



**Animal &
Plant Health
Agency**

Report on the incidence of bovine tuberculosis in cattle in 2013 - 2016

**Three years' follow-up in areas of Somerset and
Gloucestershire and one year of follow-up in
Dorset of industry-led badger control**

September 2017



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This report was republished in May 2018 with a correction to a dataset used for the calculations of recurrence in the Appendices.

A small number of herds in each area, which were in existence at the start of badger control, have since become inactive and were erroneously retained in the recurrence dataset. This dataset has been corrected and the recurrence analysis updated.

The interpretation of these amended results remains unchanged by this correction.

The results of the updated calculations have replaced the previously reported results in the following locations.

Appendix 1 – Recurrence calculations p32-33 including Figure 5.

Appendix 2 – Raw data tables 8a, 8b and 8c on p43-47.

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Executive Summary

In 2013, badger culling licences were issued for two areas in England to groups of farmers and landowners for the purpose of preventing the spread of bovine tuberculosis. In 2015, licences were issued for a further area in England. The licencing policy was implemented with an aim of reducing the population of badgers, a known carrier of bovine tuberculosis (TB), thereby reducing the potential for transmission between badgers and cattle, and therefore aiming for a subsequent reduction in TB incidence in cattle.

The primary purpose of this report is to provide an updated descriptive analysis of TB incidence in cattle for licensed areas and comparison areas (in which there is no badger culling) and to report any differences in TB incidence, for each year in isolation, which may be observed. A number of secondary descriptive measures of disease for these areas are also reported.

Methodology

Using routinely collected surveillance data, TB incidence has been assessed in cattle herds located within the areas where industry-led culling is conducted (so called “intervention” areas), and compared to TB in cattle herds in ten comparison areas matched on some, but not all, characteristics which affect risk of TB. The incidence of TB in cattle has also been monitored in 2 km buffer areas surrounding the intervention areas and compared to incidence in similarly defined areas around the comparison areas. All areas have been compared for the three years prior to culling and the first three years since culling began in Gloucestershire and Somerset, and the first year since culling began in Dorset. The primary outcome used to compare the three areas was OTF-W TB incidence per 100 herd years at risk which, in the analysis reported here, is unadjusted for additional factors which affect TB risk.

Results and Interpretation

The unadjusted incidence rate ratios in this descriptive analysis revealed no statistically significant differences between both the combined central intervention areas and their combined comparison areas or between the combined intervention buffers and their combined comparison buffer areas when each year is looked at in isolation.

All the analyses in this report are performed on an ‘unadjusted’ OTF-W incidence rate. The intervention and comparison areas could not be matched for all factors which may be associated with a risk of TB in cattle (e.g. number of badgers historically removed). Brunton et al., (2017) recently published an ‘adjusted’ (multivariable) analysis using the first two years of available data reported on previously by APHA (2016a). The same datasets were used, but incorporated additional factors which affect TB risk (confounders), and analysed the individual intervention areas of Somerset and Gloucestershire. This multivariable analysis, adjusting for confounding factors and looking at the combined time since culling began, showed that reductions in TB incidence were associated with culling in the first 2 years in both the Somerset and Gloucestershire intervention areas when

compared to areas with no culling. An increase in incidence was associated with culling in the 2-km buffer surrounding the Somerset intervention area but not in Gloucestershire. The authors urge caution in developing generalizable inferences about the effectiveness of the policy at this stage and note that a time lag of around 4 years was observed between culling in the RBCT and measurable significant effect on cattle TB incidence (Donnelly et al., 2007).

With the availability of further data in future years, the analyses which adjust for measurable confounding factors (such as in Brunton et al, 2017) and looking at combined time since culling began will be the best means available by which to determine the relationship between TB incidence in cattle and the intervention in the badger control licensed areas.

The long-term value of information from monitoring this industry-led culling will depend on the conduct of the cull, the number of areas eventually licensed and the extent to which other parts of the TB control policy remain stable.

Introduction

Badgers are a known host species for *Mycobacterium bovis* (the causative agent of TB). The results of the Randomised Badger Culling Trial (RBCT) conducted in England between 1998 and 2005 indicated that the incidence of confirmed TB in cattle could be reduced by 23.2% (95% CI: 12.4% to 32.7%) over a four year period if culling was performed systematically over large areas and sustained for at least four years (Donnelly et al 2007). Culling badgers was found to be associated with both positive and negative effects on TB incidence.

In 2013, culling licences were issued for two areas in England by Natural England under the Protection of Badgers Act 1992 to enable groups of farmers and landowners to cull badgers for the purpose of preventing the spread of bovine tuberculosis (Defra 2012, 2013). In 2015, licensing was issued for one further area in England. Criteria that licensees were required to meet included: an application area to be at least 150 km², at least 70% of the land to be accessible for culling, cattle herds subject to annual TB testing and reasonable biosecurity to be in place. In addition, culling should plan to reduce the estimated badger population by 70% and be conducted for a minimum of four years (Defra 2013). In west Somerset and west Gloucestershire, the first year of culling took place between August and November 2013, the second year took place between September and October 2014, and the third year took place between September and October 2015. In Dorset, the first year of culling took place between September and October 2015.

Using a combination of cage trapping and controlled shooting of badgers, 279 badgers were culled in Somerset, 432 were culled in Gloucestershire and 756 were culled in Dorset in 2015 (Defra, 2015a). The minimum number of badgers to be culled in Year 3 in order to achieve approximately 70% reduction in the population was estimated to be 55 for Somerset, and 265 for Gloucestershire (Defra, 2015b). The minimum number of badgers to be culled in Year 1 in order to achieve approximately 70% reduction in the population was estimated to be 615 for Dorset (Defra, 2015b). The calculation of these numbers and the considerable uncertainty around the population estimates are described in the Defra policy papers on setting the minimum and maximum numbers for the three cull areas (Defra, 2015a; 2015b).

Although industry-led culling is a disease control measure rather than a scientific experiment, specific methodologies have been developed to (i) enable the reporting and comparison of TB incidence for intervention and comparison areas and (ii) assess the association between the intervention and incidence of TB in cattle. The methodology for selecting comparison areas has been developed and reported recently in the scientific paper 'Assessing the effects of the first two years of industry-led badger culling in England on the incidence of bovine tuberculosis in cattle 2013-2015' (Brunton et al., 2017).

Brunton et al. conduct a multivariable analysis on the first two years of post-culling data which simultaneously measures the effects of multiple factors might influence the incidence of TB (confounders) such as the number of animals in a herd and the number of

previous TB incidents in a herd, which is not included in this descriptive analysis .They use the same data reported on by APHA 2015 and through multivariable analysis, found a 21% drop in the Somerset cull area and a 58% reduction in Gloucestershire. There was a 38% increase in the Somerset 2km buffer area. All three of these differences were statistically significant. There are roughly only half as many herds in the Somerset buffer area as in the cull area, so the net benefit is still positive. There was no significant change in the Gloucestershire 2km buffer zone.

The unadjusted incidence of TB in cattle in the intervention areas and comparison areas in the first three years¹ since culling began is reported and compared in this descriptive report.

¹ Data for the first three years of culling are presented for the west Somerset and west Gloucestershire intervention areas and the first year of culling for the Dorset intervention area

Methods

The methodology applied and definitions used for this analysis are as reported for the first year of culling in Annex 1 of the England TB surveillance report for 2014 (APHA 2015) and as reported for the second year of culling (APHA 2016a). A summary is provided below, further details can be found in Brunton *et al* (2017).

Outcome measure

The rationale for confining the analyses primarily to OTF-W incidents is that the RBCT demonstrated an association between badger culling and incidence of OTF-W-like incidents only rather than all incidents (OTF-W-like incidents were then called “confirmed” incidents, meaning confirmation by the detection of lesions at post-mortem examination or isolation of *M.bovis*, Independent Scientific Group on Cattle TB, 2007).

OTF-W incidence was used as the primary outcome rather than total TB incidence because this analysis was based on the assumption that we would be able to detect comparable effects on cattle TB to those observed during the RBCT, and the RBCT only showed an association between OTF-W incidence and culling (Donnelly *et al.*, 2007).

Area selection

Using routinely collected surveillance data on TB in cattle, TB incidence is assessed in cattle herds located within areas where industry-led culling is conducted (so called “intervention” areas), and compared to TB in herds in uncultured areas (so called “comparison” areas). This is conducted in a similar, but not identical way, to the approach used to analyse the impact of culling during the Randomised Badger Culling Trial (Donnelly *et al* 2003, Donnelly *et al* 2006, Donnelly *et al* 2007).

In the absence of randomised selection, comparison areas were identified by means of an unweighted ranking to best match on six characteristics. The characteristics include some of those expected to affect risk of TB: total number of TB incidents one and three years prior to the baseline date; number of ‘Officially Tuberculosis Free status – withdrawn’ (OTF-W) incidents one and three years prior to the baseline date; number of herds; median herd size, and also proximity to an intervention area; and percentage of land previously in an RBCT proactive culling area. The distribution of these characteristics was summarised for all intervention areas and their potential comparison areas. A score based on the sum of the absolute differences for each of the attributes was then used to rank potential comparison areas, the rank being used to select ten comparison areas for each intervention area.

The incidence of TB in cattle is also being monitored in 2 km buffer areas surrounding the intervention areas and compared to incidence in similarly defined areas around comparison areas. The rationale for this comparison is that the disruption of badger populations caused by culling will lead to increased ranging behaviour which may

influence TB incidence in the 2 km buffer area outside of the cull areas (Donnelly et al 2006; Woodroffe et al 2006).

Therefore intervention and comparison areas can be further distinguished into, and examined by, their 'central' and 'buffer' areas.

Cattle population

The population of herds in each area at the baseline date (the start date of Year 1 in Table 2) is described in Table 1.

Table 1 – The number of herds in each area at the baseline date (start of year 1)

Area		Number of herds at baseline date (median)
Somerset	Central	154
	Buffer	88
	Comparison	1,863 (173)
	Comparison buffer	1,199 (118)
Gloucestershire	Central	215
	Buffer	121
	Comparison	1,713 (174)
	Comparison buffer	1,008 (104)
Dorset	Central	157
	Buffer	113
	Comparison	1,511 (148)
	Comparison buffer	1,140 (113)
Total	Central	526
	Buffer	322
	Comparison	5,087
	Comparison buffer	3,347

Comparisons have been made between the number of herds present in the dataset at baseline date (2013) and those present in the equivalent dataset now (2017). In Intervention areas active in 2013, the average reduction was -5.1%, while in the Comparison areas for interventions active in 2013 the average reduction was -11.3%. The methodology used to calculate incidence rate takes into account the number of herds on which the rate is based so comparisons of incidence rates should be less affected by the change in the number of herds than other frequency measures.

Time periods

The time periods reported are the first, second and third years following the baseline date and the periods 0-12 months, 12-24 months, and 24-36 months prior to the baseline date. For conciseness, these periods have been labelled as years 1, 2 and 3 (Table 2).

Table 2 – Start and end dates for each of the reporting periods used to assess cattle TB in the Somerset, Gloucestershire, and Dorset intervention areas

Somerset			
Reporting period	Description	Start Date	End Date
3 years prior	The year which began three years prior to the intervention	26/08/2010	25/08/2011
2 years prior	The year which began two years prior to the intervention	26/08/2011	25/08/2012
1 year prior	The year prior to the intervention	26/08/2012	25/08/2013
Year 1	First year of the intervention	26/08/2013	25/08/2014
Year 2	Second year of the intervention	26/08/2014	25/08/2015
Year 3	Third year of the intervention	26/08/2015	25/08/2016
Gloucestershire			
Reporting period	Description	Start Date	End Date
3 years prior	The year which began three years prior to the intervention	03/09/2010	02/09/2011
2 years prior	The year which began two years prior to the intervention	03/09/2011	02/09/2012
1 year prior	The year prior to the intervention	03/09/2012	02/09/2013
Year 1	First year of the intervention	03/09/2013	02/09/2014
Year 2	Second year of the intervention	03/09/2014	02/09/2015
Year 3	Third year of the intervention	03/09/2015	02/09/2016
Dorset			
Reporting period	Description	Start Date	End Date
3 years prior	The year which began three years prior to the intervention	31/08/2012	30/08/2013
2 years prior	The year which began two years prior to the intervention	31/08/2013	30/08/2014
1 year prior	The year prior to the intervention	31/08/2014	30/08/2015
Year 1	First year of the intervention	31/08/2015	30/08/2016

Statistical testing for differences in unadjusted OTF-W incidence rates

The primary outcome of interest was the difference between the OTF-W incidence rates, in the combined intervention and combined comparison areas, where the incidence rate is defined as the number of herd TB incidents per 100 herd years at risk (APHA 2016b):

$$\text{Incidence rate} = \frac{\text{number of herd TB incidents}}{\text{time at risk}}$$

This method, modified from that described by Downs et al. (2013), uses the number of new OTF-W incidents detected in 2015 as numerator. For information, the number of all new TB incidents for each year and each area are also provided in Appendix 2 Table 1. The denominator is calculated by summing the time a herd was considered at risk of a breakdown, i.e. the total time the herd was not under restriction since the most recent test (or end of restrictions) before or at the beginning of the year the incidence was calculated for. The difference in incidence rate is expressed as a crude incidence rate ratio (IRR), calculated for both the combined central areas and combined buffer areas in each reporting period:

$$IRR = \frac{TB \text{ incidence rate in intervention area}}{TB \text{ incidence rate in comparison areas}}$$

95% confidence intervals for IRRs were calculated and p-values were obtained using the Fisher's exact test with a probability level of $p < 0.05$ considered to be statistically significant. IRRs were also calculated for the individual intervention areas and their respective areas, and the temporal changes in TB incidence rates are also reported.

Secondary outcome measures reported

Temporal changes in other TB measures of interest are also presented in Appendix 1. These include:

- *Herd TB prevalence* as the number of herds under movement restrictions (at a single time-point) due to an OTF-W incident *per 100 herds*;
- The *number of reactors* to the single intradermal comparative cervical test (SICCT skin test) or gamma interferon test *per incident* in each area. The number used is the median number of reactors throughout the whole duration of the incident, for OTF-W incidents that ended in the reporting period regardless of when they started;
- The median *duration* in days of OTF-W incidents that ended in each of the reporting years;
- *Method of detection* as the annual proportion of new OTF-W incidents detected by SICCT test surveillance compared to the number detected by slaughterhouse surveillance;
- *Recurrence of disease* which is described as the number and proportion of herds with a history of TB in the previous three years which suffered any incident in the reporting period compared with the proportion of herds with no history of TB which suffered any incident in the reporting period.

Results

Examining differences in OTF-W incidence rate using the combined data

A comparison of the unadjusted OTF-W incidence rate per 100 herd years at risk between the central areas of the combined intervention and combined comparison areas, and their respective buffer areas, for each year in isolation is presented in Table 1. The 95% confidence interval spanned one for all IRRs representing no statistically significant differences between combined central and comparison areas or combined buffer and comparison areas across all reporting periods for this measure.

Table 1 – OTF-W incidence rates per 100 herd years at risk and unadjusted Incidence rate ratios (IRR) for central and buffer areas versus comparison areas in Somerset, Gloucestershire, and Dorset combined. All numbers are rounded to 2 decimal places.

Reporting period	Central	Comparison	IRR	95% confidence interval		P value
3 years prior	15	14	1.11	0.86	1.41	0.38
2 years prior	15	14	1.10	0.86	1.40	0.41
1 year prior	13	14	0.88	0.66	1.15	0.35
Year 1	13	14	0.97	0.74	1.24	0.80
Year 2 ^a	11	14	0.82	0.58	1.14	0.24
Year 3 ^a	11	13	0.82	0.57	1.14	0.23

Reporting period	Buffer	Comparison buffer	IRR	95% confidence interval		P value
3 years prior	10	13	0.76	0.51	1.09	0.13
2 years prior	11	13	0.83	0.56	1.19	0.32
1 year prior	12	15	0.80	0.56	1.12	0.19
Year 1	11	14	0.80	0.55	1.13	0.20
Year 2 ^a	12	15	0.78	0.50	1.19	0.25
Year 3 ^a	8	12	0.71	0.39	1.19	0.19

^a Only Somerset and Gloucestershire have contributed to Year 2 and Year 3 data, as appropriate

Unadjusted OTF-W incidence rates for individual areas

A comparison of unadjusted OTF-W incidence rate per 100 herd years at risk between the central and comparison areas, and their respective buffer areas, in Somerset, Gloucestershire and Dorset individually are presented in Tables 2-4. The incidence rates for the Somerset, Gloucestershire, and Dorset central intervention and their buffer areas and average figures for comparison areas and comparison buffers are shown in Figures 1-3.

Somerset

In Somerset, the central areas of the intervention and comparison areas (but not the buffers) differed in terms of TB risk two years prior to the intervention ($p=0.02$) with a higher OTF-W incidence in the central area compared to the 10 comparison areas (Table 2). All 95% confidence intervals for the IRRs after the start of the intervention spanned one, denoting the absence of a statistically significant difference in unadjusted OTF-W incidence rates over years 1, 2 and 3.

Qualitatively, the incidence rate in the Somerset central area declined in the first two years following commencement of the cull and remained stable in the third year (Figure 1). This trend was not reflected in the comparison area where the summary estimates were fairly stable across all six years assessed. The incidence rate in the Somerset buffer area also declined in the first two years following commencement of the cull and remained stable in the third year.

Table 2 – OTF-W incidence rates per 100 herd years at risk and unadjusted incidence rate ratios (IRR) for central and buffer areas versus comparison areas in Somerset. P values in bold are significant at the 5% level ($p < 0.05$).

Reporting period	Central	Comparison	IRR	95% confidence interval		P value
3 years prior	20	15	1.31	0.85	1.93	0.19
2 years prior	21	13	1.59	1.05	2.33	0.02
1 year prior	23	15	1.50	0.97	2.23	0.06
Year 1	19	15	1.28	0.82	1.93	0.23
Year 2	14	15	0.95	0.57	1.50	0.86
Year 3	14	16	0.91	0.55	1.42	0.69
Reporting period	Buffer	Comparison buffer	IRR	95% confidence interval		P value
3 years prior	11	14	0.78	0.35	1.53	0.50
2 years prior	17	14	1.26	0.67	2.18	0.41
1 year prior	17	15	1.07	0.56	1.89	0.78
Year 1	17	17	0.99	0.53	1.70	0.99
Year 2	12	16	0.75	0.35	1.43	0.40
Year 3	13	14	0.98	0.41	1.98	0.99

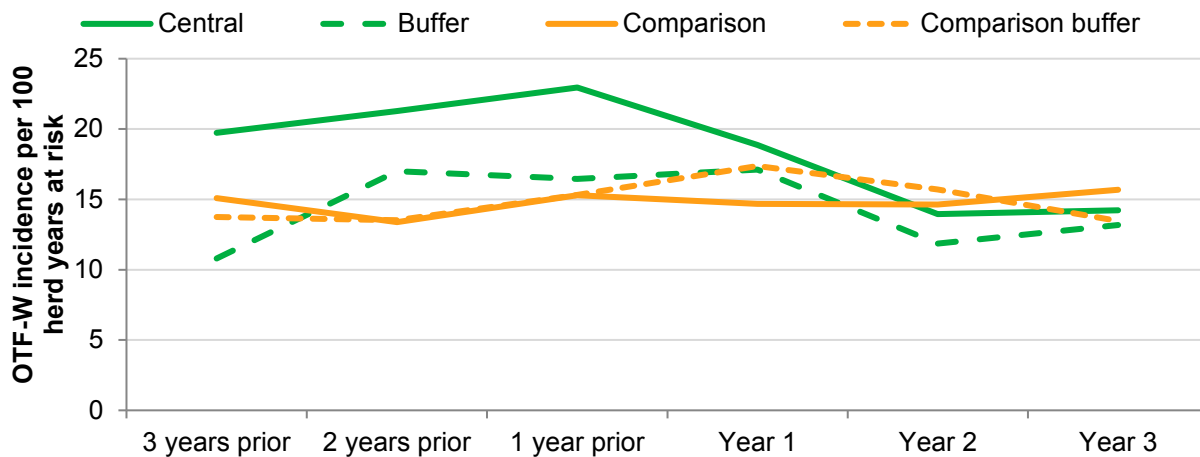


Figure 1 – Temporal changes in OTF-W incidence per 100 herd years at risk, at the end of the reporting period, in the Somerset intervention area, comparison areas, and respective buffer areas. Combined data are shown for the comparison areas. Raw data can be found in Appendix Table 3.

Gloucestershire

In Gloucestershire, the IRR for year 1 of the intervention was statistically significantly different from one ($p=0.05$) for the central and comparison areas (but not for the buffer and comparison areas) (Table 3), However, the OTF-W incidence rate was also statistically significantly lower in the central area compared to the comparison areas in year one prior the cull ($p=0.01$), No statistically significant differences in incidence rate are revealed between the intervention and comparison areas for years 2 and 3.

Qualitatively, little changes in incidence rates were observed in the Gloucestershire intervention area and the comparison areas in Years 2 and 3. Comparatively, slight declines in incidence rates were observed in the intervention and comparison buffer areas (Figure 1b).

Table 3 – OTF-W incidence rates per 100 herd years at risk and unadjusted incidence rate ratios (IRR) for central and buffer areas versus comparison areas in Gloucestershire. P values in bold are significant at the 5% level ($p<0.05$).

Reporting period	Central	Comparison	IRR	95% confidence interval		P value
3 years prior	15	14	1.07	0.71	1.58	0.70
2 years prior	11	15	0.77	0.48	1.19	0.23
1 year prior	8	15	0.52	0.29	0.85	0.01
Year 1	10	15	0.64	0.38	1.00	0.05
Year 2	9	13	0.74	0.44	1.19	0.21
Year 3	8	11	0.77	0.44	1.26	0.29
Reporting period	Buffer	Comparison buffer	IRR	95% confidence interval		P value
3 years prior	13	16	0.80	0.44	1.37	0.42
2 years prior	9	15	0.62	0.29	1.18	0.13
1 year prior	14	17	0.83	0.46	1.38	0.48
Year 1	13	14	0.93	0.50	1.58	0.80
Year 2	12	15	0.82	0.43	1.42	0.48
Year 3	6	10	0.58	0.23	1.24	0.15

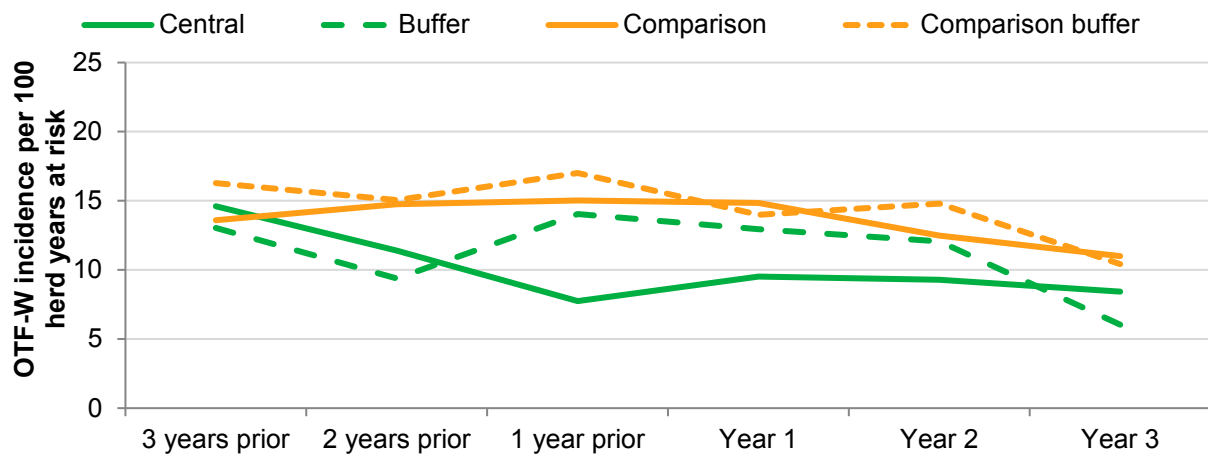


Figure 2 – Temporal changes in OTF-W incidence per 100 herd years at risk, at the end of the reporting period, in the Gloucestershire intervention area, comparison areas, and respective buffer areas. Combined data are shown for the comparison areas. Raw data can be found in Appendix Table 3.

Dorset In Dorset, the unadjusted IRRs revealed no statistically significant differences in OTF-W incidence rates for this area compared to comparison areas (Table 4).

Qualitatively, the incidence rate ratio has oscillated between higher and lower values (Figure 1c). Similar levels of stability in incidence rate were observed in the comparison area and both the comparison and intervention buffer areas.

Table 4 – OTF-W incidence rates per 100 herd years at risk and unadjusted incidence rate ratios (IRR) for central and buffer areas versus comparison areas in Dorset. P values in bold are significant at the 5% level ($p < 0.05$).

Reporting period	Central	Comparison	IRR	95% confidence interval		P value
3 years prior	12	12	0.97	0.55	1.59	0.92
2 years prior	15	14	1.11	0.69	1.72	0.61
1 year prior	11	13	0.90	0.51	1.49	0.71
Year 1	14	12	1.17	0.70	1.84	0.50

Reporting period	Buffer	Comparison buffer	IRR	95% confidence interval		P value
3 years prior	7	11	0.61	0.24	1.30	0.20
2 years prior	7	10	0.71	0.30	1.45	0.36
1 year prior	7	14	0.53	0.23	1.08	0.07
Year 1	5	12	0.47	0.17	1.06	0.05

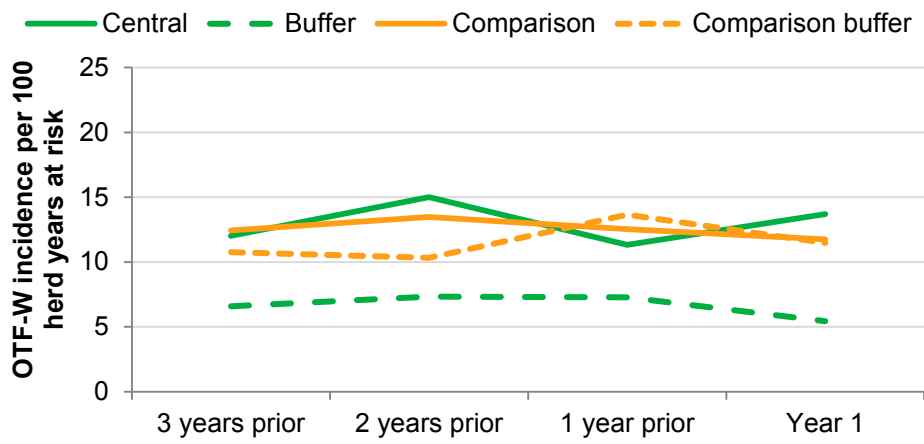


Figure 3– Temporal changes in OTF-W incidence per 100 herd years at risk, at the end of the reporting period, in the Dorset intervention area, comparison areas, and respective buffer areas. Combined data are shown for the comparison areas. Raw data can be found in Appendix Table 3.

Discussion

The current badger cull policy was implemented with an aim of reducing the population of badgers, a known carrier of TB, thereby reducing the potential for transmission between badgers and cattle, and therefore aiming for a subsequent reduction in TB incidence in cattle. The report has described and compared the unadjusted TB incidence in the licensed intervention areas, comparison areas and their buffer areas for each year in isolation.

As in previous years, this descriptive analysis showed different distributions of OTF-W incidents between the intervention areas. The unadjusted incidence rate in the Gloucestershire intervention area has remained lower than in the comparison area, and follows a similar trend. These differences can be observed across all time periods (i.e. prior to as well as after the introduction of the intervention). The unadjusted incidence rate in the Somerset intervention area in the 3 years prior to culling area was higher than in the comparison areas, although declines in OTF-W incidence rate in Years 1 and 2 following culling reduced it to a similar level which was maintained in Year 3. The incidence rate in the Dorset intervention area has been variable across all years of interest. The temporal changes in this area will need to be observed over longer periods as this currently reports only a single year since the commencement of culling.

The unadjusted incidence rate ratios revealed no statistically significant differences between the combined central areas of the intervention areas compared to comparison areas, or combined buffers of intervention areas compared to comparison areas buffers for years in isolation.

To be able to best evaluate if this policy has a statistically significant effect on TB incidence rates, a randomised controlled trial of the culling intervention would have been the most rigorous study design and the most straightforward to design and interpret. Randomisation maximises the chances that comparable intervention and comparison groups on both known and unknown confounders will be equally distributed between the two groups. However, as part of the policy rollout the current culls are purposively selected and delivered by the industry.

In the absence of randomisation, adjustment for differences in the distribution of factors between intervention and comparison areas that could affect TB risk factors is generally addressed by including these factors (confounders) in statistical models analysing effects. The purposive selection of areas reduces the robustness of results and the assessment of the cause-effect relationship between the culling intervention and cattle TB incidence rates, because complete adjustment for confounding factors is difficult to achieve.

The selection of matched comparison areas for intervention areas was an attempt to alleviate the issues of non-randomised selection. However, this may have introduced other biases due to incomplete matching.

The long-term value of information from monitoring industry-led culling will depend on the conduct of the cull, the number of areas eventually licensed and the extent to which other parts of the TB control policy remain stable. Continued delivery of the intervention in these areas, and further roll out of the intervention to other areas will enable better assessments to be made of the longer term impact of the policy on TB incidence in cattle.

Furthermore, with the availability of additional data for subsequent years, analyses which adjust for measurable confounding factors (such as in Brunton et al, 2017) will be the best means available by which to determine the relationship between TB incidence in cattle and the intervention in the badger control licensed areas.

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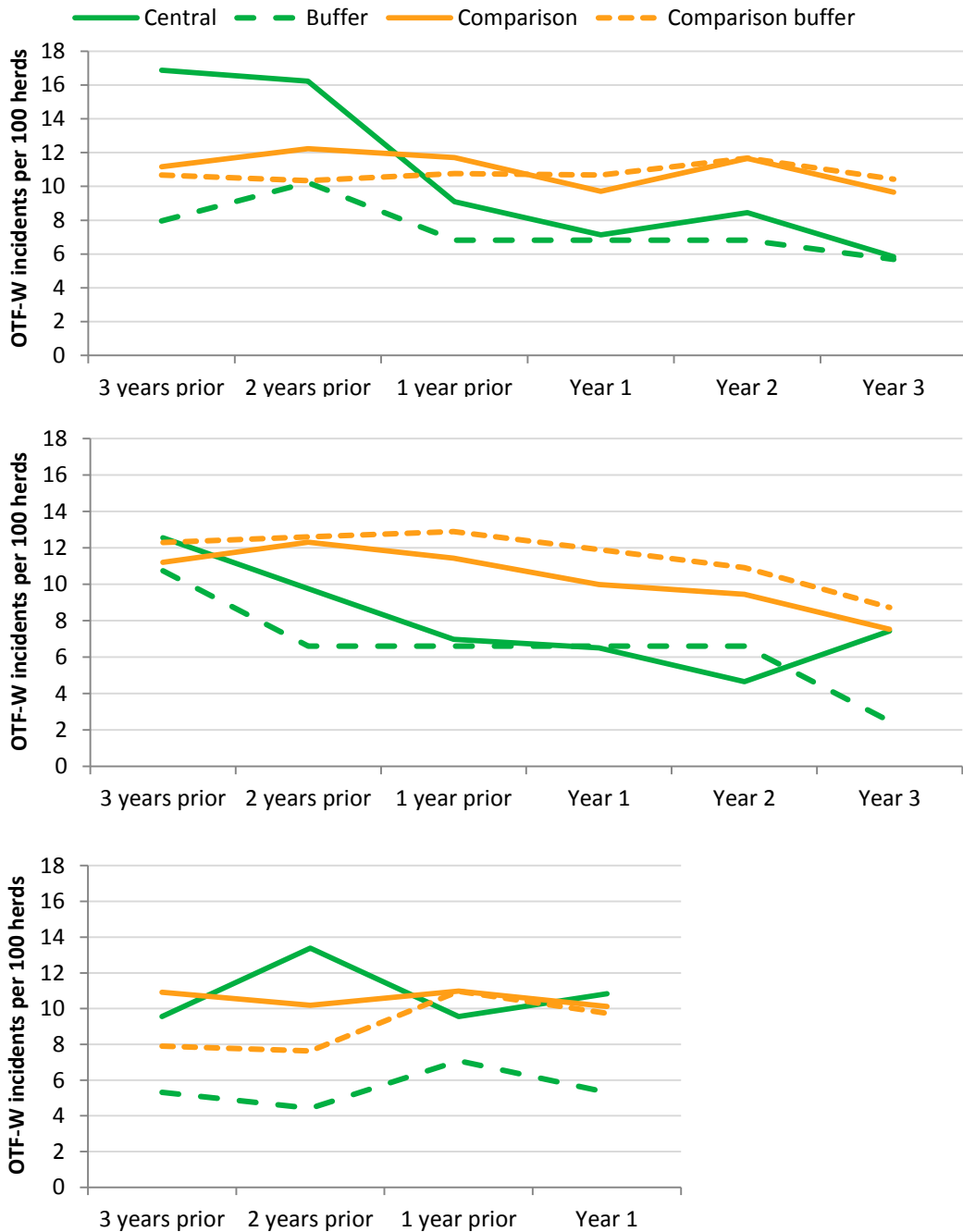
http://webarchive.nationalarchives.gov.uk/20081108133322/http://www.defra.gov.uk/animalh/tb/isg/pdf/final_report.pdf

Appendix 1 - Secondary outcome measures

Qualitative descriptions of the temporal changes in other TB measures of interest are presented below.

Herd TB prevalence

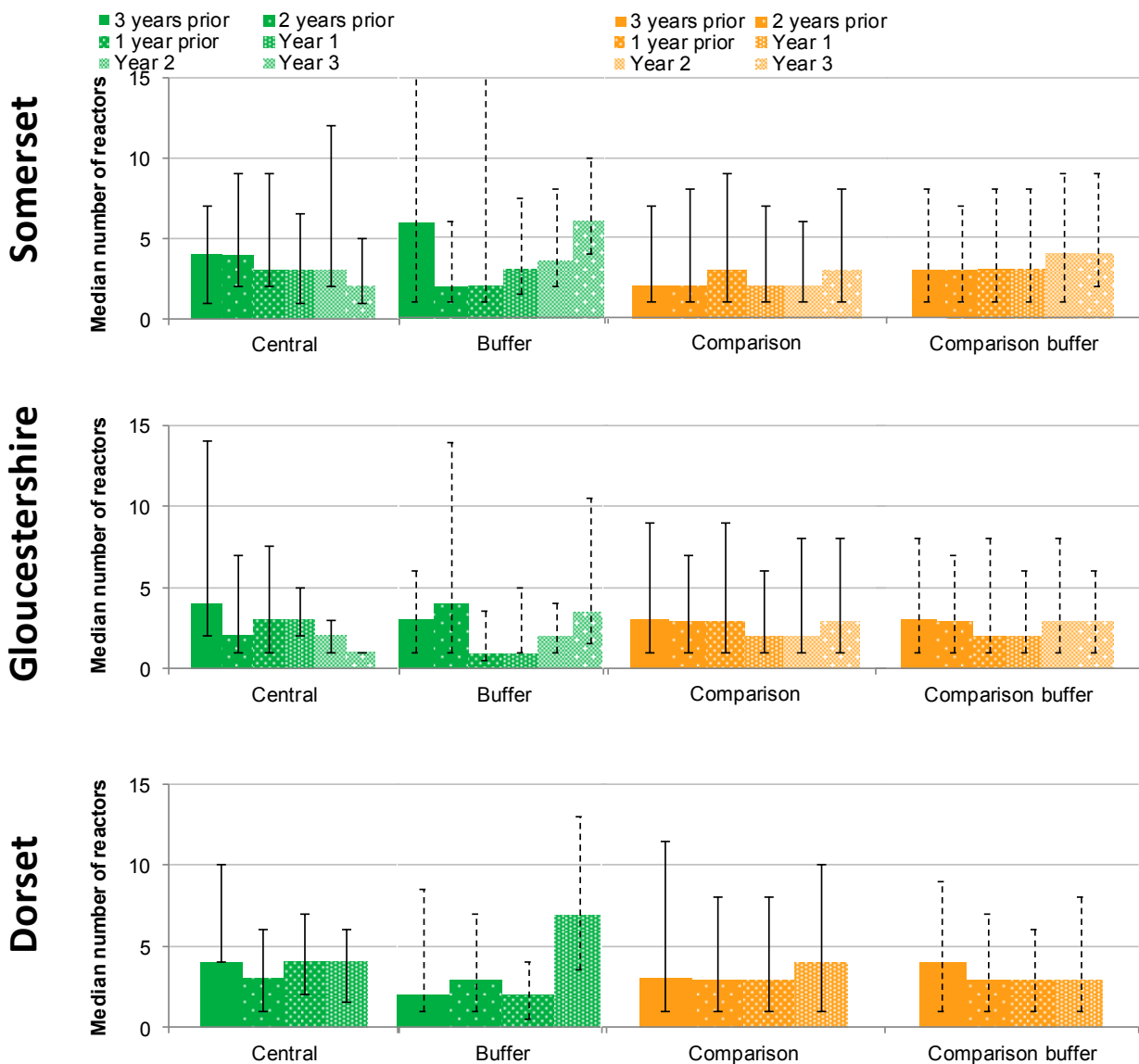
The prevalence of herds under restriction for OTF-W incidents only, per area and reporting period, is presented in Appendix Figure 1. There was an observed decrease in prevalence in all Somerset areas in Year 3. This follows a slight increase in prevalence in all Somerset areas except the central buffer area between the first and second years of culling. Overall the pattern of prevalence in the Somerset intervention area closely resembles the pattern in the Somerset comparison area in the three years since the beginning of the intervention. Conversely, there was an observed increase in prevalence in the Gloucestershire intervention area in Year 3. There were decreases in all other areas in all years, including prior to the commencement of culling. Most notably there was a decrease in prevalence in the Gloucestershire intervention buffer in Year 3. As with incidence rate, in the Dorset intervention area prevalence increased slightly in the first year following commencement of culling, although the level remains lower than that observed two years prior to culling. Slight decreases in prevalence were observed in all other Dorset areas of interest. For information, the total number of herds under restriction for all TB incidents for each year and each area are provided in Appendix 2 Table 2.



Appendix Figure 1 – Temporal changes in the number of herds under restrictions (OTF-W incidents only) at the end of the reporting period per 100 herds, in Somerset, Gloucestershire, and Dorset intervention areas and their respective buffer areas, and comparison areas and buffer areas. Raw data used for this figure can be found in Appendix Table 4.

Number of reactors

There have been apparent decreases observed in the median number of reactors (per incident closing) in the three years following the commencement of culling in both the Somerset and Gloucestershire intervention areas (Appendix Figure 2). The interquartile ranges (*range of the central 50% of values*) for the number of reactors were overlapping between central, comparison and buffer areas in all three areas indicating that the observed differences are extremely unlikely to be statistically significant.

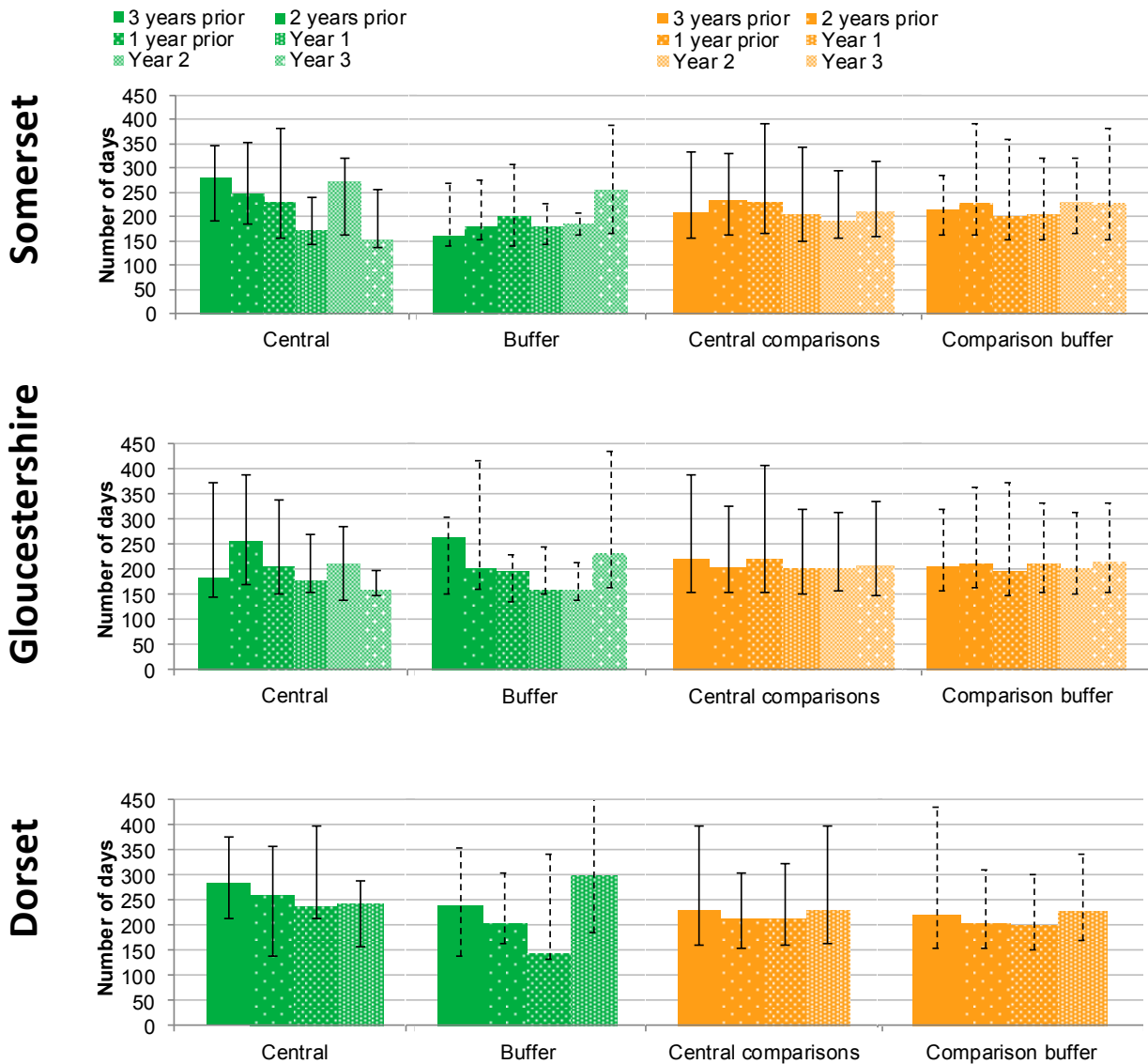


Appendix Figure 2 – The median number of reactors for OTF-W incidents that ended in the reporting period in Somerset, Gloucestershire, and Dorset; inter-quartile range are shown. Raw data used for this figure can be found in Appendix Table 5.

Note: the upper quartile for the Somerset buffer region 3 years prior to culling (15.5) and 1 year prior to culling (16) are not shown to improve the clarity of the figure.

Duration of restrictions

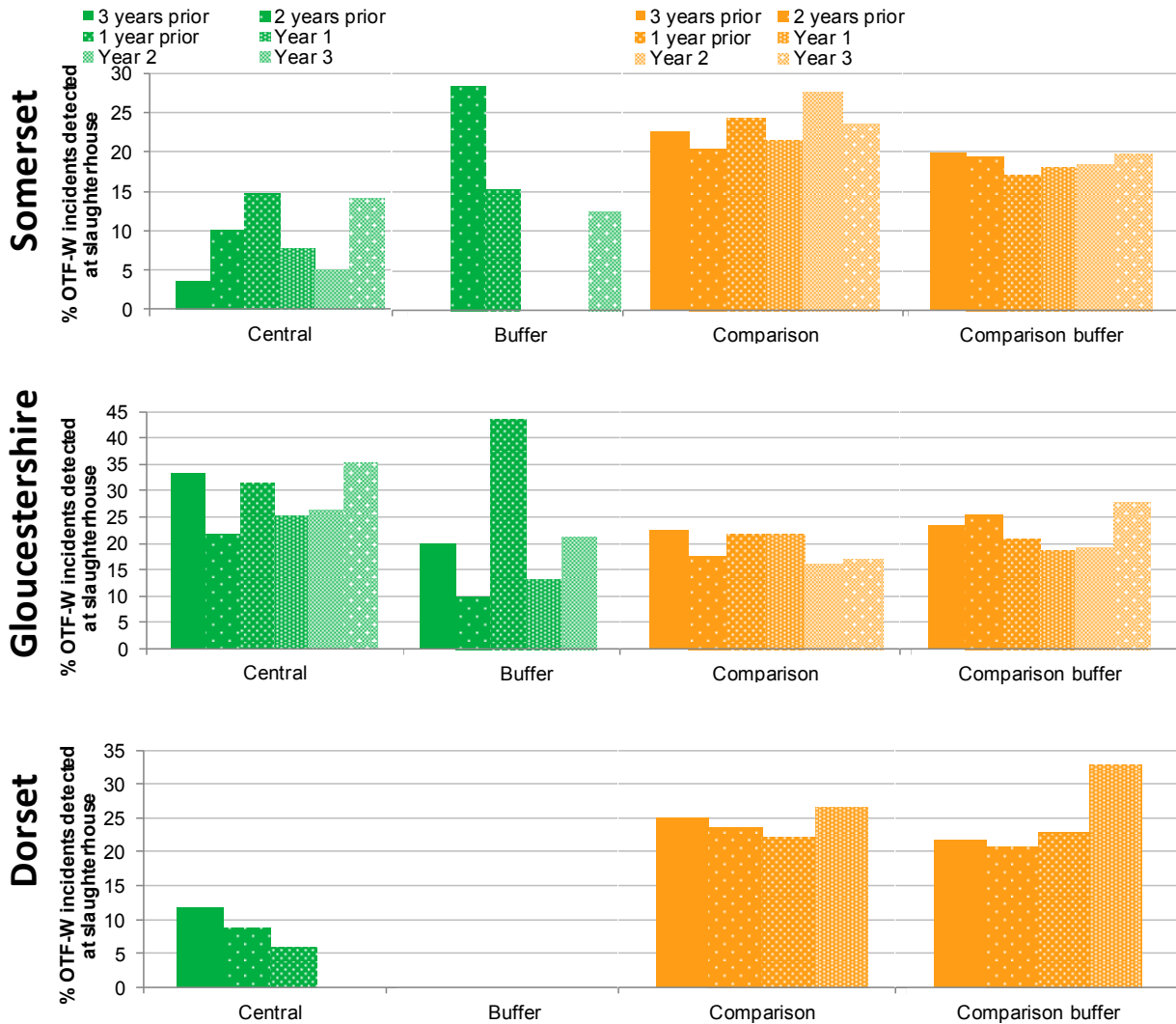
The median durations of OTF-W incidents closing in each year, with inter-quartile ranges, are shown in Appendix Figure 3. There was considerable overlap in the ranges of median duration of OTF-W incidents between all areas, indicating that any observed differences are extremely unlikely to be statistically significant. The proportion of herds with an OTF-W incident lasting for more than 550 days fluctuated across all areas and reporting periods due to the small number of incidents. There were no discernible trends in the proportion of OTF-W incidents which lasted more than 550 days (Appendix Table 6).



Appendix Figure 3 – Median duration of incidents in Somerset, Gloucestershire, and Dorset central and comparison areas, and respective buffer areas; inter-quartile ranges are shown. Raw data used for this figure can be found in Appendix Table 6.

Herd incident detection

The proportion of new OTF-W incidents disclosed at slaughterhouse, as opposed to first disclosed through skin testing, is shown in Appendix Figure 4. Across all areas and reporting periods the proportions of OTF-W incidents first detected at slaughterhouse (all OTF-W by definition) fluctuated between years, due to the small numbers observed. This is particularly apparent in all three intervention buffer areas.



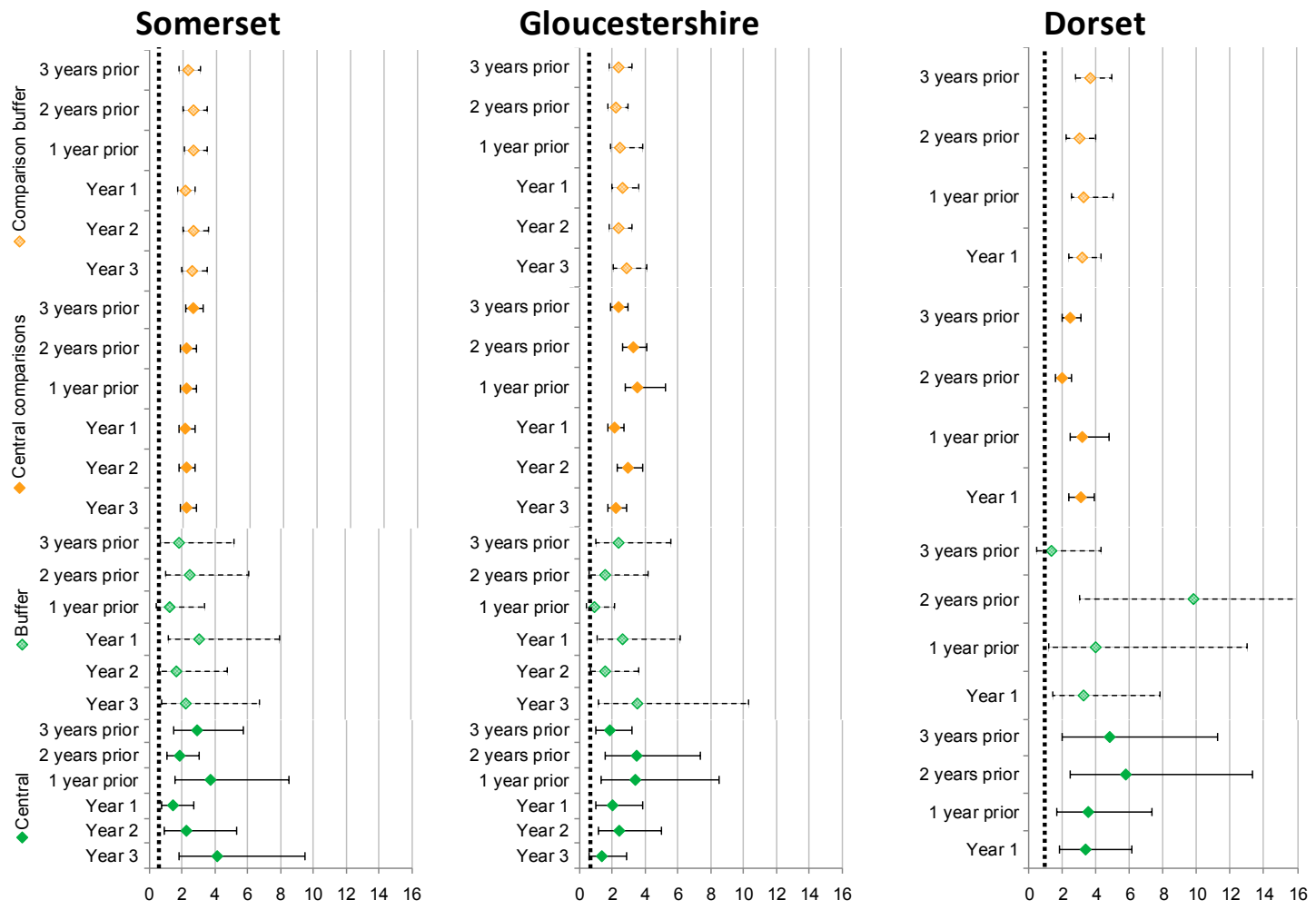
Appendix Figure 4 – Proportion of OTF-W incidents first detected at slaughterhouse in Somerset, Gloucestershire, and Dorset. Raw data used for this figure can be found in Appendix Table 6.

Recurrence

In Appendix Figure 5 recurrence is presented as the risk ratio (RR) of herds suffering any new TB incident in the reporting period which also suffered a TB incident in the preceding 36 months compared to herds suffering any new TB incident in the reporting period without any TB incidents in the preceding 36 months:

$$RR = \frac{\text{Number of incidents with herd TB history}}{\text{Number of herds with TB history}} \div \frac{\text{Number of herds without TB history}}{\text{Number of incidents without herd TB history}}$$

A risk ratio greater than 1 indicates an increased risk among those with a history of TB and a risk ratio less than 1 indicates a reduced risk. In all intervention areas, herds with a history of TB were at a higher risk of having an incident (Year 3, Somerset: RR = 4.1, 95% CI = 1.8 – 9.5; Year 3, Gloucestershire: RR = 1.3, 95% CI = 0.6 – 2.9; Year 1 Dorset: RR = 3.3, 95% CI = 1.8 – 6.2). Across all areas, the overall changes to the risk ratio over time were small, with considerable overlap observed in the 95% confidence intervals, so any changes should be interpreted cautiously.



Appendix Figure 5 – Risk ratios and 95% confidence intervals for herds suffering any new TB incident in the reporting period which also suffered a TB incident in the preceding 36 months compared to herds suffering any new TB incident in the reporting period without any TB incidents in the preceding 36 months, in Somerset, Gloucestershire, and Dorset. The dotted horizontal line represents a RR of 1. Raw data used for this figure can be found in Appendix 2 -Tables 8a-8c.

Note: the upper quartile for the Dorset buffer region 2 years prior to culling (37.1) is not shown to improve the clarity of the figure.

Appendix 2 – Raw data

Appendix Table 1 – Total number of all **new TB incidents** (OTF-W and OTF-S) at the end of the reporting period in Somerset, Gloucestershire, and Dorset intervention areas and buffers.

Area	3 years prior	2 years prior	1 year prior	Year 1	Year 2	Year 3
Somerset						
Central	34	42	30	29	23	27
Buffer	12	15	16	15	12	11
Gloucestershire						
Central	41	31	18	29	24	23
Buffer	19	14	22	19	19	15
Dorset						
Central	25	29	26	35	-	-
Buffer	11	16	10	17	-	-

Appendix Table 2 – Total number of **herds under restrictions** at the end of the reporting period in Somerset, Gloucestershire, and Dorset intervention areas and buffers due to any TB incident, regardless of when it started.

Area	3 years prior	2 years prior	1 year prior	Year 1	Year 2	Year 3
Somerset						
Central	27	31	16	13	14	13
Buffer	9	10	6	6	7	6
Gloucestershire						
Central	31	22	15	18	12	18
Buffer	13	10	10	10	11	6
Dorset						
Central	18	23	16	25	-	-
Buffer	8	9	9	12	-	-

Appendix Table 3 – Incidence per 100 herd years at risk at the end of the reporting period in Somerset, Gloucestershire, and Dorset intervention areas, comparison areas, and respective buffer areas (for all incidents and for OTF-W incidents only). Raw data for Figure 1.

Area	Total			OTF-W								
	3 years prior	2 years prior	1 year prior	Year 1	Year 2	Year 3	3 years prior	2 years prior	1 year prior	Year 1	Year 2	Year 3
Somerset												
Central	24.0	29.8	25.5	21.0	16.0	18.3	19.7	21.3	23.0	18.9	14.0	14.2
Buffer	14.4	18.2	20.2	18.3	14.2	18.1	10.8	17.0	16.5	17.1	11.9	13.2
Comparison area	19.0	16.5	18.6	17.7	17.3	20.3	15.1	13.4	15.3	14.7	14.6	15.7
Comparison buffer	18.2	17.1	18.3	20.7	19.4	17.8	13.8	13.5	15.3	17.4	15.7	13.5
Gloucestershire												
Central	20.0	15.4	8.7	13.8	11.7	11.4	14.6	11.4	7.7	9.5	9.3	8.4
Buffer	16.5	13.1	19.3	16.4	16.4	12.9	13.0	9.4	14.0	12.9	12.1	6.0
Comparison area	17.5	18.7	17.9	18.5	15.9	15.2	13.6	14.8	15.0	14.8	12.5	11.0
Comparison buffer	19.5	19.8	20.3	17.4	17.5	14.9	16.3	15.1	17.0	14.0	14.8	10.4
Dorset												
Central	17.7	18.9	17.3	22.8	-	-	12.0	15.0	11.3	13.7	-	-
Buffer	10.3	14.7	9.1	15.4	-	-	6.6	7.3	7.3	5.4	-	-
Comparison area	17.9	17.9	15.7	16.7	-	-	12.4	13.5	12.5	11.7	-	-
Comparison buffer	15.2	15.0	18.4	15.4	-	-	10.8	10.3	13.6	11.5	-	-

Appendix Table 4 – Number of herds under movement restrictions at the end of the reporting period due to a TB incident, per 100 herds (for all incidents and for OTF-W incidents only) for Somerset, Gloucestershire, and Dorset intervention areas, comparison areas, and respective buffer areas. Raw data for Appendix Figure 1.

Area	Total						OTF-W					
	3 years prior	2 years prior	1 year prior	Year 1	Year 2	Year 3	3 years prior	2 years prior	1 year prior	Year 1	Year 2	Year 3
Somerset												
Central	17.5	20.1	10.4	8.4	9.1	8.4	16.9	16.2	9.1	7.1	8.4	5.8
Buffer	10.2	11.4	6.8	6.8	8.0	6.8	8.0	10.2	6.8	6.8	6.8	5.7
Comparison area	12.8	13.6	13.3	10.9	12.7	11.2	11.2	12.2	11.7	9.7	11.6	9.7
Comparison buffer	11.8	12.0	11.9	11.7	13.3	12.2	10.7	10.3	10.8	10.7	11.7	10.4
Gloucestershire												
Central	14.4	10.2	7.0	8.4	5.6	8.4	12.6	9.8	7.0	6.5	4.7	7.4
Buffer	10.7	8.3	8.3	8.3	9.1	5.0	10.7	6.6	6.6	6.6	6.6	2.5
Comparison area	12.7	13.6	12.1	11.1	10.6	9.3	11.2	12.3	11.4	10.0	9.5	7.5
Comparison buffer	13.4	15.2	14.2	13.1	12.4	10.4	12.3	12.6	12.9	11.9	10.9	8.7
Dorset												
Central	11.5	14.6	10.2	15.9	-	-	9.6	13.4	9.6	10.8	-	-
Buffer	7.1	8.0	8.0	10.6	-	-	5.3	4.4	7.1	5.3	-	-
Comparison area	13.0	11.3	12.0	12.4	-	-	10.9	10.2	11.0	10.1	-	-
Comparison buffer	10.2	9.5	13.3	11.8	-	-	7.9	7.6	11.0	9.7	-	-

Appendix Table 5 – Total number and median number (with inter-quartile range) of reactors per incident for OTF-W incidents. Raw data for Appendix Figure 2.

OTF-W INCIDENTS												
Reporting period	Central			Buffer			Comparison			Comparison buffer		
	No.	Mean	Median (IQR)	No.	Mean	Median (IQR)	No. of reactors	Mean	Median (IQR)	No. of reactors	Mean	Median (IQR)
Somerset												
3 years prior	105	5.8	4 (1,7)	71	7.1	2 (1,14)	909	4.8	2 (1,5)	748	5.8	2 (1,5)
2 years prior	279	7.5	3 (1,6)	62	4.8	1 (1,6)	1589	6.0	2 (1,5)	1362	7.6	2 (1,6.5)
1 year prior	246	5.5	3 (2,7)	103	6.1	2 (1,3)	2352	7.3	2 (1,7)	1379	6.8	2 (1,5.5)
Year 1	208	5.8	3 (1,6)	81	4.8	3 (1,7)	2164	6.6	2 (1,5)	1561	7.5	2 (1,6)
Year 2	196	10.3	3 (1,12)	52	4.3	2.5 (1,6)	2613	9.8	2 (1,5)	1273	7.4	3 (1,8)
Year 3	128	4.7	2 (1,5)	66	6.0	5 (3,10)	2430	7.5	3 (1,6)	1517	7.7	3 (1,7)
Gloucestershire												
3 years prior	252	7.6	2 (1,7)	88	5.9	2 (1,6)	1201	6.9	2 (1,7)	694	6.9	2 (1,7.5)
2 years prior	196	5.4	2 (1,4)	189	9.5	3 (1,10.5)	1526	5.7	2 (1,5)	1631	9.6	2 (1,5)
1 year prior	92	4.0	3 (1,7)	48	2.5	1 (0,2)	2312	7.6	2 (1,8)	1164	6.2	2 (1,5.5)
Year 1	163	5.8	2 (1,4.5)	65	3.0	1 (1,3)	1918	6.0	2 (1,5)	1254	7.1	2 (1,5)
Year 2	182	6.7	2 (1,3)	96	5.6	1 (1,4)	1691	6.8	2 (1,6)	1416	8.2	2 (1,6)
Year 3	39	2.1	1 (1,3)	232	11.6	1.5 (1,4)	1553	6.0	2 (1,6)	849	5.4	2 (1,5)
Dorset												
3 years prior	82	5.1	4 (4,9)	48	4.0	1 (1,4)	1788	10.4	2 (1,6.5)	669	6.6	3 (1,7)
2 years prior	159	5.7	2 (1,5)	56	3.7	2 (1,5)	1524	5.6	2 (1,5)	885	4.9	2 (1,4)
1 year prior	118	4.4	2 (1,5)	13	1.4	1 (0,2)	1473	7.0	2 (1,6)	654	4.4	2 (1,4)
Year 1	119	4.4	3 (1,6)	77	5.5	2.5 (1,8)	2590	10.3	2 (1,7)	1120	6.0	2 (1,6)

Appendix Table 6 – Median duration of OTF-W incidents that ended in each of the reporting periods, and the proportion of OTF-W incidents that were >550 days. Raw data for Appendix Figure 3.

Reporting period	Central		Buffer		Comparison area		Comparison area buffer	
	Median duration (IQR)	% >550 days	Median duration (IQR)	% >550 days	Median duration (IQR)	% >550 days	Median duration (IQR)	% >550 days
Somerset								
3 years prior	278.5 (189.5,346.5)	11	159.5 (139,269)	10	209 (157,333)	12	216 (161,284)	11
2 years prior	247 (186,354)	13	179 (154,274)	9	235.5 (162,331.5)	11	228 (162,391)	13
1 year prior	230 (155,381)	5	202 (141,306)	0	230.5 (164,390)	13	203 (154,358.5)	10
Year 1	171.5 (143.5,240)	6	180 (142.5,227.5)	0	204 (150,344)	12	204 (154,319)	9
Year 2	271 (161,321)	12	185.5 (162,208)	10	194 (155,292)	8	230.5 (163,321)	9
Year 3	153 (136,257)	4	257 (165,389)	0	210 (158,315)	10	227 (154,382)	11
Gloucestershire								
3 years prior	185 (146,372)	16	264 (152,304)	8	220 (154,385)	18	205.5 (158,318)	10
2 years prior	256 (169,388)	7	204 (161,416)	6	203 (153,323)	9	211 (162,362.5)	12
1 year prior	205.5 (151,338)	10	197 (134,229)	6	221 (153,405)	16	196 (148,371)	15

Year 1	179 (154,269)	5	160 (151,245.5)	13	200 (150,319)	12	212 (154,333)	12
Year 2	213 (138,285)	10	160 (137,214)	8	200 (157,313)	9	201 (150,309)	11
Year 3	158 (147,197)	0	232 (163,435)	17	207 (148,333)	10	214.5 (153.5,331.5)	6
Dorset								
3 years prior	284 (213,375)	10	239.5 (137,353)	0	231 (159,395)	19	220 (155,435)	18
2 years prior	259 (138,357)	10	202.5 (162,305)	20	212.5 (154,303)	11	204 (153.5,309)	10
1 year prior	239 (213,397)	0	145 (131.5,342)	0	213 (161,321)	13	199 (151.5,301.5)	6
Year 1	242.5 (157,287.5)	10	299.5 (186,551)	25	229 (163,397)	16	227 (169.5,341)	7

Appendix Table 7 – The annual proportion of new OTF-W incidents detected by SICCT test surveillance vs. slaughterhouse surveillance. Raw data for Appendix Figure 4.

Reporting period	Central			Buffer			Comparison area			Comparison area buffer		
	Total new OTF-W incidents	OTF-W incidents first detected at slaughterhouse (%)	OTF-W incidents disclosed through skin testing (%)	Total new OTF-W incidents	OTF-W incidents first detected at slaughterhouse (%)	OTF-W incidents disclosed through skin testing (%)	Total new OTF-W incidents	OTF-W incidents first detected at slaughterhouse (%)	OTF-W incidents disclosed through skin testing (%)	Total new OTF-W incidents	OTF-W incidents first detected at slaughterhouse (%)	OTF-W incidents disclosed through skin testing (%)
Somerset												
3 years prior	28	1 (3.6)	27 (96.4)	9	0 (0)	9 (100)	257	58 (22.6)	199 (77.4)	140	28 (20)	112 (80)
2 years prior	30	3 (10)	27 (90)	14	4 (28.6)	10 (71.4)	230	47 (20.4)	183 (79.6)	143	28 (19.6)	115 (80.4)
1 year prior	27	4 (14.8)	23 (85.2)	13	2 (15.4)	11 (84.6)	258	63 (24.4)	195 (75.6)	168	29 (17.3)	139 (82.7)
Year 1	26	2 (7.7)	24 (92.3)	14	0 (0)	14 (100)	244	53 (21.7)	191 (78.3)	175	32 (18.3)	143 (81.7)
Year 2	20	1 (5)	19 (95)	10	0 (0)	10 (100)	248	69 (27.8)	179 (72.2)	156	29 (18.6)	127 (81.4)
Year 3	21	3 (14.3)	18 (85.7)	8	1 (12.5)	7 (87.5)	240	57 (23.8)	183 (76.3)	135	27 (20)	108 (80)
Gloucestershire												
3 years prior	30	10 (33.3)	20 (66.7)	15	3 (20)	12 (80)	203	46 (22.7)	157 (77.3)	141	33 (23.4)	108 (76.6)
2 years prior	23	5 (21.7)	18 (78.3)	10	1 (10)	9 (90)	230	41 (17.8)	189 (82.2)	144	37 (25.7)	107 (74.3)

1 year prior	16	5 (31.3)	11 (68.8)	16	7 (43.8)	9 (56.3)	233	51 (21.9)	182 (78.1)	151	32 (21.2)	119 (78.8)
Year 1	20	5 (25)	15 (75)	15	2 (13.3)	13 (86.7)	238	52 (21.8)	186 (78.2)	132	25 (18.9)	107 (81.1)
Year 2	19	5 (26.3)	14 (73.7)	14	3 (21.4)	11 (78.6)	192	31 (16.1)	161 (83.9)	139	27 (19.4)	112 (80.6)
Year 3	17	6 (35.3)	11 (64.7)	7	0 (0)	7 (100)	176	30 (17)	146(83)	97	27 (27.8)	70 (72.2)
Dorset												
3 years prior	17	2 (11.8)	15 (88.2)	7	0 (0)	7 (100)	172	43 (25)	129 (75)	115	25 (21.7)	90 (78.3)
2 years prior	23	2 (8.7)	21 (91.3)	8	0 (0)	8 (100)	186	44 (23.7)	142 (76.3)	110	23 (20.9)	87 (79.1)
1 year prior	17	1 (5.9)	16 (94.1)	8	0 (0)	8 (100)	179	40 (22.3)	139 (77.7)	148	34 (23)	114 (77)
Year 1	21	0 (0)	21 (100)	6	0 (0)	6 (100)	171	46 (26.9)	125 (73.1)	124	41 (33.1)	83 (66.9)

Appendix Table 8a – Number and proportion of herds in **Somerset areas** with any new TB incident in the reporting period, in herds with and without a history of any TB incident in the preceding 36 months. Raw data for Appendix Figure 5.

Area	Reporting period	TB incident in the preceding 36 months		No TB incident in the preceding 36 months		Risk ratio ²	95% CI for risk ratio	
		No. herds	No. herds with incident in reporting period ¹ (%)	No. herds	No. herds with incident in reporting period ¹ (%)			
Central	3 years prior	64	24 (37.5)	69	9 (13)	2.9	1.4	5.7
	2 years prior	59	23 (39)	73	16 (21.9)	1.8	1.0	3.0
	1 year prior	70	22 (31.4)	70	6 (8.6)	3.7	1.6	8.5
	Year 1	67	16 (23.9)	70	12 (17.1)	1.4	0.7	2.7
	Year 2	72	17 (23.9)	57	6 (10.5)	2.2	0.9	5.3
	Year 3	58	21 (36.2)	68	6 (8.8)	4.1	1.8	9.5
	3 years prior	21	5 (23.8)	54	7 (13)	1.8	0.7	5.2
	2 years prior	26	8 (30.8)	56	7 (12.5)	2.5	1.0	6.1
	1 year prior	26	5 (19.2)	58	9 (15.5)	1.2	0.5	3.3
Buffer	Year 1	29	10 (34.5)	44	5 (11.4)	3.0	1.2	8.0
	Year 2	30	7 (23.3)	36	5 (13.9)	1.7	0.6	4.8
	Year 3	27	7 (25.9)	34	4 (11.8)	2.2	0.7	6.8
	3 years prior	592	187 (31.6)	1037	125 (12.1)	2.6	2.1	3.2
	2 years prior	567	150 (26.5)	1066	123 (11.5)	2.3	1.8	2.8
	1 year prior	588	161 (27.4)	1123	134 (11.9)	2.3	1.9	2.8
Comparison area	Year 1	622	163 (26.2)	962	116 (12.1)	2.2	1.8	2.7
	Year 2	611	175 (28.6)	826	106 (12.8)	2.2	1.8	2.8
	Year 3	594	179 (30.1)	771	102 (13.2)	2.3	1.8	2.8

Comparison area buffer	3 years prior	360	94 (26.1)	679	77 (11.3)	2.3	1.8	3.0
	2 years prior	355	98 (27.6)	708	75 (10.6)	2.6	2.0	3.4
	1 year prior	380	110 (28.9)	729	79 (10.8)	2.7	2.1	3.5
	Year 1	380	112 (29.5)	640	88 (13.8)	2.1	1.7	2.7
	Year 2	385	120 (31.2)	506	59 (11.7)	2.7	2.0	3.5
	Year 3	357	108 (30.3)	490	58 (11.8)	2.6	1.9	3.4

¹ Herds under restriction for four or more months of the reporting period due to an incident that started before the reporting period were excluded from the analyses. It was considered that such herds had limited opportunity to become cases since there may have been no further testing in the period following the close of the incident. Setting a threshold of four months allowed for the detection of possible recurrence at the next test scheduled after lifting of restrictions in herds where restrictions were lifted within the first four months of the current year.

² Risk that herds under movement restrictions in the preceding 36 months had a new TB incident in the reporting period compared with risk that herds that had no history of movement restrictions had a new TB incident. The risk ratio is the proportion of herds with a history of TB that had a new incident, divided by the proportion of herds with no history of TB that had a new incident.

Appendix Table 8b – Number and proportion of herds in **Gloucestershire areas** with any new TB incident in the reporting period, in herds with and without a history of any TB incident in the preceding 36 months. Raw data for Appendix Figure 5.

Area	Reporting period	TB incident in the preceding 36 months		No TB incident in the preceding 36 months		Risk ratio ²	95% CI for risk ratio	
		No. herds	No. herds with incident in reporting period ¹ (%)	No. herds	No. herds with incident in reporting period ¹ (%)			
Central	3 years prior	73	20 (27.4)	112	17 (15.2)	1.8	1.0	3.2
	2 years prior	78	19 (24.4)	112	8 (7.1)	3.4	1.6	7.4
	1 year prior	77	12 (15.6)	128	6 (4.7)	3.3	1.3	8.5
	Year 1	65	14 (21.5)	127	14 (11)	2.0	1.0	3.8
	Year 2	55	13 (23.6)	112	11 (9.8)	2.4	1.2	5.0
	Year 3	50	8 (16)	113	14 (12.4)	1.3	0.6	2.9
	3 years prior	39	11 (28.2)	59	7 (11.9)	2.4	1.0	5.6
	2 years prior	37	6 (16.2)	66	7 (10.6)	1.5	0.6	4.2
	1 year prior	35	6 (17.1)	79	15 (19)	0.9	0.4	2.1
Buffer	Year 1	44	12 (27.3)	67	7 (10.4)	2.6	1.1	6.1
	Year 2	42	10 (23.8)	53	8 (15.1)	1.6	0.7	3.6
	Year 3	37	10 (27)	52	4 (7.7)	3.5	1.2	10.3
	3 years prior	524	141 (26.9)	930	106 (11.4)	2.4	1.9	3.0
	2 years prior	521	178 (34.2)	987	103 (10.4)	3.3	2.6	4.1
	1 year prior	532	168 (31.6)	1027	91 (8.9)	3.6	2.8	4.5
Comparison area	Year 1	536	158 (29.5)	915	124 (13.6)	2.2	1.8	2.7
	Year 2	581	163 (28.1)	749	71 (9.5)	3.0	2.3	3.8
	Year 3	542	139 (25.6)	746	85 (11.4)	2.3	1.8	2.9

Comparison area buffer	3 years prior	317	92 (29)	542	66 (12.2)	2.4	1.8	3.2
	2 years prior	299	97 (32.4)	571	82 (14.4)	2.3	1.7	2.9
	1 year prior	313	93 (29.7)	595	71 (11.9)	2.5	1.9	3.3
	Year 1	338	95 (28.1)	511	54 (10.6)	2.7	2.0	3.6
	Year 2	353	105 (29.7)	449	56 (12.5)	2.4	1.8	3.2
	Year 3	323	88 (27.2)	439	41 (9.3)	2.9	2.1	4.1

¹ Herds under restriction for four or more months of the reporting period due to an incident that started before the reporting period were excluded from the analyses. It was considered that such herds had limited opportunity to become cases since there may have been no further testing in the period following the close of the incident. Setting a threshold of four months allowed for the detection of possible recurrence at the next test scheduled after lifting of restrictions in herds where restrictions were lifted within the first four months of the current year.

² Risk that herds under movement restrictions in the preceding 36 months had a new TB incident in the reporting period compared with risk that herds that had no history of movement restrictions had a new TB incident. The risk ratio is the proportion of herds with a history of TB that had a new incident, divided by the proportion of herds with no history of TB that had a new incident.

Appendix Table 8c – Number and proportion of herds in **Dorset areas** with any new TB incident in the reporting period, in herds with and without a history of any TB incident in the preceding 36 months. Raw data for Appendix Figure 5.

Area	Reporting period	TB incident in the preceding 36 months		No TB incident in the preceding 36 months		Risk ratio ²	95% CI for risk ratio	
		No. herds	No. herds with incident in reporting period ¹ (%)	No. herds	No. herds with incident in reporting period ¹ (%)			
Central	3 years prior	53	18 (34)	84	6 (7.1)	4.8	2.0	11.2
	2 years prior	54	22 (40.7)	85	6 (7.1)	5.8	2.5	13.3
	1 year prior	49	16 (32.7)	96	9 (9.4)	3.5	1.7	7.3
	Year 1	50	22 (44)	91	12 (13.2)	3.3	1.8	6.2
Buffer	3 years prior	27	4 (14.8)	65	7 (10.8)	1.4	0.4	4.3
	2 years prior	28	12 (42.9)	69	3 (4.3)	9.9	3.0	32.3
	1 year prior	30	6 (20)	79	4 (5.1)	4.0	1.2	13.0
	Year 1	24	8 (33.3)	79	8 (10.1)	3.3	1.4	7.8
Comparison area	3 years prior	413	124 (30)	854	103 (12.1)	2.5	2.0	3.1
	2 years prior	456	118 (25.9)	867	112 (12.9)	2.0	1.6	2.5
	1 year prior	478	132 (27.6)	908	79 (8.7)	3.2	2.5	4.1
	Year 1	477	146 (30.6)	867	86 (9.9)	3.1	2.4	3.9
Comparison area buffer	3 years prior	297	95 (32)	681	59 (8.7)	3.7	2.7	5.0
	2 years prior	300	86 (28.7)	710	68 (9.6)	3.0	2.2	4.0
	1 year prior	331	113 (34.1)	754	78 (10.3)	3.3	2.5	4.3
	Year 1	312	90 (28.8)	692	62 (9)	3.2	2.4	4.3

¹ Herds under restriction for four or more months of the reporting period due to an incident that started before the reporting period were excluded from the analyses. It was considered that such herds had limited opportunity to become cases since there may have been no further testing in the period following the close of the incident. Setting a threshold of four months allowed for the detection of possible recurrence at the next test scheduled after lifting of restrictions in herds where restrictions were lifted within the first four months of the current year.

² Risk that herds under movement restrictions in the preceding 36 months had a new TB incident in the reporting period compared with risk that herds that had no history of movement restrictions had a new TB incident. The risk ratio is the proportion of herds with a history of TB that had a new incident, divided by the proportion of herds with no history of TB that had a new incident.