



Department
for Environment
Food & Rural Affairs

www.gov.uk/defra

The Incidence of TB in Cattle in Great Britain

Consultation on changes to National Statistics

February 2015



Llywodraeth Cymru
Welsh Government



The Scottish
Government



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<https://www.gov.uk/government/statistics/consultation-on-changes-to-statistics-on-tb-in-cattle>

Any enquiries regarding this document/publication should be sent to us at tbstatistics@defra.gsi.gov.uk

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Topic of this consultation	Changes to statistics on the incidence of TB in cattle in GB
Scope of this consultation	<ul style="list-style-type: none"> • Headline measures of incidence and prevalence of TB in cattle • Definition of a new incident • Geographical disaggregation • Frequency of publication
Geographical coverage	Great Britain
To	<p>Any person or body who provides data for, uses or has a strong interest in the Department's official statistics, outputs or data collections within the scope of this consultation.</p> <p>E.g. members of any relevant statistics user groups; businesses; other Government departments; local authorities; voluntary organisations; consultants; academics; members of the public.</p>
Body/bodies responsible for the consultation	TB Statistics team within the Department for Environment, Food and Rural Affairs (Defra)
Duration	8 weeks
Enquiries	tbstatistics@defra.gsi.gov.uk
How to respond	<p>We would prefer responses to be submitted via the online survey at https://www.surveymonkey.com/s/CVCRWKP</p> <p>If you are emailing your responses please send them to tbstatistics@defra.gsi.gov.uk and with 'Consultation' in the subject line.</p> <p>If sending your response by post, please address to:</p> <p>TB Statistics 201 Foss House 1-2 Peasholme Green York YO1 7PX</p>
After the consultation	<p>The responses to this consultation will be used to inform the development of the statistics on the incidence of TB in cattle.</p> <p>The government's response to summary of the consultation responses will be published on the Department's website after the consultation has closed and the responses have been analysed.</p>
Compliance with the Code of Practice	<p>This consultation complies with both the Government's Code of Practice on Consultation and the United Kingdom Statistics Authority's Code of Practice for Official Statistics (http://www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html).</p>

Introduction

Defra publishes [monthly National Statistics](#) on the incidence of tuberculosis in cattle (bovine TB). The publication includes statistics about new incidents of the disease, the total number of cattle herds not officially TB-free (non-OTF), the number of herds and animals tested for the disease and the number of animals compulsorily slaughtered as a result of TB.

The headline measure in the statistical notice is herd incidence, currently calculated as the number of new TB incidents in herds¹ as a proportion of the number of tests carried out on officially TB-free (OTF) herds. This is currently only published at GB level.

Bovine TB is a chronic and complex infectious disease of cattle, with a marked regional variation in incidence. While it is therefore difficult to present the distribution of infected cattle in a single measure, it is important to have a reliable tool to measure real changes in the epidemic as early and accurately as possible. In recent years it has been recognised by experts both within and outside government that the current measure of herd incidence can be artificially inflated or deflated depending on how often herds are tested for TB in different parts of the country, and that there may therefore be better ways of presenting herd incidence. There are also additional headline indicators which could better help to measure the extent of and trends in the disease.

The statistics are currently published for GB, with data also published for England, Wales and Scotland and at a county-level. Statistics for English counties are also grouped by old administrative APHA regions. This consultation also seeks feedback from users on some options for presenting the statistics at different geographical levels.

When proposing a significant change to National Statistics, it is a requirement of the Code of Practice for Official Statistics to consult users on the changes (under protocol 1 (practice 7) on user engagement and principle 2 (practice 4) on impartiality and objectivity). This consultation document is being jointly published by Defra, the Welsh Government and the Scottish Government to seek feedback from users on a number of possible options for headline indicators to measure TB in in England, Wales and Scotland.

If one or more new headline statistics is chosen following this consultation, it will be important not only to show the long term trend for the new measure (or measures) but also to present herd incidence as it is currently calculated alongside the new measure. This will allow users to draw their own comparisons between the old and the new measures:

- The time series for any new headline statistic(s) will be backdated to 1996.
- The existing measure will continue to be presented for at least twelve months after any changes are implemented.

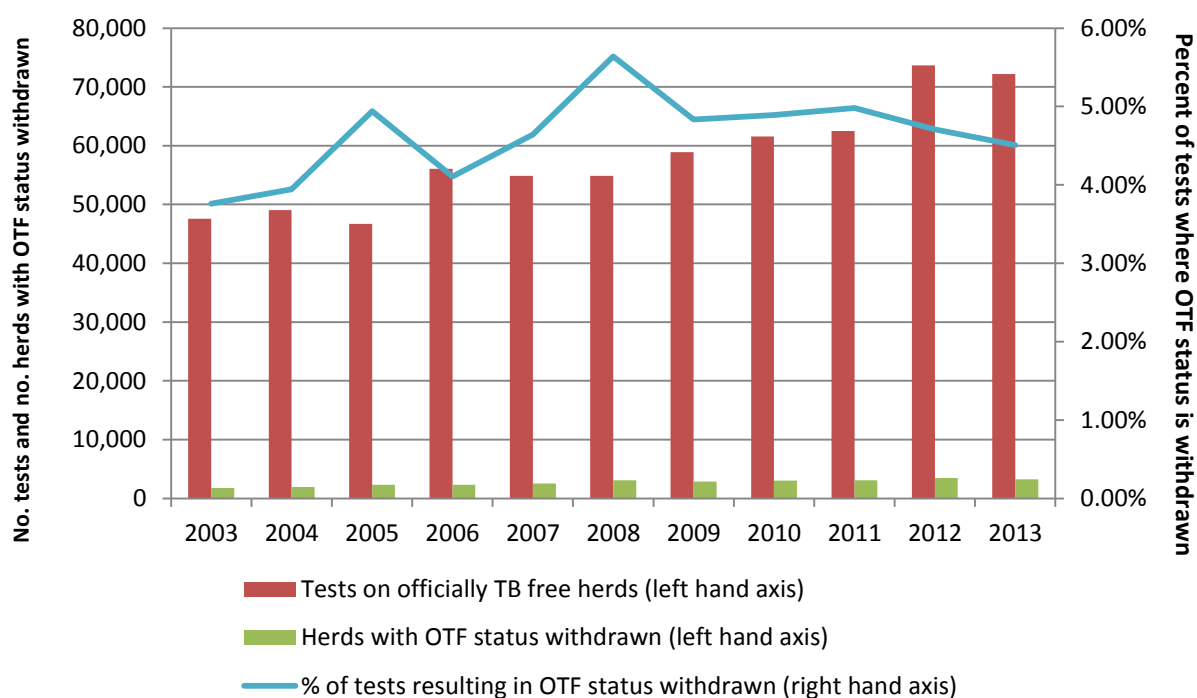
¹ Commonly referred to as *breakdowns* and where there is additional post-mortem evidence of infection either from laboratory cultures or from the detection of lesions.

Why change the statistics?

The current headline statistic in the National Statistics release is calculated as the number of new TB herd incidents where OTF status had been withdrawn as a proportion of the number of tests carried out on OTF herds. This method is influenced by the amount of testing carried out. For example, if testing increases over time in parts of the country where there is less TB in cattle, incidence can appear to decline (see below). The existing method can therefore give an unclear picture of disease trends.

Figure 1 shows the component parts of the existing methodology for measuring incidence: the number of tests on officially TB-free herds, the number of new herd incidents where OTF status has been withdrawn and the herd incidence rate (OTFW breakdowns as a percentage of tests on OTF herds). There is more annual variation in the number of herds tested (red bars) than in the number of herds suffering a new bTB breakdown (OTF status withdrawn – green bars). The chart shows that as the amount of testing increases, the herd incidence (number of new OTFW breakdowns as a percentage of tests on OTF herds) appears to decrease (blue line) even if the number of herds with OTF status withdrawn has not changed. This was most notable in 2012 and 2013 following the rollout of annual bTB testing to all cattle herds in the High Risk and Edge Areas of England (comprising the South West and Midlands). In years where surveillance (testing) is temporarily reduced, such as 2005, the incidence can appear to increase.

Figure 1: number of herd tests and OTFW breakdowns alongside current herd incidence rate (OTFW breakdowns as a percentage of number of tests of OTF herds), GB



This consultation is seeking feedback on a range of options for measuring herd incidence (new cases of TB detected in herds over a particular period).

While several different approaches to calculating the headline statistics are presented in this consultation, government's preferred approach is highlighted. This is based on the views of veterinary epidemiologists and statisticians.

What the consultation is seeking feedback on

- Changes to the headline herd incidence rate.
- Additional headline indicators of herd prevalence and animal incidence.
- Presentation of statistics at different geographic levels.
- The frequency of publishing the headline statistics (e.g. incidence rate).

What will not be changing

- The underlying statistical counts – e.g. statistics showing the number of herd breakdowns, the number of cattle and herds tested, the number of animals slaughtered and herds under movement restrictions during or at the end of the reporting period.
- The frequency at which the above statistics will be published (monthly).

Q1. Headline Statistics

Herd status used in incidence calculation

When an animal in a cattle herd presents with a positive tuberculin skin test, that herd has its OTF status *suspended*. The skin test is very specific which means if an animal shows a positive result (i.e. a reactor) it is highly likely to be infected. However OTF status is only *withdrawn* if there are characteristic lesions of TB at post-mortem meat inspection or identification of the bovine TB bacterium in laboratory cultures. These post-mortem tests are less sensitive than the skin test and so the failure to find visible lesions or the bacteria that causes TB in a test reactor does not necessarily mean that the animal was not infected. A majority of skin test reactors are truly infected regardless of the post-mortem findings, in particular in areas of high bTB prevalence or risk such as the West of England and parts of Wales.²

The herd incidence rate is currently calculated for incidents where OTF status is withdrawn. Distinguishing these incidents is an important distinction for reporting to the European Commission (and in achieving OTF status for certain regions or the country as a whole). However it is also important to capture in a headline measure the total number of infected herds irrespective of post-mortem results.

We are therefore seeking feedback on the intention to present the incidence measure in two ways:

- An incidence rate for OTF status withdrawn breakdowns only.
- Incidence rate for all new herd incidents (whether OTF status is withdrawn or suspended).

The examples given in the body of this consultation all use breakdowns where OTF status has been withdrawn. This is to make it easier to compare with the current methodology for measuring herd incidence. Examples using all breakdowns (OTFW and OTFS) are presented in Annex A.

Herd incidence calculation methodology

Options being consulted on:

Option	Description
1	New breakdowns as a percentage of herd tests carried out
2	New breakdowns as a percentage of herd tests carried out (reduced number of test types)
3	New breakdowns as a percentage of herds tested
4	New breakdowns per 100 herd years at risk
5	No incidence rate presented

² Goodchild T.G., Downs S.H., Upton P., Wood J.L.N., de la Rua-Domenech, R. Specificity of the comparative skin test for bovine tuberculosis in Great Britain. Vet Rec. Under review

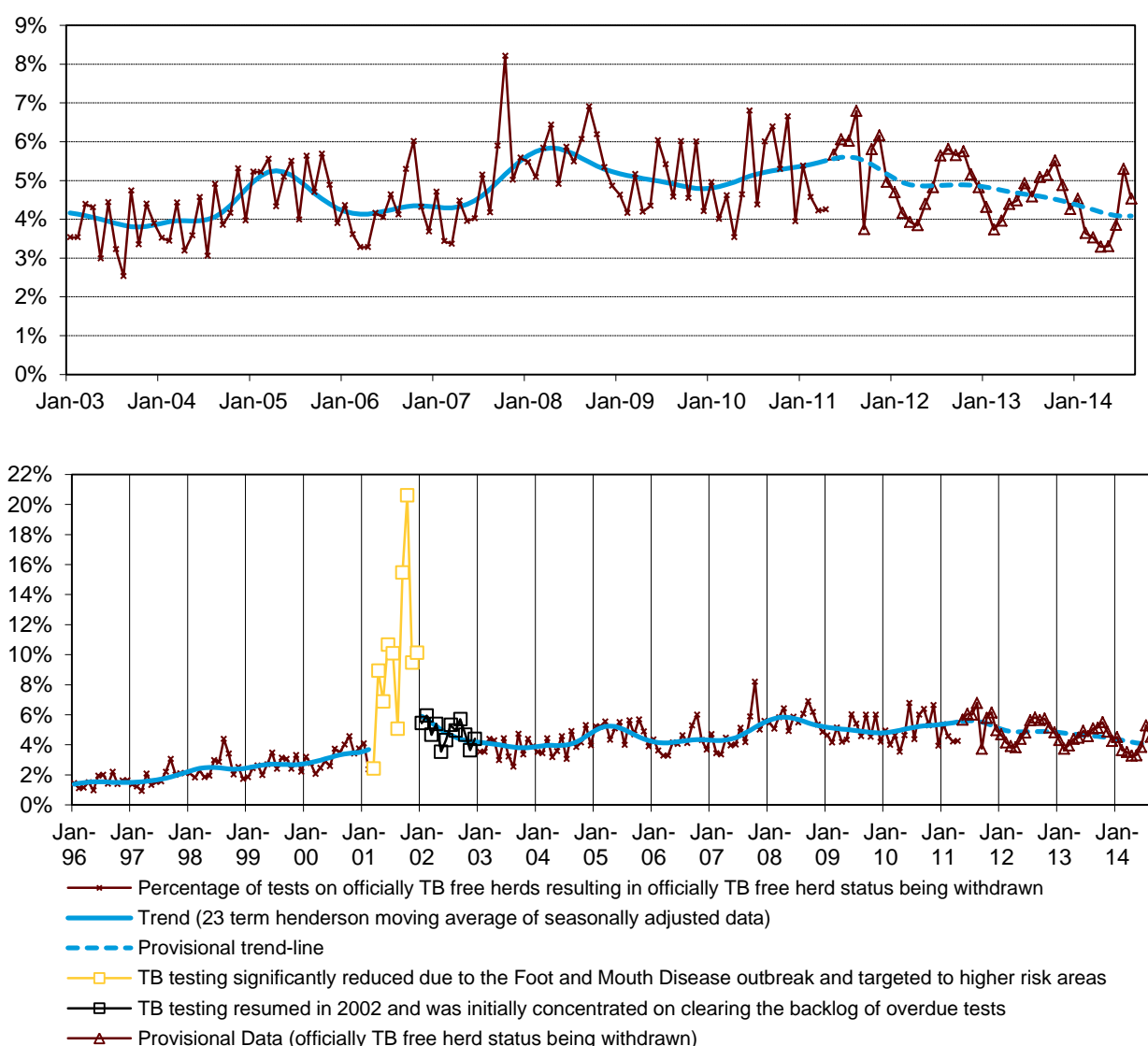
1. New incidents as a percentage of tests carried out in OTF herds (the current method).

Numerator: the number of new bTB incidents in cattle

Denominator: the number of tests on OTF herds

Example: an incidence rate of 5% means that for every 100 tests carried out on unrestricted herds, there were five new incidents of the disease. This is the existing measure.

Figure 1: herd incidence of bovine TB (bTB) in GB. Number of new incidents of bTB leading to the withdrawal of officially TB free (OTF) herd status, as a percentage of tests carried out in OTF herds each month since 2003 (top) and 1996 (bottom)



Advantages	Drawbacks
Simple to understand the calculation	Difficult to interpret the trends
Established measure of incidence	Heavily influenced by changes in surveillance (testing)
Easy to replicate/calculate from the published statistics	Highly dependent on the amount of testing carried out

2. New incidents as a percentage of tests carried out in OTF herds (with a reduced number of test-types included)

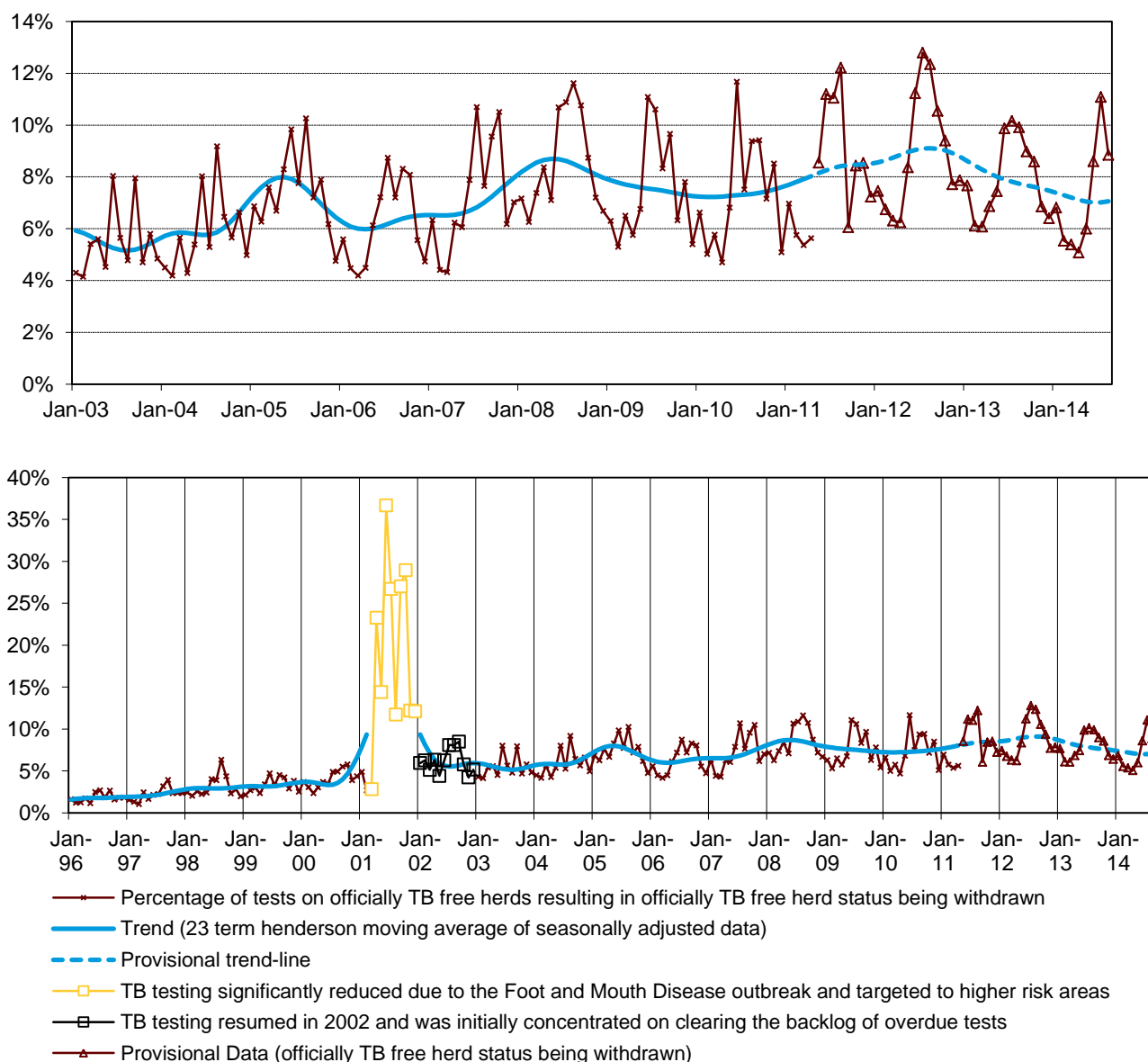
Numerator: the number of new bTB incidents in cattle

Denominator: number of tests on OTF herds, excluding any individual animal tests

Example: an incidence rate of 5% means that for every 100 tests carried out on unrestricted herds, there were five new incidents of the disease.

This is an adjusted version of the current measure. It removes some test types from the denominator where a small proportion or only a single animal in the herd was tested, thereby resulting in a higher herd incidence. The types of TB test that would be excluded from the denominator are detailed in Annex B.

Figure 2: herd incidence of bovine TB (bTB) in GB. Number of new incidents of bTB leading to the withdrawal of officially TB free (OTF) herd status, as a percentage of herd tests carried out in OTF herds each month since 2003 (top) and 1996 (bottom)



Advantages	Drawbacks
Simple to understand the calculation	Difficult to interpret the trends
Established measure of incidence	Heavily influenced by changes in surveillance (testing)
Easy to replicate/calculate from the published statistics	Highly dependent on the amount of testing carried out
Removes individual animal tests from the denominator of tests on OTF <i>herds</i>	

3. New incidents as a percentage of OTF herds tested

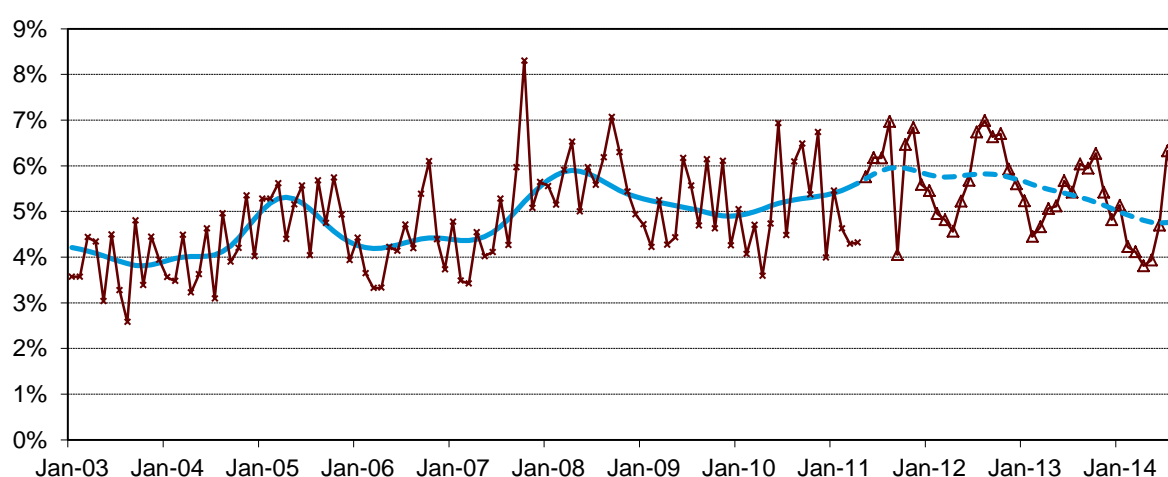
Numerator: number of new bTB incidents in cattle

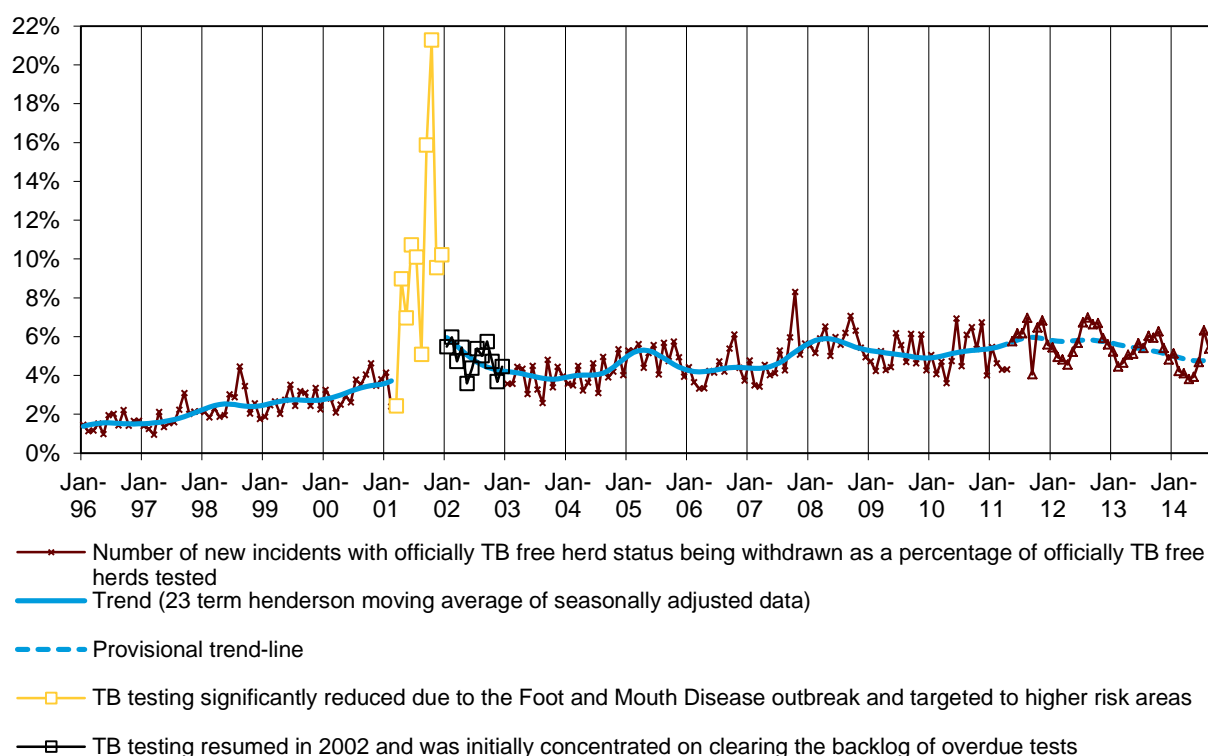
Denominator: number of OTF herds tested

Example: An incidence rate of 5% would mean that for every 100 unrestricted herds tested, there were five new incidents of the disease.

Rather than calculating the number of new incidents as a proportion of tests on herds, this calculates it as a proportion of herds tested. This reduces the denominator when herds are tested more than once. However, it does not have a huge impact on the trend because the rate is calculated on a monthly basis and it is not very common for a herd to be tested multiple times in an individual month.

Figure 3: herd incidence of bovine TB (bTB) in GB. Number of new incidents of bTB leading to the withdrawal of officially TB free (OTF) herd status, as a percentage of OTF herds tested each month since 2003 (first chart) and 1996 (second chart)





Advantages	Drawbacks
Means that a herd counts only once towards the incidence rate for the period in question, rather than multiple times if it has been tested more than once during the period.	Heavily influenced by changes in surveillance (testing)
Simple to understand the calculation	Difficult to interpret the trends
Easy to replicate/calculate from the published statistics	Incidence rate is highly dependent on the amount of testing carried out

4. New breakdowns per 100 herd-years at risk, for a rolling 12 month period, presented quarterly

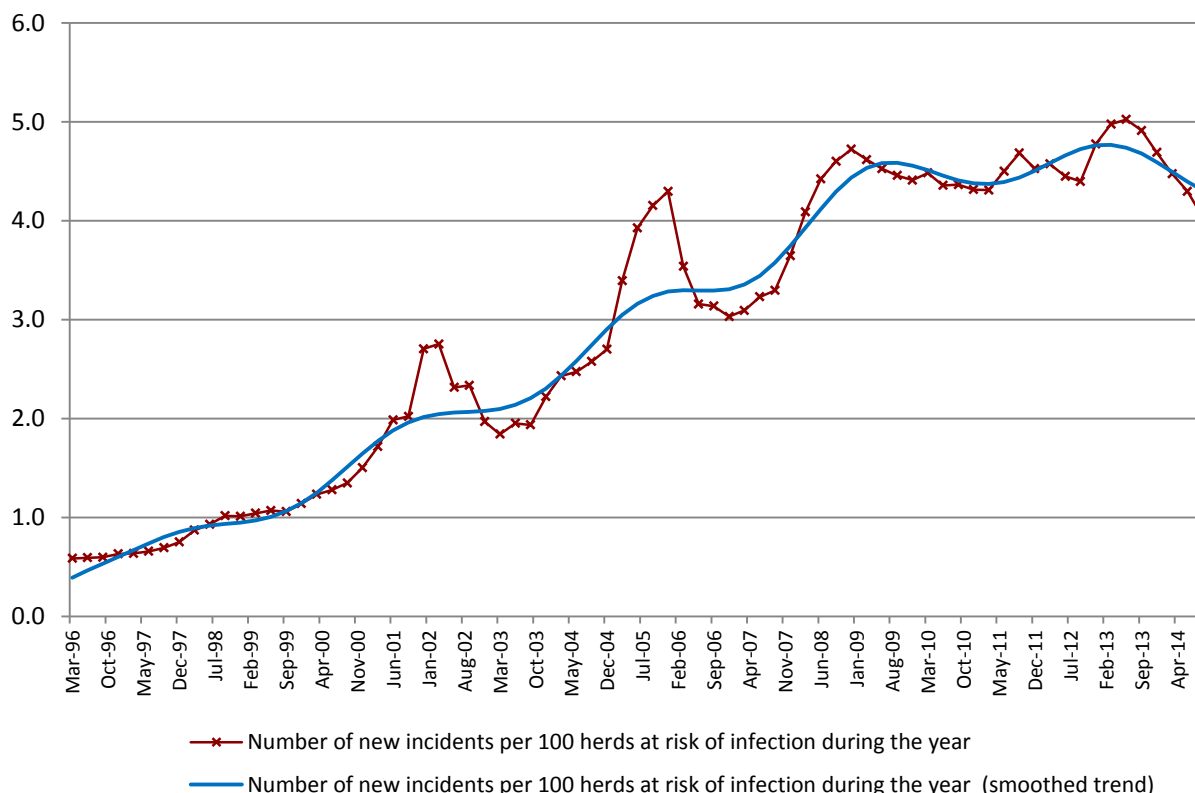
Numerator: the number of new bTB incidents in cattle

Denominator: the total amount of time herds tested that year were unrestricted and at risk of infection

Example: An incidence rate of 'five per 100 herd years at risk' would mean that for every 100 herds that had been unrestricted for a year and tested in the period of interest, there were five new incidents of the disease.

$$\text{Incidence rate} = \left(\frac{\text{Number of new incidents (OTFW)}}{\text{Herds tested} \times \text{amount of time unrestricted since last test}} \right) \times 100$$

Figure 4: herd incidence of bovine TB (bTB) in GB per quarter. Number of new incidents of bTB leading to the withdrawal of officially TB free (OTF) herd status per 100 herds at risk of infection during the previous 12 months, presented per quarter



NB data presented in this chart is subject to further checks and is therefore provisional

Advantages	Drawbacks
Provides a more reliable time series because changes in testing frequency that may differ regionally and over time are taken into account (e.g. adjusts for differences in testing frequency between annually tested herds and herds tested every four years).	More complicated than the existing calculation and less easy to understand to the non-expert user.
12 month rolling average introduces smoothing and makes trend clearer.	Not calculable from the published dataset because the actual dates herds were tested and the test result (positive or negative) is required to calculate the denominator.
Is an established measure of disease incidence and already published (on an annual basis) in the APHA annual Surveillance Report on bTB since the 2011 report.	

Option 5: No incidence rate

Herd incidence rate would be removed from the statistical notice, with only the underlying statistics presented (number of herd tests, number of new incidents of bTB etc.) instead.

Advantages	Drawbacks
Allows users to calculate their own incidence rate depending on their need	Need an official, agreed approach to measuring changes in the trend to aid monitoring of the disease.

Preferred approach:

Option 4: **New breakdowns as a percentage of herd years at risk.** This measure is much less affected by the amount of surveillance carried out than the existing measure, and so is less vulnerable to the effect of changes in testing frequency over time. Although based on a more complex calculation, changes in the trend are easier to explain. It would be presented for both OTFW incidents and all new herd incidents (OTFW and OTFS).

Herd prevalence

Options being consulted on:

Option	Description
1	Number of non-OTF herds as a percentage of all active cattle herds
2	Do not include herd prevalence rate as a headline statistic

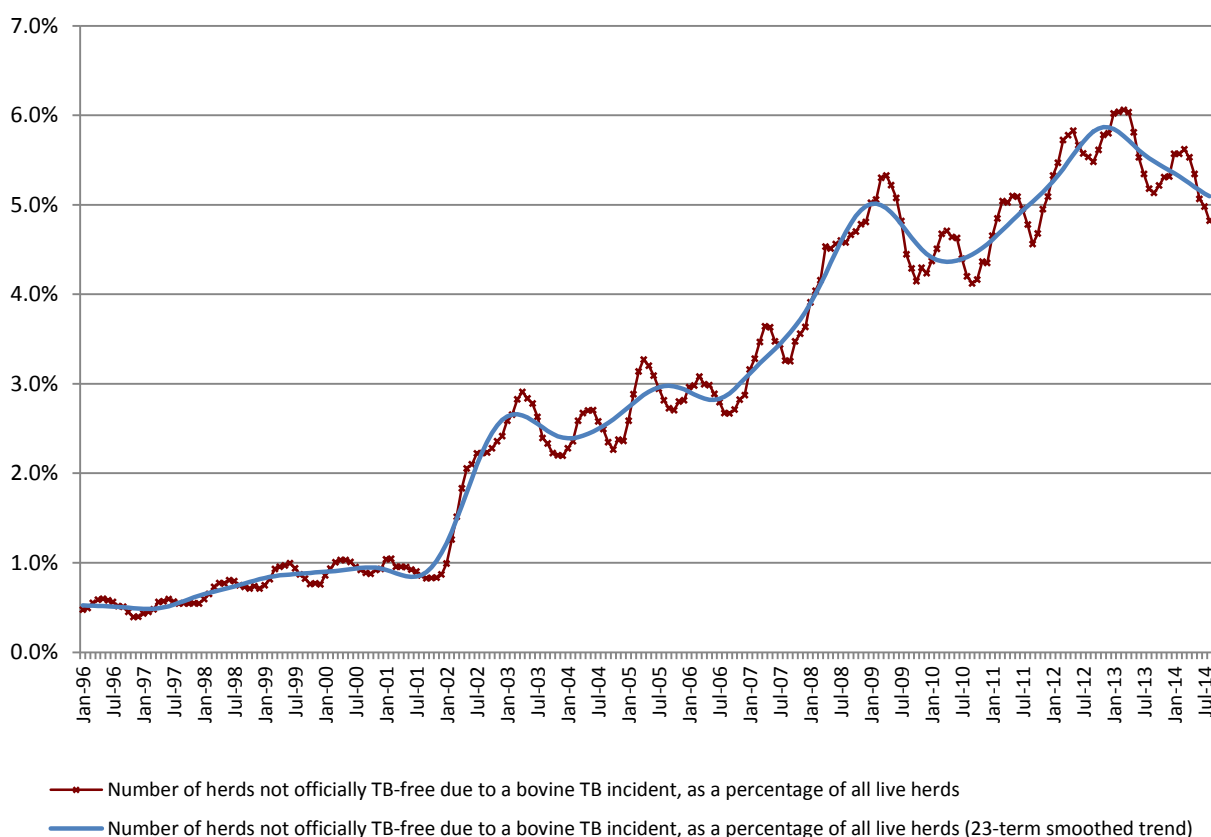
1. Non-OTF herds as a percentage of all cattle herds

Numerator: number of herds not officially TB-free due to an ongoing TB incident at the end of each reporting period

Denominator: number of active cattle herds at the end of each reporting period

Example: a herd prevalence rate of 5% means that for every 100 active herds, five of them do not have OTF status.

Figure 5: number of non-OTF cattle herds as a proportion of all active herds, GB, from June 2011



This is an established way of measuring herd prevalence and would be published alongside herd incidence as a supplementary headline statistic that measures the overall impact of the epidemic on the cattle industry.

Advantages	Drawbacks
Provides context alongside which to view herd incidence measure.	Moves away from the simpler approach of a single headline measure for bTB.
Not dependent on testing frequency or type of test.	If restrictions on a farm are lifted but there is a lag in this information showing in the data, this measure can be inflated.

2. No herd prevalence measure (the status quo)

An alternative is not to present any additional headline statistics and retain only herd incidence rate.

Preferred approach:

Option 1: measure prevalence as **number of non-OTF herds as a percentage of all active cattle herds** and include it as a headline statistic.

Animal incidence

Options being consulted on:

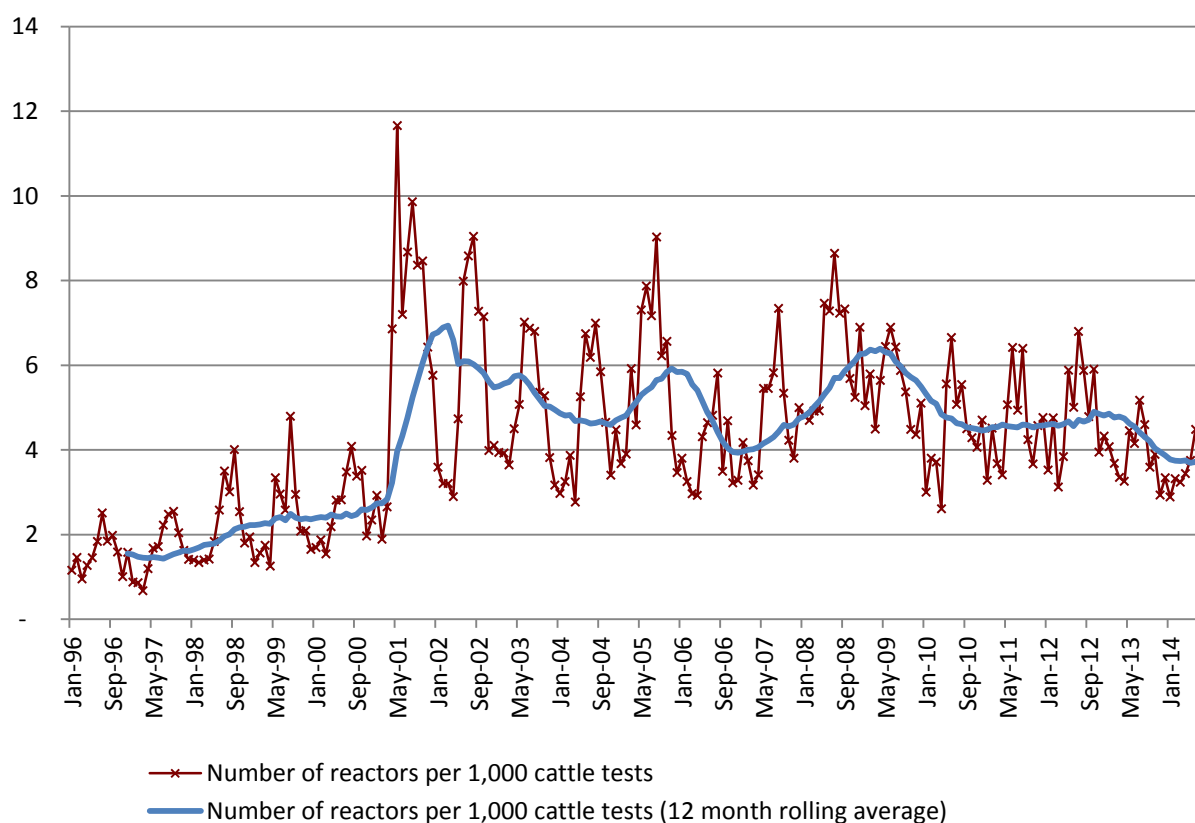
Option	Description
1	Number of reactors per 1,000 cattle tests
2	Do not include an animal incidence as a headline statistic

1. Number of reactors per 1,000 cattle tests

Numerator: number of TB reactors

Denominator: number of animal tests (000s)

Example: an animal incidence of 5 means that for every 1,000 tests carried out on animals, five animals were found to be reactors.



Advantages	Drawbacks
Gives context to the herd-based measures	Can be biased by herd size, type of test etc (see below)
	Heavily influenced by changes in surveillance (testing)
	Difficult to interpret the trends

An alternative to this is to calculate animal incidence measure as the number of reactors per 1,000 cattle tested (rather than 1,000 tests on cattle). This is similar to the difference between options 1 and 3 for herd incidence. However, this lacks meaning below the GB-

level, because an animal could be tested in England one month then moved to Wales and tested there the next. Data is only available to September 2011 (when APHA moved from the VetNet system to Sam). As such this has been rejected as an option.

2. No animal incidence rate

Animal incidence rate can be biased by several factors, including:

- The size of the herd, where a breakdown in a large herd involving many animals would have a greater impact on this statistic than a breakdown with one or two reactors
- Test type, where if the skin test is supplemented by a more sensitive test (e.g. the gamma interferon blood test) more animals are likely to test positive for infection
- Test interpretation, which is more stringent ('severe') in herds under restriction and will lead to more animals testing positive for infection

It is also heavily influenced by the amount of testing carried out, in much the same way as the current measure of herd incidence. Because of these issues, this option proposes that animal incidence is not included as a headline statistic, and that instead only the underlying statistics currently published (including number of animal tests and number of reactors) would be presented.

Preferred approach:

Option 2: animal incidence rate **not to be included** as a headline statistic.

Q2. Geographical breakdowns

The National Statistics are published for three administrative regions of England (West, East and North) previously used by APHA, as well as Wales and Scotland. The English regions used in the monthly National Statistical notices no longer reflect the current division of England into three distinct zones for bovine TB risk and surveillance purposes. Similarly the statistics as they are currently published do not allow the statistics to be disaggregated into the TB regional boards used in Wales to monitor the disease.

While the county-level statistics would continue to be published as they currently are, this consultation is seeking feedback on the usefulness of also publishing the statistics, including any headline measures, for:

- The TB risk areas defined in the Bovine TB Strategy for England (High Risk Area, Edge and Low Risk Area)
- The TB regional boards in Wales (North, South East and South West).

The differences in incidence in these areas are illustrated in figures 6 and 7.

Figure 6: Number of new incidents of bTB leading to the withdrawal of officially TB free (OTF) herd status, as a percentage of tests carried out in OTF herds, England by risk area, 2013

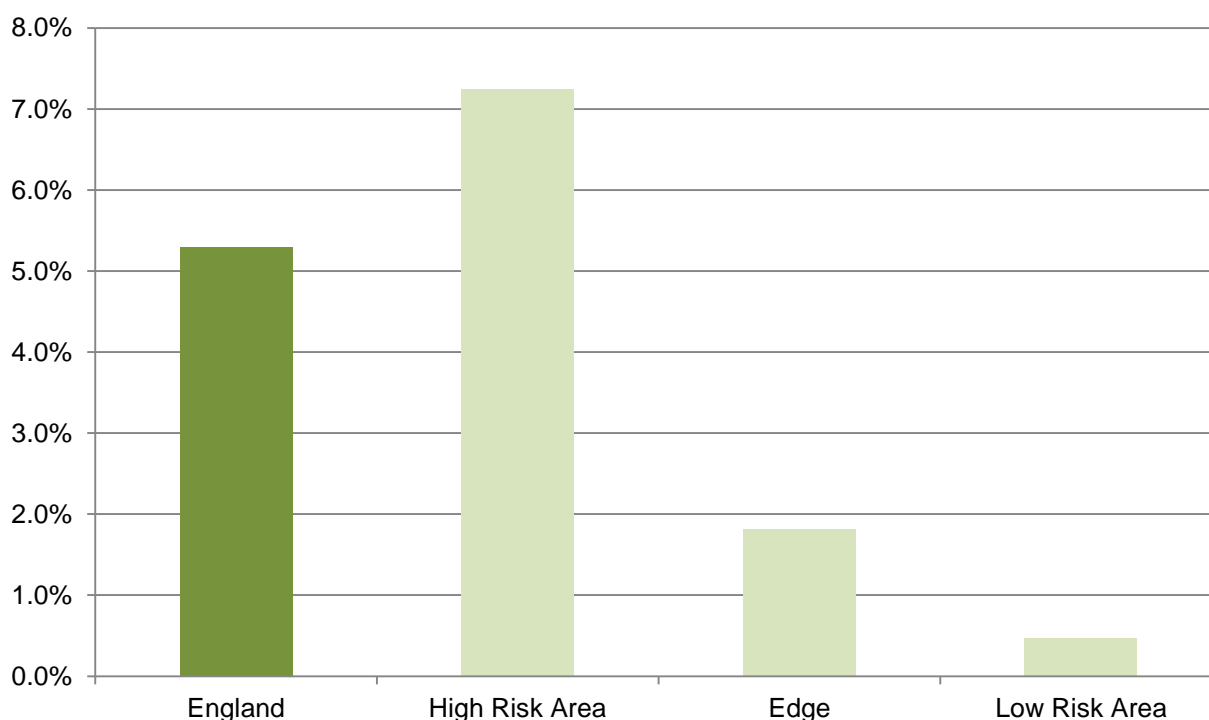
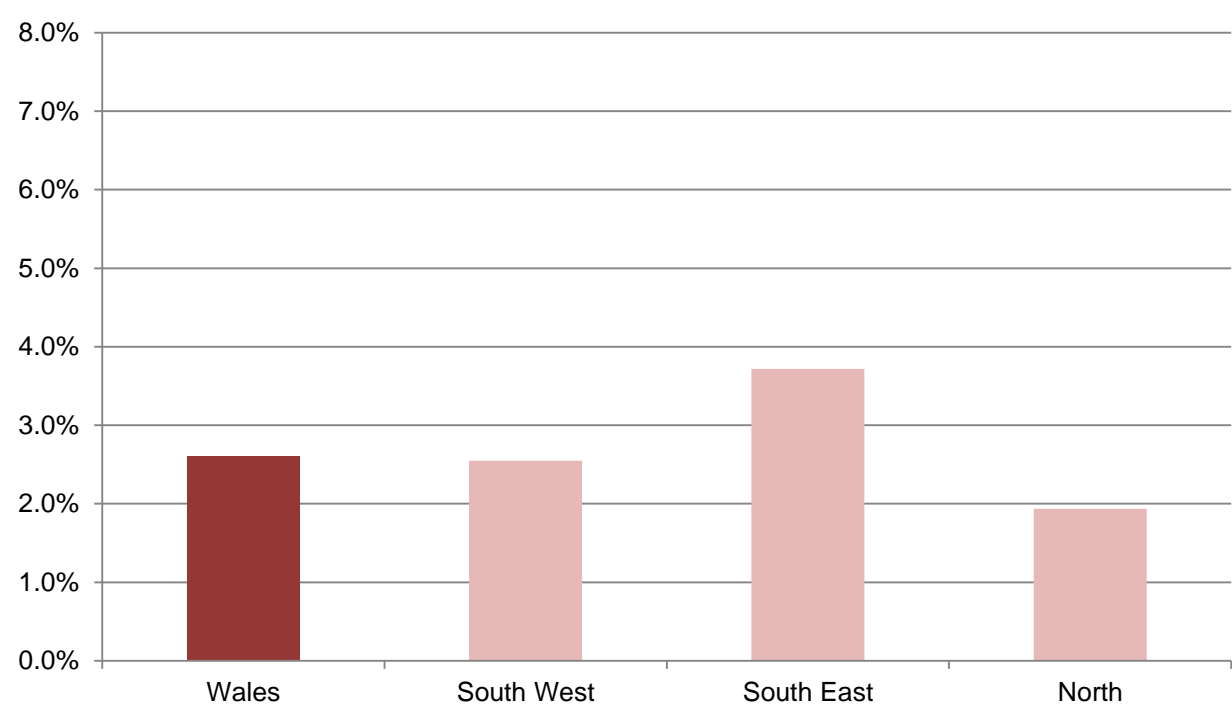


Figure 7: Number of new incidents of bTB leading to the withdrawal of officially TB free (OTF) herd status, as a percentage of tests carried out in OTF herds, Wales by TB regional board, 2013



Q3. Frequency of publication

Currently the National Statistics are published monthly, three months in arrears, including the calculation of the latest monthly herd incidence rate for GB. However the Statistical Notice states that short term changes in these statistics should be considered in the context of long term trends, and the proposals recommended in this document seek to remove some of the uncertainty in the trends and short term changes.

This consultation seeks feedback on the proposal that the statistical notice will move to being published quarterly, with underlying datasets continuing to be produced monthly. Both the quarterly and monthly statistical releases would continue to be published three months in arrears. This would mean that the information published would be:

- Each month: datasets showing the underlying statistics as currently published. This includes the number of herd and cattle tests, new herd incidents, the number where OTF status was withdrawn, the number of animals slaughtered and the number of herds under movement restrictions. The full dataset can be seen [here](#), entitled *Incidence of TB in cattle in Great Britain: GB dataset*.
- Each quarter: a statistical notice (PDF) showing the headline statistics in charts and tables, with accompanying commentary and updated herd incidence and prevalence measures (for GB, by country and by region of England and Wales). This would be similar to the existing statistical notice, found [here](#) and entitled *Incidence of TB in cattle in Great Britain – statistical notice*. For example, the statistical notice published in June would contain the headline statistics for the period ending in March.

Annex A

Charts showing herd incidence options where the numerator includes all TB breakdowns, i.e. both OTFW and OTFS breakdowns.

Figure A1: herd incidence of bovine TB (bTB) in GB. Number of new incidents of bTB, as a percentage of tests carried out in OTF herds each month since 2003 (top) and 1996 (bottom)

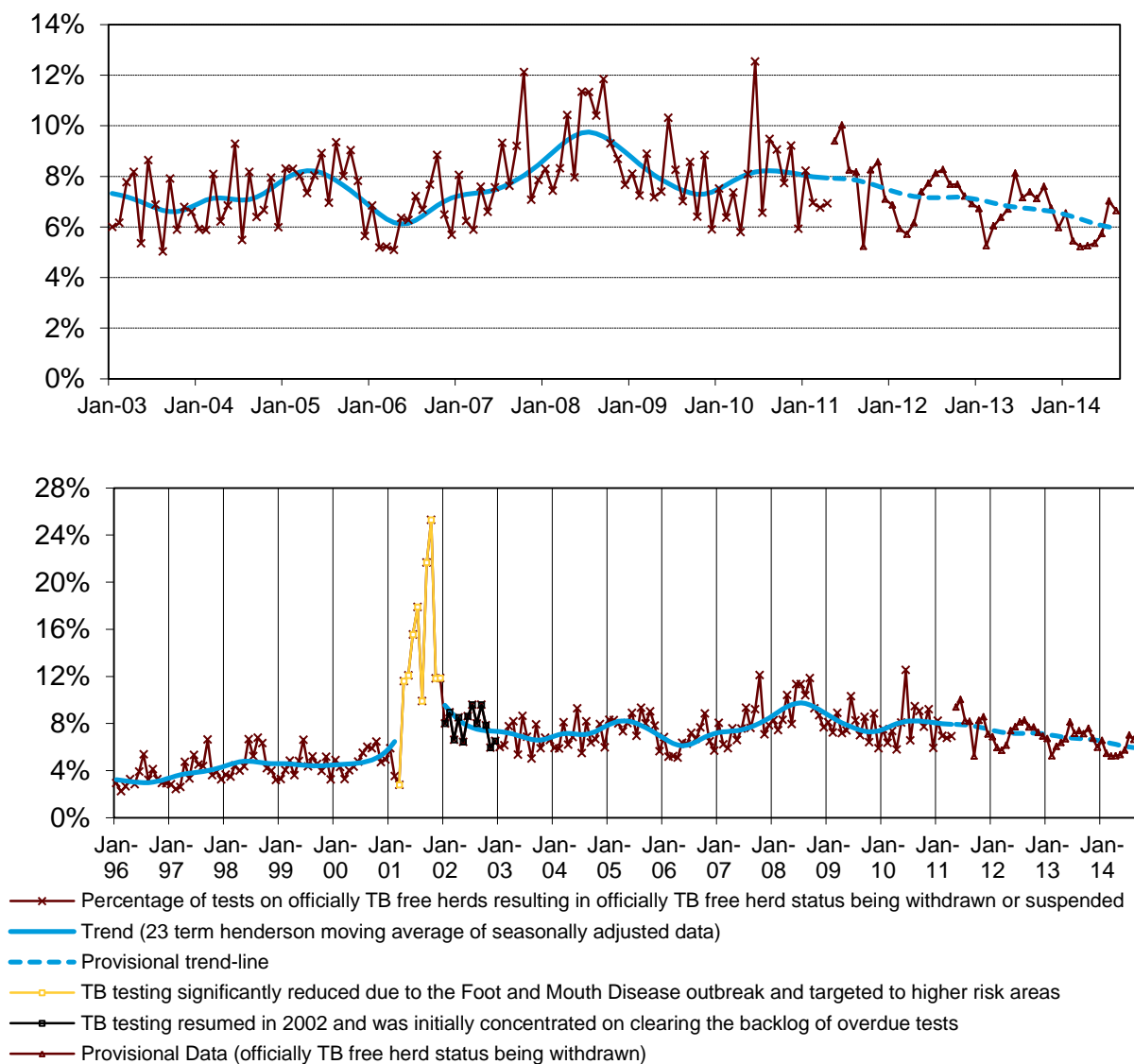


Figure A2: herd incidence of bovine TB (bTB) in GB. Number of new incidents of bTB, as a percentage of herd tests carried out in OTF herds each month since 2003 (top) and 1996 (bottom)

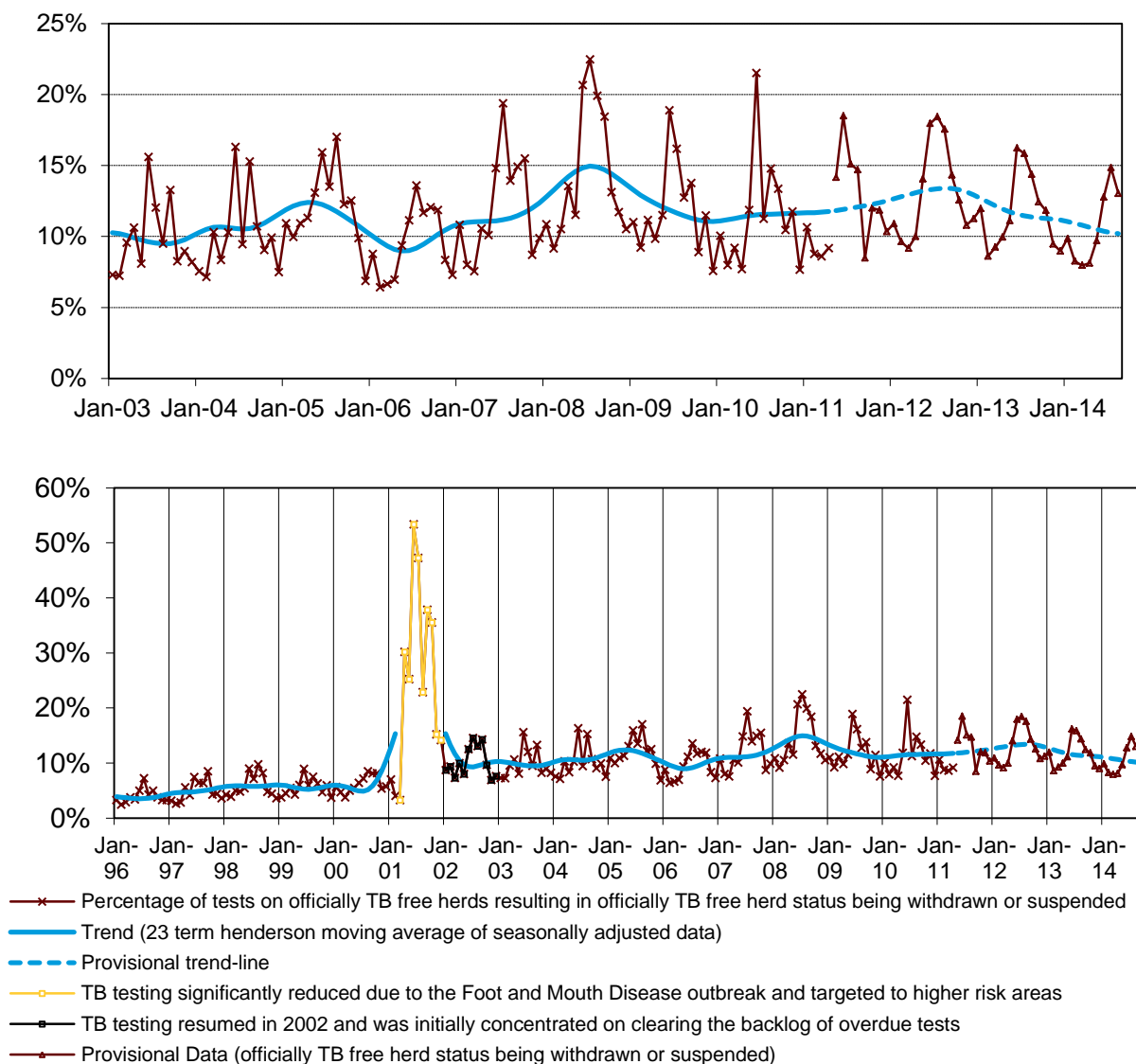


Figure A3: herd incidence of bovine TB (bTB) in GB. Number of new incidents of bTB, as a percentage of OTF herds tested each month since 2003 (top) and 1996 (bottom)

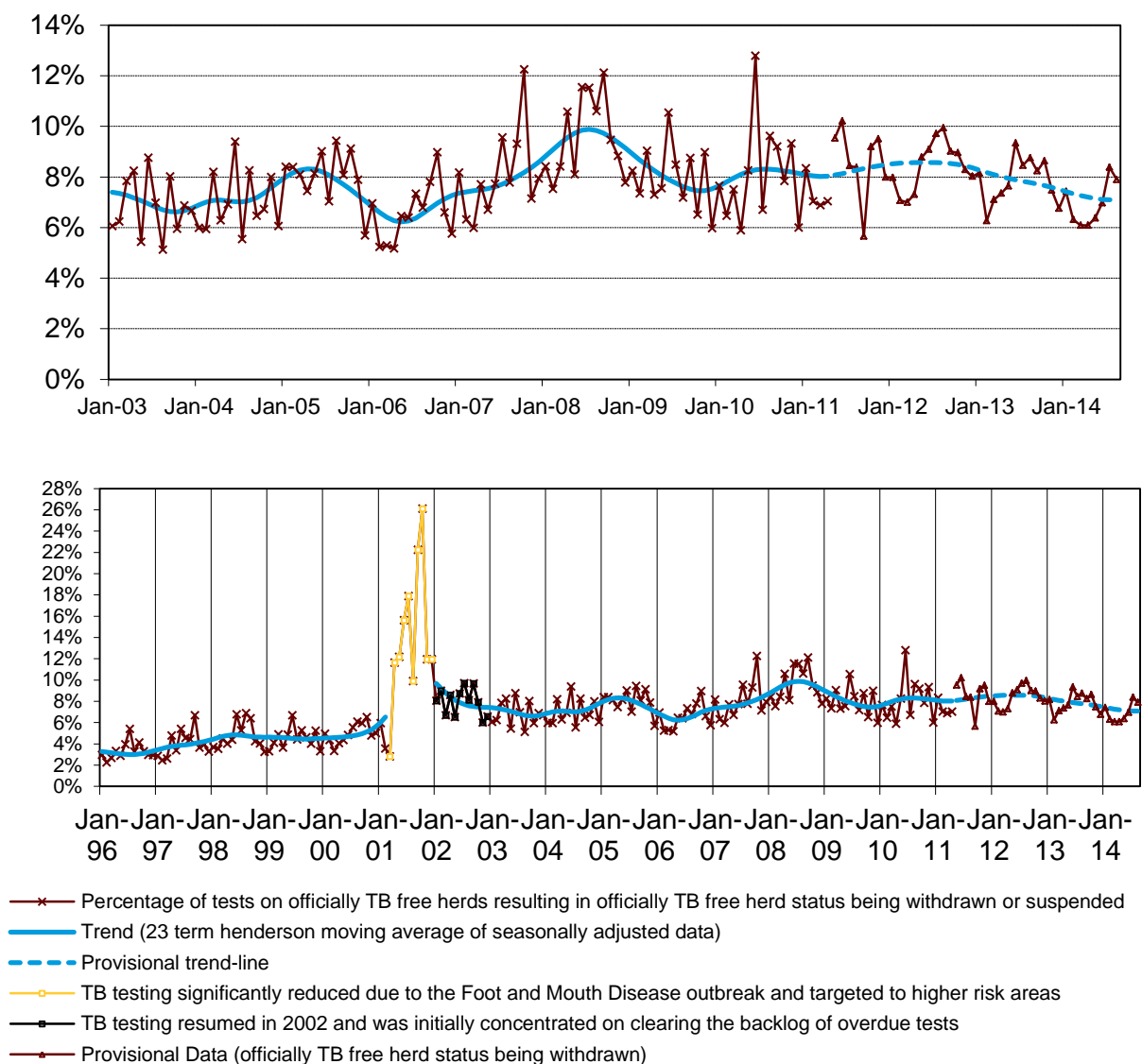
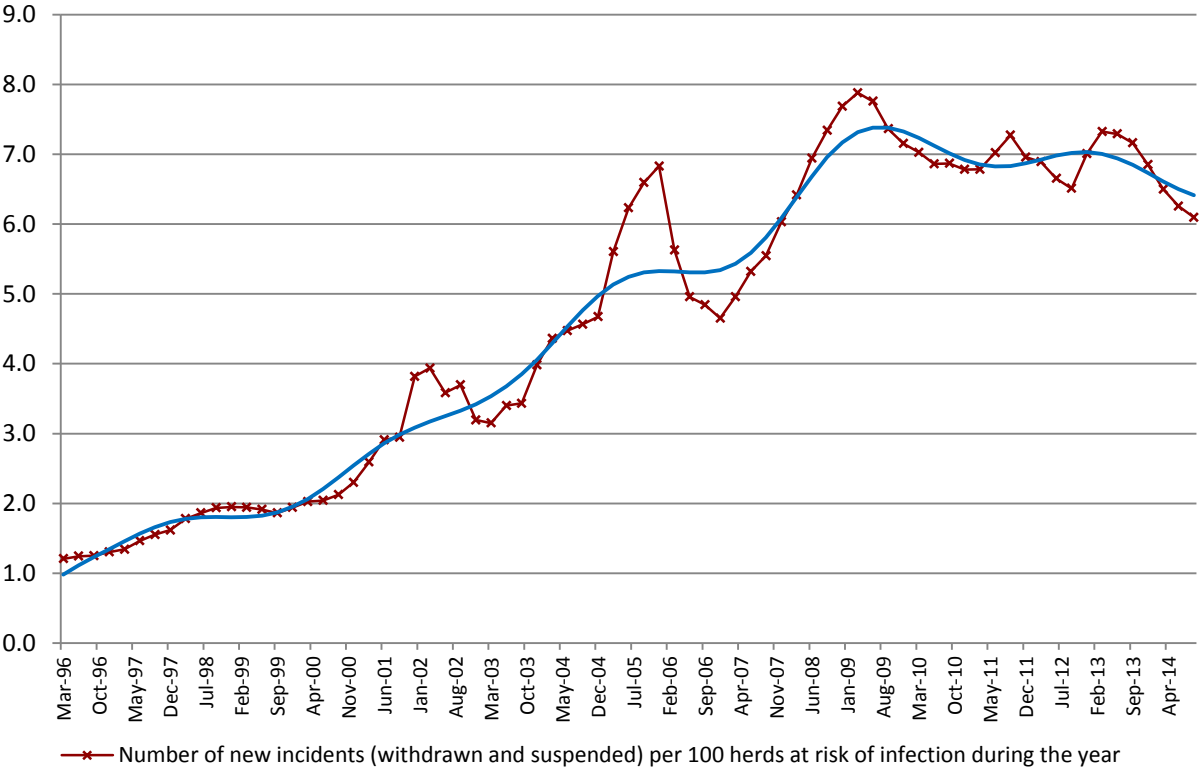


Figure A4: herd incidence rate of bovine TB (bTB) in GB per quarter. Number of new incidents of bTB per 100 herd years at risk of infection presented per quarter



Annex B

Tests included in different options

Broad test types currently included in 'tests on OTF herds' (option 1)	
TB 12 month test (12 months after restrictions lifted)	Check test
TB 6 month test (6 months after restrictions lifted)	Radial test
90 day test (for approved finishing units)	Routine herd test
Contiguous test	Whole herd test
Artificial insemination	Inconclusive reactor test
Private export test	Post Irish import test
Tracing test	Post import test

Test proposed to be excluded (option 2)	
Artificial insemination test	Inconclusive reactor test
Private export test	Post Irish import test
Tracing test	Post import test