

Monday 18th November 2024

bTB Testing Regimes

The routine surveillance bTB testing programme is targeted, using testing protocols and frequencies appropriate to the prevailing disease situation in each area. This programme is necessarily different in England, Scotland and Wales¹. For this brief, bTB testing regime in England will be taken as the standard with any deviation in Wales and Scotland discussed individually.

England²

Herd Status:

- Officially TB Free (OTF):
 - If herds are up to date with their routine bTB testing (which is negative) and there is no reason to suspect bTB is present in the herd.
- OTF status can be lost if:
 - At least one animal has failed the bTB skin test – a ‘**reactor**’.
 - At least one animal is positive on a **private** interferon gamma blood test.
 - At least one animal has two consecutive inconclusive skin results.
 - Typical TB lesions were found on post-mortem inspection (PMI)
 - In these cases, the herd is considered a high-risk breakdown (see later).
 - A herd TB test is overdue.
 - At least one animal has an inconclusive skin result i.e., is an ‘**inconclusive reactor**’.
 - However, **OTF status may be reinstated** depending on the herds TB history over the previous 3 years, and movement restrictions may be limited to the inconclusive reactor while waiting for it to be retested.
- OTF Suspended³:
 - This occurs if one or more **skin test/interferon positive** animals are detected, but **no lesions** are found at post-mortem inspection (PMI) and the **culture is negative** to *M.bovis*, or **pending**, i.e., where there is suspicion of bTB infection present in a herd.
 - This may also occur in non-bTB breakdown herds where:
 - Suspect bTB lesions are detected at PMI and the PCR results are pending.
 - bTB routine testing becomes overdue.
 - One or more inconclusive reactors are reported in a herd that had a sustained bTB breakdown in the previous three years.
- OTF Withdrawn
 - If the bTB herd breakdown is considered **high risk**⁴:
 - **Visible lesions** at post-mortem inspection (PMI) in at least one reactor animal.
 - **Positive PCR or culture** from a reactor/inconclusive reactor/direct contact at PMI for *M.bovis*.
 - These herds can qualify for supplementary interferon gamma testing and trigger source and spread tracings³.
- Generally, all herds experiencing a new bTB breakdown in high-risk areas and edge areas must undergo a minimum of two successive skin tests at severe interpretation yielding negative results, irrespective of PMI or culture results.

¹ http://apha.defra.gov.uk/external-operations-admin/library/generics/Tuberculosis/ATT_Skin_Test_Background.html

² [https://www.gov.uk/guidance/bovine-tb-getting-your-cattle-tested-in-england#:~:text=You%20must%20test%20your%20cattle,the%20Low%20Risk%20Area%20\(%20LRA%20](https://www.gov.uk/guidance/bovine-tb-getting-your-cattle-tested-in-england#:~:text=You%20must%20test%20your%20cattle,the%20Low%20Risk%20Area%20(%20LRA%20)

³ <https://tbhub.co.uk/advice-during-a-tb-breakdown/actions-once-tb-is-suspected-or-confirmed/>

⁴ <https://www.gov.uk/guidance/bovine-tb-getting-your-cattle-tested-in-england#officially-tb-free-otf-status>

- Once herds regain their OTF status, the testing frequency changes to a shorter interval if in a annual or 4-yearly testing area depending on the location of the herd, previous bTB history and PCR results:
 - These tests occur between 6 and 12 months after the herd has regained OTF status.
 - If this test is negative, the herd will either return to routine testing intervals or will require a second extra test 12 months after the first one.

bTB SICCT test Interpretation and Results:

- The single intradermal comparative cervical tuberculin (SICCT) test is the primary tested used for antemortem detection of bTB.
 - Intradermal avian tuberculin (above) and bovine tuberculin (below) are injected at two adjacent sites on the neck and checked 72 hours later.
 - Overall:
 - **Positive** – an increase of more than 2mm skin thickness or any oedematous reaction⁵.
 - **Negative** – an increase of 2mm or less in skin thickness.
 - Results of interpretation:
 - **Reactor:**
 - Bovine tuberculin site must be **>4mm** greater than the avian using **standard interpretation** or **>2mm** when using **severe interpretation** (used in high-risk bTB herds).
 - Must be slaughtered in 10 working days of test results.
 - **Inconclusive reactor:**
 - The animal shows a greater positive reaction to bovine tuberculin than to avian tuberculin but not enough to be classified as a reactor.
 - It is believed this can arise from testing occurring in the early-stages of infection before a full immune response, terminal bTB infection causing anergy, immunosuppression (disease, drugs, post-calving), error in test administration, cross-reactivity with other mycobacteria.
 - **Non-reactors** can return to the herd as normal.
- **Inconclusive reactor:**
 - Must be isolated from the herd straight away until their **re-test in 60 days** from the injection which gave the inconclusive result.
 - The **entire herd will remain under TB movement restrictions** until the inconclusive reactors have been retested, **if in the last 3 years** the herd has had any of the following:
 - ☞ Reactors with lesions of TB at PMI.
 - ☞ Animals with *M. bovis* positive PCR test.
 - ☞ Animals with *M. bovis* positive culture.
 - Results from a 60-day re-test:
 - Non-reactor – the animals become known as **'resolved inconclusive reactor'**.
 - ☞ Movement restrictions will be removed from the herd/animal **only if the resolved inconclusive reactor is not found** in:
 - ◆ A high-risk area (HRA), an edge area (EA) or a TB breakdown herd in a low-risk area (LRA).
 - ☞ If restrictions remain, the animal is only permitted to be moved off the holding for slaughter.

⁵ May E, Prosser A, Downs SH, Brunton LA. Exploring the Risk Posed by Animals with an Inconclusive Reaction to the Bovine Tuberculosis Skin Test in England and Wales. *Vet Sci.* 2019;6(4):97. Published 2019 Nov 30. doi:10.3390/vetsci6040097

- ♦ Life-long restrictions **can be lifted** if a negative interferon gamma blood test is obtained (sample must be taken on, or the day after the animal is injected for the retest).
- Inconclusive reactor - treated as a **reactor** and slaughtered, herd will lose OTF status if they haven't already.
- Reactor – treated as a **reactor** and slaughtered, herd will lose OTF status if they haven't already.

Routine Testing

- Performed by an authorised vet or an approved tuberculin tester.
- Frequency of testing (Figure 1):

- **High Risk Areas (HRAs) - every 6 months.**
- **Edge Areas (EAs) - once a year OR every 6 months.**
- **Low Risk Areas (LRAs) - once every 4 years.**
- Exemptions:

- Cattle in lower risk herds within the 6-month testing zones that meet certain criteria, can be tested once a year.
- Cattle in high-risk herds within the LRA may be tested every 6-12 months if they:
 - ☞ Are part of an open/city farm.
 - ☞ Run an artificial insemination centre.
 - ☞ Produce/sell raw milk or unpasteurised milk products to the final consumer.
 - ☞ Rear heifers.
 - ☞ Keep a dealer herd.
 - ☞ Regularly bring cattle from Ireland onto the premises.
 - ☞ Keep a hire bull herd or business.
 - ☞ Herds in LRAs which has only regained its OTF status in the last 6-12 months.
 - ☞ Radial testing in a 3km zone around a breakdown farm in a LRA.

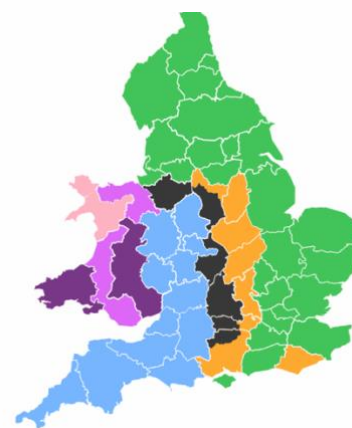
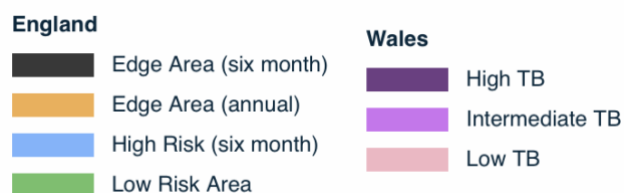


Figure 1: Bovine TB Risk Map England and Wales,
Source - TB hub

- Overdue tests result in herds:
 - Losing OTF status, possibly receiving less compensation for any animals which test positive for bTB and have to be slaughtered (see later) and the local authority has the right to investigate the farm and prosecute the animal keeper.

Pre-movement Testing⁶:

- **All cattle over 42 days old must test negative to bTB test within 60 days before movement onto another farm by the tuberculin skin test, unless:**
 - They come from a herd tested less than annually i.e. LRA.
 - They animal, herd or type of movement is exempt.
- These tests need to be booked and **privately paid** for via their private vet who is registered as an Official Veterinarian, unless movement falls within 60 days of a clear routine government-funded surveillance test.

⁶ <https://www.gov.uk/government/publications/bovine-tb-pre-movement-and-post-movement-testing-in-great-britain/guidance-bovine-tb-pre-movement-and-post-movement-testing>

- Clear pre-movement tests are **valid for 60 days** from the date of injection of the test i.e. day 0.
- Movements to Scotland:
 - Must ensure cattle have tested **negative within 30 days of movement from OTF herds only**, unless:
 - The cattle are <42 days old.
 - They have lived in a LRA their entire life.
 - They are being sent directly to slaughter.
 - They are moving to a show/exhibition for <24 hours and then returning to their original premises.

Post-movement Testing⁷:

- Must be arranged when cattle move from a higher to a lower testing frequency area i.e., from a HRA to a LRA, or from a 6-monthly testing EA to an annually testing EA, and in all cattle moved from Wales to England.
- Need to be carried out within 60-120 days of their arrival.
- Cattle **must not be moved** until they receive a negative post-movement test, unless they are:
 - Going directly to slaughter (within 120 days of arrival)
 - Going to a slaughter gathering
 - Going to an approved finishing unit
 - Going to a licenced finishing unit (England only)
 - Going to an exempt finishing unit (England only)
 - Under license issued by an APHA inspector

PMI Testing⁸:

- Carried out on all cattle slaughtered as **reactors, in-contacts and compulsory/private slaughtered/dead inconclusive reactors**.
 - Samples are collected for RT-PCR where if they test positive, the sample will be cultured and genomic sequencing for clade definition will also occur to help understand geographical spread.
- Routine PMI may also identify suspicious bTB lesions which will subsequently be tested by PCR and culture.
- Carcass classification:
 - Visible lesions (VL)⁹
 - VL positive animals can only enter the food chain if the lesion is restricted to one organ or part of the body with the affected area declared unfit for human consumption.
 - Generalised infection or localised infection in several organs is declared unfit for human consumption.
 - Non-visible lesions (NVL)

TB Breakdown:

- Occurs if one or more animals fails a TB test (**reactor**) and/or PCR positive test and/or positive TB lesions are routine PMI.
- APHA restrictions apply to all TB breakdown herds:
 - Standard restrictions:

⁷ <https://www.gov.uk/government/publications/bovine-tb-pre-movement-and-post-movement-testing-in-great-britain/guidance-bovine-tb-pre-movement-and-post-movement-testing>

⁸ <https://www.gov.uk/government/news/new-post-mortem-pcr-test-to-identify-tb-infection-rolled-out>

⁹ <https://www.food.gov.uk/business-guidance/chapter-6-notifiable-diseases#>

- Prohibit the movement of cattle on/off the premises unless the APHA issues a special licence.
- Arrange slaughter and PMI of reactors and direct contacts (non-reactor animal but considered to have high risk of being infected) to check for TB lesions.
- Cleaning and disinfecting areas of the farm after reactors have been removed and confirm with them you have done this.
- Dairy herd restrictions:
 - Must notify customers of milk that it must be heat-treated prior to human consumption.
 - Ensure milk from reactors doesn't enter the human food chain.
 - Must never sell unpasteurised milk from TB restricted herds directly to consumers.
- High-risk TB breakdowns:
 - The APHA will interpret the original skin test results under a '*severe interpretation*' and therefore other animals may be re-classified as reactors.
 - Other animals that are non-reactors may be slaughtered if considered high-risk i.e., '*direct contact individuals*', '*inconclusive reactors*', or all the cattle in the herd if the infection is severe or extensive.
 - The APHA will carry out trace and testing:
 - ☞ **Forward tracing** - any animals moved from the infected herd to another premises during the time that APHA assesses that infection could have been present on your premises.
 - ☞ **Back tracing** - any herds from which reactor animals in the infected herd may have come from.
 - Test any herds in the vicinity which might be high-risk of infection.
- Regaining OTF status:
 - After a positive/reactor animal from any form of bTB test, **repeat tests are carried out every 60 days**, except on calves <42 days old (unless in exceptional circumstances).
 - Herds need **two consecutive negative 60-day skin test results to regain OTF**:
 - Only one negative skin test is required if the herd is in a LRA and the breakdown is considered to be 'lower-risk'.
 - The number of repeat tests required depends on:
 - Geographical location of the herd – LRA, EA, HRA.
 - Previous bTB testing history of the herd.
 - Incidence of visible lesions at PMI, PCR, culture results from previous reactors.
 - The bTB situation in neighbouring farms.

Slaughter:

- Can be arranged by the APHA or privately.
 - If private, the farmer doesn't receive compensation but may keep salvage payments for the slaughterhouse if the carcass is fit for human consumption, however if the carcass is condemned because of TB lesions at PMI, the APHA will pay for compensation.
- Animals must be slaughtered **within 10 working days** from the day it was found to be a **reactor/repeat inconclusive reactor/direct contact**.
 - This can be delayed if an animal is in the **last 60 days of pregnancy** to allow the animal to calve. Requires confirmation from the APHA.
- Emergency on-farm slaughter can be arranged for cattle not fit for travel.

Compensation:

- Calculated by:

- Using monthly average market process published by Defra
- Based off the animals age, sex, pedigree status (requires full certification from recognised breed society) and type (beef/dairy)
- If there is not enough price data for a category, price is determined by:
 - The most recently available table value for that category, or
 - An amount decided by the valuer who is APHA nominated or the President of the Royal Institute of Chartered Surveyors.
- Farmers will receive compensation even if the carcass is condemned at slaughter due to extensive TB lesions on PMI.
- Reduced compensation:
 - Delays in TB testing:
 - 61-90 days late = 25% reduction
 - 91-180 days late = 50% reduction
 - >181 days late = 95% reduction
 - If an animal moved onto a TB breakdown holding and then is removed for slaughter as a reactor/repeat inconclusive reactor/direct contact before the breakdown has concluded, there will be a 50% reduction in compensation.
 - Dirty animals sent to slaughter for TB reactor/repeat inconclusive/direct contact will receive 50% less compensation for that animal.

Alternative Tests:

- Interferon Gamma Blood Test¹⁰
 - Ancillary test, often combined with the SICCT to reduce the duration of bTB breakdown and reduce the risk of leaving false negatives in the herd by the time restrictions are lifted.
 - Can identify cattle at earlier stage of infection compared to SICCT and those which don't respond to SICCT.
 - **Less specific** than the SICCT, thus **more false positives**, therefore is **only applied to lesion or culture positive bTB breakdown herds**.

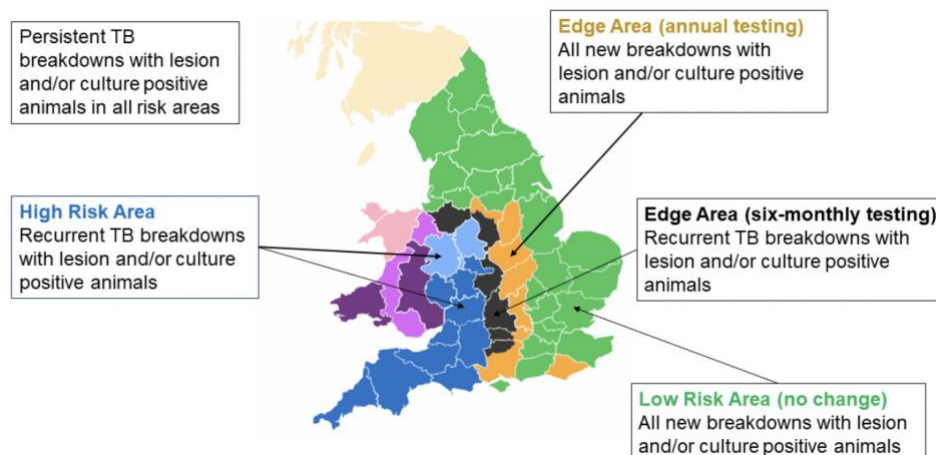


Figure 2: Mandatory usage of Interferon Gamma depending on geographical region

- Government-funded use and decoupling from the SICCT (Figure 2):
 - Compulsory for:
 - ☞ **Chronic/persistent bTB problems** - recurrent bTB breakdowns with lesions and/or culture positive animals in a **HRA or 6-monthly surveillance EA** where the breakdown occurred within 18 months of

¹⁰ <https://tbhub.co.uk/tb-testing-cattle/blood-testing/interferon-gamma-blood-testing-of-cattle/>

regaining OTF following a previous breakdown with lesion/positive culture animals.

- **Breakdowns in areas when TB incidence is low** - every new breakdown herd with lesions at PMI and/or culture positive animals in:
 - ◆ LRA
 - ◆ Annual surveillance EA
 - Discretionary testing in areas not eligible for mandatory testing if there is extensive breakdown with a high number of reactors¹¹.
 - The test is repeated as long as standard interpretation SICCT reactors or animals with visible TB lesions at PMI are continued to be identified in those herds.
- Private testing (only in England):
 - Requires prior approval from the APHA.
 - Can be used in the following situations:
 - To supplement pre- post- movement testing of animals
 - To screen animals joining high-value herds
 - To test animal following a negative routine or tracing skin test
 - As a marketing tool to add value to herds/animals for sale
 - Rapid testing of inconclusive reactors where no government-funded test is planned.
 - Cannot be used for the following cattle:
 - Reactors.
 - Cattle awaiting slaughter for bTB control purposes i.e. in-contacts.
 - Cattle from breakdown herds with government-funded gamma testing.
 - Herds under restrictions for overdue SICCT surveillance testing.
- **Resolved inconclusive reactors¹:**
 - Negative results can lift the lifelong movement restrictions on these cattle.
 - In these cases, the test is either privately funded or farmers can use a government-funded surveillance test.
 - If a farmer asks a vet to do the test privately, they must get **prior permission from the APHA.**
 - The test cannot be used on resolves inconclusive reactors <6 months old due to their developing immune systems increasing the chance false negatives.
- **Positive results are classified as reactors and slaughtered, even if the SICCT is negative.**
- IDEXX Antibody Test
 - Detects bTB antibodies in infected cattle.
 - The animal must have had a skin test 10-30 days before the blood sample is taken.
 - This test is used by the APHA to identify bTB positive animals in **herds with a long history of TB breakdowns**, i.e., when after repeat skin tests and interferon gamma testing the herd fails to regain OTF status.
 - In this case, the test is only used after interferon-gamma testing.
 - **Only available privately with prior authorisation from the APHA.**

¹¹ <https://tbhub.co.uk/tb-policy/england/refinements-to-the-interferon-gamma-testing-policy-in-the-high-risk-and-edge-area-of-england/>

Wales¹²

Testing Regime:

- Routine testing:
 - All cattle herd in Wales are tested at least once a year.
 - Intensive action area (IAA) – tested at least twice a year.
- Pre-movement testing:
 - Cattle must have a negative SICCT within 60 days prior to the movement unless:
 - They are <42 days old.
 - They animal, herd, type of movement is exempt.
 - All risk areas are included.
 - If a pre-movement test finds an inconclusive reactor, then the whole herd is under movement restrictions.
 - The releasing test after a persistent breakdown (>18 months) **cannot** be used as a pre-movement test - at least 60 days must be waited between releasing and pre-movement test can be conducted.
- Post-movement testing:
 - All cattle need a post movement test within 60-120 days after arrival onto a holding when they are moved into:
 - The low bTB area of Wales from:
 - Intermediate or high bTB area in Wales
 - EA or HRA in England
 - Northern Ireland
 - The intermediate bTB area of Wales from (introduced Feb 2024):
 - High bTB area Wales
 - HRA England
 - Northern Ireland
 - Cattle **must not be moved** until they receive a negative post-movement test, unless they are moved to:
 - An abattoir
 - An approved finishing unit (in Wales or England)
 - A move licensed by the APHA.

OTF Herd Status:

- OTF Suspended (OTFS) – suspect bTB in the herd
 - A tuberculin skin test is completed, and inconclusive reactors are identified with no skin test reactors.
 - Suspect lesions of TB are detected in animals at routine slaughter inspection.
 - Clinical signs of TB are detected in animals (differs from England).
 - The TB status of the herd is unknown because a routine tuberculin skin test is overdue.
- OTF Withdrawn (OTFW):
 - A tuberculin skin test is completed with positive results in one or more animals – stricter than in England.
 - An inconclusive reactor result is an inconclusive reactor at the retest.
 - Lesions typical of TB are found at PMI of tuberculin skin or TB blood test reactors or inconclusive reactors.
 - Resolved inconclusive reactors are illegally moved from England → Wales and then test positive to interferon gamma (differs from England).

¹² <https://www.gov.uk/government/publications/testing-for-tb-in-your-herd/testing-for-tb-in-your-herd-what-this-means-to-you-wales>

- *M. bovis* is identified by PCR, or culture, from tissue samples from any animal in the herd (differs from England).
- A gamma interferon blood test is completed on an inconclusive reactor in your herd with positive results.
- OTF is suspended for one of the reasons listed in the OTFS section above and is considered a high-risk breakdown.

Additional Tests

- Interferon gamma
 - Used in the same way as in England but is also compulsory for inconclusive reactors that remain inconclusive at their retest.
 - In England and Wales, the gamma test is repeated as long as standard interpretation skin test reactors and/or animals with visible lesions of TB at slaughter continue to be identified in those herds.
 - Can only be carried out by the APHA, i.e., **not available for private use**.
- IDEXX Antibody test
 - Compulsory for every new breakdown herd with lesions at PMI and/or culture positive animals in:
 - Low and intermediate bTB areas as well as inconclusive reactors that remain upon retesting.
 - **No option for private testing.**
- Enferplex:
 - WOAHA validated test.
 - Not currently approved by the Welsh government as a 'relevant test' under the Tuberculosis (Wales) Order 2010 but is currently subject to a short-term pilot in Pembrokeshire for private usage.

Cattle Health Certification Standards¹³:

- Provides bTB health status of herds ranked from 0 (a breakdown in the past year) to 10 (>10 years since last breakdown).
- Aims to:
 - Improve the knowledge of the risks involved in buying cattle.
 - Recognise lower risk animals within herds across Wales which may not have recently had (or ever had) a TB breakdown.
 - Improve herd risk score year-on-year and use this status when selling homebred cattle.
 - A post movement test will **not** be needed after moving an animal from a level 10 herd in the Intermediate or High TB Areas into a herd in the Low TB Area

Scotland^{14,15}

Testing Regime:

- Scotland has been OTF (low and stable incidence) since 2009.
- Routine:
 - Cattle are tested at a default interval of every 4 years.

¹³ <https://www.gov.wales/bovine-tb-herd-health-accreditation-scheme>

¹⁴ <https://www.gov.uk/government/publications/testing-for-tb-in-your-herd/testing-for-tb-in-your-herd-what-this-means-to-you-scotland>

¹⁵ <https://www.gov.scot/publications/bovine-tb/pages/testing-surveillance/>

- Some low-risk herds are **exempt** from this if they comply with one of the following criteria:
 - Herds with under 50 cattle with no more than one consignment of cattle moved on from a high bTB risk area of the UK in the previous four years.
 - Herds that slaughter >25% of their stock annually and with no more than one consignment of cattle moved on from a high bTB risk area of the UK in the previous four years.
 - Herds that slaughter >40% of their stock annual in each of the previous four years.
- Some high-risk herds are tested more frequently.
- Movement testing:
 - All cattle >42 days old on annual, or more, frequent testing intervals in England or Wales need a pre-movement test **within 30 days** of movement into Scotland.
 - Cattle >42 days old from a LRA in England must be pre-movement tested, unless they have resided in a low incidence area for the duration of their lives.
 - Exemptions includes:
 - Animals sent direct to slaughter.
 - Animals moving to shows and returning directly to their farm of origin.
 - Post movement testing occurs within 60-120 days of **all** animals arrival on to the holding unless:
 - Animals are slaughtered within 120 days of arrival onto the Scottish holding.
 - Animals are moved for veterinary treatment.
 - Animals are moved under a licence issued by the APHA.

Herd Status:

- OTF Suspended – suspect bTB in the herd:
 - At least one animal has failed the bTB skin test.
 - At least one animal has two consecutive inconclusive skin test results.
 - Inconclusive reactors are found at routine bTB skin testing with no reactors.
 - At least one animal has had an inconclusive skin test result, and the herd has had its OTF status withdrawn at any time in the last three years.
 - Suspect lesions of TB are detected in animals at routine PMI.
 - An animal shows clinical signs and tests positive to the skin test.
 - The routine tuberculin skin test is overdue.
 - **Needs one short interval test to return to OTF.**
- OTF Withdrawn:
 - Lesions typical of bovine TB are found at PMI form skin/interferon reactors or inconclusive reactors.
 - The *M. bovis* organism is detected by PCR or on culture.
 - The herd status is OTFS and there is a high risk of breakdown.
 - **Needs two consecutive short interval tests to return to OTF.**
 - Severe interpretation is applied to the first of these tests.

Compensation¹⁶:

- A two-tier cap determines the amount of compensation paid for individual animals:
 - £7,500 for all pure bred pedigree bovine animals whose market value exceeds this amount.

¹⁶ <https://www.gov.scot/publications/bovine-tb/pages/slaughter-compensation/>

- £5,000 for all other non-pedigree bovine animals whose market value exceeds this amount.
- Compensation can be reduced in bTB routine tests are overdue, as in England and Wales, unclean cattle and improve isolation of reactor or inconclusive reactor animals.