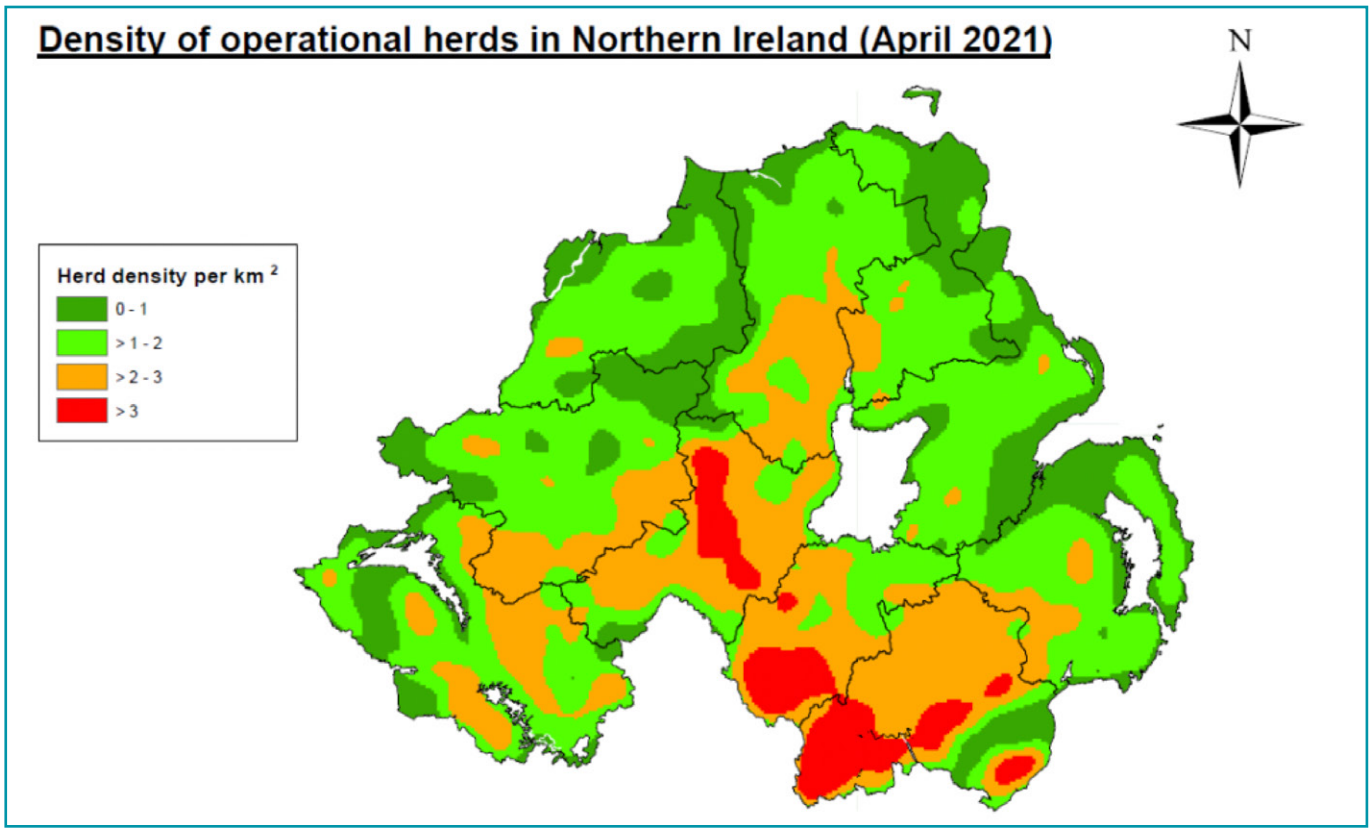


Figure 6: Density of operational cattle herds in NI (May 2020)



New Herd Breakdowns

14.6 Herds with at least one reactor animal where the herd had no other reactor animals during the previous 12 months are defined as new bovine TB herd breakdowns. 1861 new TB herd breakdowns were identified during 2020, compared to 1757 in 2019 (a 5.92% increase). Almost all DVO areas had an increased number of new bovine TB herd breakdowns during 2020.

Table 8: New Bovine TB Breakdown Herds in 2019 and 2020

Year	Armagh	Ballymena	Coleraine	Dungannon	Enniskillen	Mallusk	Strabane	Newry	Newtownards	Omagh	Totals
2019	174	122	211	190	218	128	29	304	209	172	1,757
2020	169	173	213	203	216	119	52	310	217	189	1,861
% change	-2.87	41.80	0.94	6.84	-0.92	-7.03	79.31	1.97	3.83	9.88	5.92

Further Statistics

14.7 Further, more detailed statistics for post mortem and skin test results etc. are referenced elsewhere in this report. DAERA also publish detailed monthly TB stats on the internet at: https://www.daera-ni.gov.uk/articles/tuberculosis-statistics-northern-ireland

TB in NI Compared to Other Jurisdictions

14.8 There are some differences in the methodology and timing used to collate statistics in other jurisdictions which make direct comparisons difficult. However, in broad terms:

- **Wales**

  The number of new bovine TB herd incidents in Wales peaked during 2008 and 2009. Subsequently, there were substantial decreases in 2010, 2013 and 2016, with periods of relative stability in between each of these decreases. Since the TB Eradication Programme was established in 2017 there has been an overall downward trend with some short-term fluctuations.

  In 2020 the herd incidence rate in Wales was 6.6%- a decrease from 6.9% in 2019. The herd prevalence rate also decreased from 5.6% in 2019 to 5.1% in 2020. The actual number of animals slaughtered due to a TB incident was 9,762. This represents a 20% decrease compared with the previous year. The number of new TB incidents in Wales in 2020 decreased by 8% in 2020 and was the lowest annual figure recorded since 2002.

- **Scotland**

  Scotland has maintained Officially Tuberculosis Free (OTF) status since 2009. It continues to have a very small number of sporadic breakdowns. In 2020, there were 14 new confirmed (OTF status withdrawn - OTFW) TB incidents, which is consistent with another year of officially TB-free status. Two of the new confirmed cases in Scotland had their origins in Northern Ireland, one in the Republic of Ireland and one in England. Five of the fourteen cases were detected via slaughterhouse surveillance.

  In 2020 herd and animal incidence remained static. Herd incidence was 0.7% in 2020 and animal incidence was 0.2% the same as in 2019.

- **England**

  Overall, the TB descriptive statistics for 2020 for England point to a stabilisation (and subsequent improvement) of the herd incidence rate and herd prevalence of TB over the last eight years. England is divided into 3 areas for the purposes of the TB Eradication Programme, a High Risk, Low Risk and separating these, an Edge Area. The tighter TB testing regimes and control measures for cattle

herds introduced since 2010 initially resulted in the detection of more positive herds and animals. This increasing trend peaked between 2011 and 2015 and continued until 2018 in the Edge Area, but 2020 saw reductions in annual herd incidence, prevalence and number of new herd incidents recorded in the High Risk Area and a stabilisation in the Edge Area. In England as a whole, 2020 saw the lowest number of new TB herd incidents recorded since 2009. For the High Risk Area in particular, this was the lowest recorded number since 2006. Low Risk Area herd incidents remained low and stable. In England the herd incidence rate (new herd incidents per 100 herd years at risk of infection) remained static in 2020 at 9.4%, but the overall herd prevalence rate (disease restricted herds as a percentage of registered herds) decreased from 5.3% in 2019 to 4.9% in 2020 with marked regional differences between High Risk, Edge and Low Risk Areas. The total number of animals slaughtered due to a TB incident in England in 2020 was 27,810 a decrease of 11% in comparison to 2019.

- **ROI**
  In the ROI TB incidence declined steadily after a peak in 2012. However, since 2016 there has been a gradual increase in disease levels. The 12-month rolling herd incidence at end of 2020 was 4.38% compared with 3.72% in 2019.

15. Laboratory Testing and TB Strain Typing

15.1 All animals displaying visible lesions at PME have samples submitted for laboratory examination. Samples are also submitted from some animals without visible lesions, if a positive or negative result will impact on a herd keeper's testing requirements e.g. in an OTS breakdown.

15.2 *M. bovis* has evolved and continues to evolve into many different strain types. There are slight genetic differences between each strain type. Using modern laboratory techniques, *M. bovis* isolates can be analysed to identify their specific strain type.

15.3 When *M. bovis* is isolated (i.e. there is a positive culture result), the isolate is submitted for strain typing. DAERA has been strain typing samples in this way since 2009.

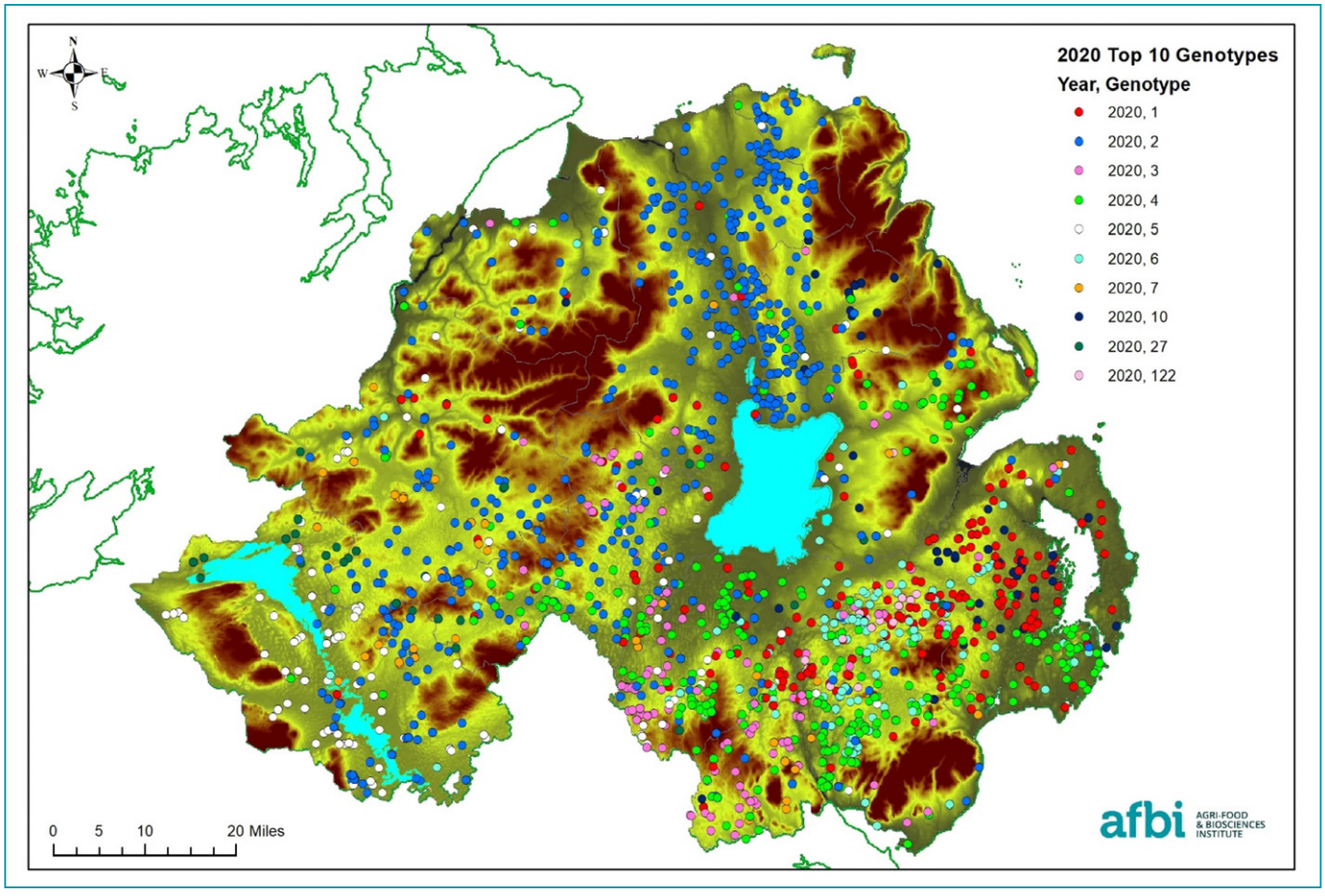
15.4 117 *M. bovis* strain types were isolated during 2020 with the "top 10" accounting for 84.9% of samples. Variation in strain types is seen over time because of:

- New daughter strains being generated by mutations of existing strains
- Newly imported strains coming into NI from GB or ROI
- Re-occurrence of older strains that have been seen previously.

15.5 The different strains of *M. bovis* tend to show a striking degree of geographical localisation. Different areas appear to have different predominant local strains (see Figure 7 below). This means that when a particular strain type occurs in an area outside its normal cluster, the disease is likely to have been brought into the area via movement of an infected animal/s from outside the area.

15.6 Strain typing results are made available to DAERA Patch Vets and this can provide useful epidemiological information for disease investigations. In particular, it can provide retrospective information in relation to likely sources of infection and associations between outbreaks.

Figure 7: Map showing distribution of the Top 10 *M. bovis* strain types in 2020



16. Bovine TB in Wildlife

16.1 For many years, bovine TB infection has been known to exist in badgers and it is now widely acknowledged that they can act as a reservoir for bovine TB infection. There has however been considerable controversy over the years as to how significant the role of badger to cattle transmission is in real life.

16.2 A study by Donnelly and Nouvellet in 2013 suggested that, although the number of cattle that directly acquire infection from badgers may be relatively small, badgers may be a significant source of entry of infection into the herd, with infection then mainly spread from cattle to cattle[6].

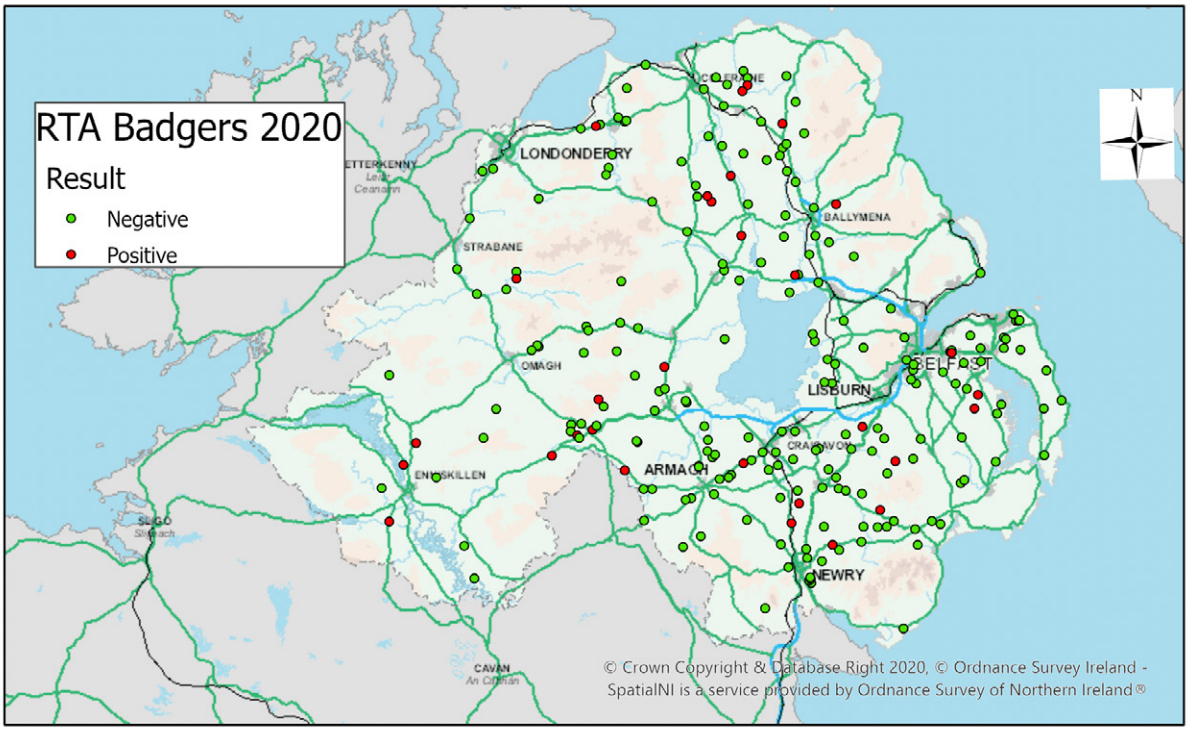
16.3 In recognition of the role of badgers in transmission of infection, DAERA staff discuss badger biosecurity with herd keepers and information on badger biosecurity is provided.

TB Prevalence in NI Badgers

Road Traffic Accident (RTA) Badger Survey

16.4 A survey of roadkill badgers has been ongoing in NI since 1998. Anyone can report a dead badger for collection and DAERA publishes and displays flyers to encourage public awareness:

16.5 In 2020 248 badgers were submitted to AFBI for the survey. Badgers are examined for evidence of bTB using gross PME, histopathology of visible lesions, bacteriology, and strain typing if possible. Of these, 34 were found to be positive for *M. bovis*. This is equivalent to a prevalence of 13.7% (95% CI 9.7-18.6%). This is lower than 2019, where 50 out of 293 RTA badgers were culture positive for TB (equivalent to a prevalence of 17.1% (95% CI 12.9-21.9%)). Since PME will inevitably miss a number of infected animals, where lesions may be too small to be grossly visible, or where the carcass has been significantly decomposed on arrival at AFBI, the actual prevalence is likely to be higher.



TVR (Test, Vaccinate and Remove) Project

16.6 Between 2014 and 2018, DAERA conducted a unique and innovative "Test, Vaccinate and Remove" (TVR) Research Project. Details of the methodology used in the Project and preliminary results can be found at:
Veterinary Record, **189**, e248. https://doi.org/10.1002/vetr.248

Eight other TVR papers, each covering specific aspects of the Project have also been published.

A follow up field project, looking specifically at the interaction between BCG strains and repeat vaccination, was carried out in 2019. A paper outlining the findings is in advanced drafting and will be published shortly.

TB in Wild Deer

Bovine TB has been shown to infect wild deer in NI and this may pose a reservoir of infection in some geographical areas. There is limited evidence in relation to the prevalence of bovine TB in wild deer in NI. DAERA is therefore currently sponsoring research aimed at establishing the distribution of wild deer species, and bTB infection within those species, across Northern Ireland. This project is due to be completed in 2023.

17. Bovine TB in Other Domestic Species

17.1 Bovine TB is a notifiable disease and as such, suspected or confirmed cases in ANY species must be reported to DAERA. If cases are reported, DAERA will liaise with Public Health Agency (PHA) and also conduct investigations to see if the case could be linked to disease in cattle or other species.

17.2 In contrast to the situation in England, in Northern Ireland the Department currently has no statutory powers in TB legislation to test non bovines, unless there are also bovine animals on the same holding.

TB in Domestic Pets

17.3 Cases are uncommon and when they do occur, they mainly affect cats or very rarely dogs. In 2020 there were 6 notified cases of bovine TB in domestic cats. 1 of these was an urban cat with a positive Enferplex blood test. The remaining 5 cats were all from the same farm and bTB was confirmed by PM and histological examination at AFBI. There were no cases of bovine TB in dogs reported to DAERA in 2020.

TB in Camelids (Alpacas & Llamas)

17.4 Camelid species appear to be very susceptible to infection with bovine TB. Infected animals generally manifest with respiratory signs and weight loss or sudden death. The TB skin test, Enferplex antibody test and IFNG tests have been used diagnostically in camelids.

17.5 In NI, there is no legislative requirement for registration of movements of camelid species and no legal capacity for DAERA to enforce movement restrictions or testing. There is however provision for DAERA to enforce slaughter and pay compensation if the camelids are on the same holding as cattle.

17.6 In 2020, bovine TB was confirmed in an alpaca submitted to AFBI for PME, and another alpaca was removed from the same farm following a test of the remaining alpacas on the premises. An alpaca on an unconnected farm had a positive Enferplex antibody test.

TB in Farmed Deer

17.7 Deer can also become infected with bovine TB. The skin test does appear to be useful in detecting infection but there is no statutory routine testing programme for deer in any part of the UK at present.

17.8 In NI, DAERA does not routinely carry out skin testing on deer herds but it can be carried out by private vets at the request of herd keepers who may require testing for the purposes of some exports (live exports intended for breeding and production).

17.9 There are currently no abattoirs in NI slaughtering deer, however DAERA does receive sporadic reports of TB like lesions being detected in farmed deer exported from NI for direct slaughter in England. Unlike cattle, avian TB in deer may cause visible lesions at PM, so not all TB lesions in deer are due to *M. bovis*.

17.10 When TB-like lesions are reported to DAERA, a status is applied to the herd blocking further exports for a period of 42 days. 2 such notifications were received in 2020. Both these notifications were in relation to the one deer holding.

17.11 In 2020 there was one case of bovine TB confirmed in a non-abattoir slaughtered deer following submission to AFBI of its head and pluck for post mortem examination.

18. The Finances of Bovine TB

18.1 Since 2010, our Programme has been annually approved for EU co-funding as part of the overall bovine TB Eradication Plan. An end of year summary of specified Programme costs is submitted annually to the EU Commission.

18.2 The amount of co-funding received by NI in 2020 was £1,604,175 while in 2019, £2,120,103.36 was received. In 2018, £ 3,948,731 was received in comparison to £5.75 million in 2017. It should be noted that 2020 was the last year in which the TB eradication programme in Northern Ireland will receive co-funding from the EU.

18.3 The costs of the NI TB Programme in 2020 are summarised in the table overleaf:

Table 9 Comparative of specified TB Programme Costs for 2019 and 2020

TB Programme Element	2019 cost	2020 cost
Compensation for reactors, NICs and voluntarily slaughtered interferon gamma - only positive cattle	£20,049,234	£21,078,241
Haulier expenses	£393,247	£395,134
PVP tuberculin testing (excluding travel)	£8,387,540	£8,257,024
TVO/VOT tuberculin testing (excluding travel)	£1,249,141	£1,086,717
Tuberculin	£676,266	£791,652
Laboratory analysis for interferon gamma and culture	£668,911	£746,335
Research	£452,354	£528,976
Veterinary and Administrative Staff (excluding TVO/VOT testing)	£7,785,092	£8,310,078
Salvage monies (paid to DAERA by meat plant)	-£4,341,047	-£4,819,047
Total	**£35,320,738**	**£36,375,110**

18.4 As can be seen from the table above, total Programme costs in 2020 were £1,054,372 higher than in 2019 with the programme seeing an increase in expenditure in all areas except PVP tuberculin testing and TVO/VOT tuberculin testing.

18.5 Bovine TB also generates a lot of additional costs to the industry in terms of labour, extra stocking density, restrictions on trading and market access.

18.6 The cost of bovine TB to the taxpayer has long been a matter of concern. In recognition of this, the TBSPG originally proposed significant reductions in compensation payments as part of an overall package of measures which was envisaged to include wildlife intervention. In light of the fact that any changes to compensation would be very unpopular with stakeholders, TBEP recommended to DAERA in their 2019 advice paper that while there remains no agreed badger intervention plan, compensation changes are not introduced until there is a "significant change in approach to wildlife intervention in NI". No compensation changes have been introduced to date. The TBEP Advice Paper can be viewed at: TBEP Advice Paper to DAERA (qub.ac.uk)

TB Fraud

18.7 It is recognised by DAERA that although the vast majority of TB breakdowns in NI are genuine, there is undoubtedly potential for fraudulent activity. The most likely mechanism for fraud is interference with the TB skin test in order to "manufacture" additional reactors and gain compensation payments. Such activities also have significant potential to adversely affect animal welfare. DAERA also has a statutory duty to ensure that taxpayers' money is well utilised and as such operates a robust approach to suspected fraud.

19. Bovine TB Research and Development (R&D)

The following provides a brief overview of the main research projects which were ongoing during 2020:

- FaRTHEr: Fragmentation as a Risk factor for TB in cattle Herds; impacts on Eradication.
- ELITE CLINIC: Exploring Livestock Trade through Cattle purchasing In Northern Ireland implications for b TB Control.
- Assessing the role of deer in the current bTB epidemic.
- Bovine TB: Analysis of strain types in NI.
- Assessing the risk of indirect *M. bovis* transmission through slurry and animal faeces.
- Optimisation and enhancement of the test format for the interferon gamma assay - completed September 2020.
- A pilot study to investigate experimental approaches to elucidate *Mycobacterium bovis* survival in the environment - completed July 2020
- Interferon Assay - performance characterisation - completed September 2020.

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Glossary of Terms

Term	Definition
AFBI	Agri-Food and Biosciences Institute.
AHT	Annual Herd Test, a routine herd test carried out on a disease free herd to maintain OTF status.
Animal incidence	Number of reactors divided by the number of animals tested over a specified period of time expressed as a percentage (i.e. one animal with multiple tests is only counted once).
APHIS	Animal and Public Health Information System.
AVS	Approved Veterinary Surgeon. Private veterinary practitioner approved under the TB Contract.
Bovine TB	Bovine Tuberculosis.
Bovine TB confirmed	Two or more of the following have a positive result: SICCT (skin test), PME and histology. It can be confirmed on bacteriological culture alone.
Confirmation rate for skin test reactors	A reactor is confirmed either at post-mortem inspection (Visible Lesions) or by laboratory examination i.e. histology and/or bacteriology. The confirmation rate is the number of confirmed reactors out of the total number of skin reactors.
DAERA	Department of Agriculture, Environment and Rural Affairs.
Herd incidence	Number of new herd breakdowns divided by the number of herds with a herd level test over a specified period of time expressed as a percentage (i.e. one herd with multiple tests is only counted once).
IFNG	Interferon Gamma.
LRS	Lesion at Routine Slaughter: Suspect bovine TB cases identified at post mortem inspection of skin test negative animals slaughtered as part of normal business.
M. bovis	*Mycobacterium bovis* - the main bacterial agent causing bovine TB.
New herd breakdown	A herd with at least one reactor animal where the herd had no other reactor animals during the previous 12 months. NB - In DAERA's routine statistics, herds with bovine TB confirmed from lesions found at routine slaughter, and no subsequent reactors during the breakdown, are not currently included.

Term	Definition
NIC	Negative In Contacts (NICs) are animals that are not positive to a diagnostic test, but are removed on the basis of being at increased disease risk due to the extent of their exposure to disease.
OTF	Officially Tuberculosis Free.
OTS	OTF Suspended.
OTW	OTF Withdrawn.
PME	Post Mortem Examination.
Reactor	An animal that gives a positive response to the skin test is called a reactor.
Reactor removal times	Number of working days between the test revealing the reactor animal and the death of that animal.
SICCT test	Single Intradermal Comparative Cervical Tuberculin test. Also known as skin test.
Skin test	See SICCT above.

Veterinary Service Animal Health Group
Department of Agriculture, Environment and Rural Affairs (DAERA)
Ballykelly House
111 Ballykelly Road
Ballykelly
Limavady
BT49 9HP

www.daera-ni.gov.uk

Department of
Agriculture, Environment
and Rural Affairs
www.daera-ni.gov.uk

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DMS 21.22.229