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Dear Paul,

You will recall that during a committee appearance on 6<sup>th</sup> March, the former Minister for Rural Affairs committed to provide you with a response Affairs Committee meeting on 6<sup>th</sup> March 2024 to provide a Welsh Government response to the peer-reviewed paper authored by Colin Birch *et al* (2024)<sup>1</sup>. This examines the impact of removing infected wildlife on the incidences of Bovine TB in England and a copy is attached.

The study examines the period from 2009 to 2021 with the first year of badger interventions from 2013.

One conclusion cited is that the herd incidence rate of TB reduced by 56% in the four years after the introduction of a badger control policy (BCP) in England, with the largest reductions seen in the second and third years.

All 52 BCP areas are included in the study and no control areas, and there is more than one control method used - Interferon-gamma testing and removal of positive cattle, as well as badger culling. The analysis used is a method that has been infrequently used in the epidemiology and health field so far, and its application on this data represents a more novel approach.

The paper goes on to say that from 2017 compulsory Interferon-gamma testing was implemented on cattle in Officially TB Free – Withdrawn (OTFW) herd incidents in areas that had been in the BCP for at least two years (so from the third year of intervention, in all but the first two BCP areas). This was aimed at reducing the likelihood of recurrence

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<sup>1</sup> Birch, C.P.D., Bakrania, M., Prosser, A. *et al*. (2024). Difference in differences analysis evaluates the effects of the badger control policy on bovine tuberculosis in England - *Sci Rep* **14**, 4849 (2024).  
<https://doi.org/10.1038/s41598-024-54062-4>

of infection, after the end of the herd incident. The paper confirms that "*this data analysis cannot explicitly distinguish the effects of the BCP's [badger control policy] component measures*" (page 20).

The authors, however, do not mention that the removal of infected cattle in an OTFW incident that are additionally identified through gamma testing may also reduce the number of infected cattle remaining in a herd when TB restrictions are revoked and can therefore be freely traded. It is also relevant that the Birch paper acknowledges that "*reducing the risk of M.bovis transmission between cattle and badgers across large areas of England may increase the effectiveness of controls of other sources and pathways of infection for cattle*".

My officials consider that other factors, such as additional biosecurity, advice and changes in farmer behaviour may also have contributed to the differences in TB observed, but the relative impact of multiple and concurrent interventions is not determined.

The paper states that the analysis evaluates the outcome of a government policy and was not a controlled experimental trial meaning that in addition to there being no control areas, there were challenges for the analysis including adequate adjustment for non-random variation and confounding factors.

Trend lines for each BCP area before and after the start of the cull are included, with variation between areas. Some trend lines were increasing and have since started to fall, but in other areas, the trend downwards had already started prior to the BCP and does not appear to have changed since the policy started.

Given the conclusions in the paper, how does the trend in herd-level TB incidence in England compare with the trend in incidence in Wales since the BCP began in 2013?

Our policy approach in Wales, has been to consider all TB incidents as OTFW, since 1<sup>st</sup> January 2022, because experience has shown that a reactor to the skin test is highly likely to be an infected animal.

The skin test at standard interpretation (as used in all routine, annual herd tests in Wales) has a very high specificity – only one in 5,000 uninfected animals are likely to be a false positive. Furthermore, the finding of Non-Visible Lesions (NVL) at a slaughterhouse post-mortem examination is a poor indicator of an uninfected animal as TB-related lesions may be very small in size (<1cm in diameter), or not be visible to the naked eye.

Considering all incidents as OTFW provides added confidence that any herd released from restrictions is less likely to contain animals with undisclosed infection, because it

will have had at least two further herd skin tests, with at least the first being at severe interpretation (as this increases the sensitivity of the skin test, to better identify infected animals).

For this reason, we will compare below all TB incidents in Wales and England, i.e. both those with confirmed disease (a Visible Lesion at post-mortem examination, or culture confirmation of *M. bovis* and those incidents with unconfirmed disease (NVL & culture negative) generally following on from the disclosure of one or more reactors at the initial herd skin test, or as a result of a slaughterhouse case confirmed by a PCR, or culture positive result.

Furthermore, our analytical approach is to consider all types of herd TB incidents i.e. both Officially TB Free Suspended (OTFS) and OTFW that are identified by the disclosure of one or more reactors a herd skin test, or as a result of a slaughterhouse case confirmed by a PCR, or culture positive result. This is because the Officially TB-Free (OTF) herd classification criteria vary between England and Wales. Wales has historically classified more incidents as OTFW, as Wales additionally classifies some incidents as OTFW for epidemiological reasons only. England classifies fewer incidents as OTFW, thus reporting fewer OTFW cases in their statistics.

### **Comparative analysis of herd-level TB incidence in England and Wales**

If we consider the period 2012, the year before the BCP started and also a year when incidence between England and Wales was almost identical and 2021, the same end year as the paper - and consider all TB incidents (i.e. those designated as OTFS & those as OTFW combined) the following can be seen using Defra official statistics, the same source data as used in the Birch paper.

The herd incidence (New incidents per 100 herd years at risk) can be compared for England and Wales and it is also possible to compare herd incidence in the High-Risk Area (HRA) of England, where badger culling was targeted, against incidence in the High TB Area West (HTBW) in Wales, where there has been no badger culling.

Analyses of Herd Incidence (Table 1) by Welsh Government of the period January 2012 to December 2021:

- In **England**, the number of TB incidents per 100 herd years at risk started at 9.8 in 2012, rose to 11 in December 2017 and fell to 8.8 in December 2021: a 10.8% fall in incidence overall since 2012 the year before BCP interventions began.
- In **Wales**, herd incidence started at 10.0 in 2012 and fell to 7.1 in 2021: a 29.1% overall reduction in incidence over the same time period (Figure 1).

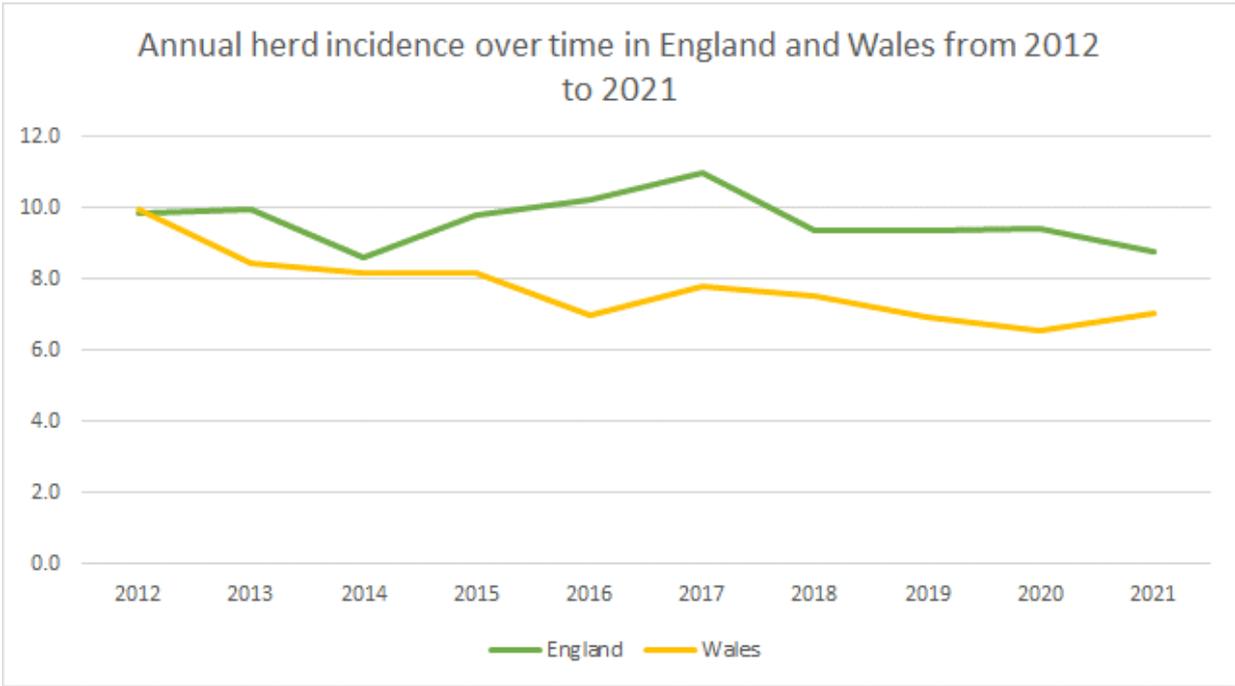
- In the **HRA** of England, herd incidence started at 18.5 in 2012, was at 19.8 in 2017 and fell to 14.4 in 2021: a 22.2% reduction during the period.
- In the **HTBW of Wales**, herd incidence was 18.1 in 2012 and fell to 11.00 in 2021: a 39.4% reduction during the period (Figure 2).

**Table 1: Comparison of Herd incidence\* in England and Wales, and the High-Risk Area of England and the High TB Area West Wales for each year from 2012 to 2021**

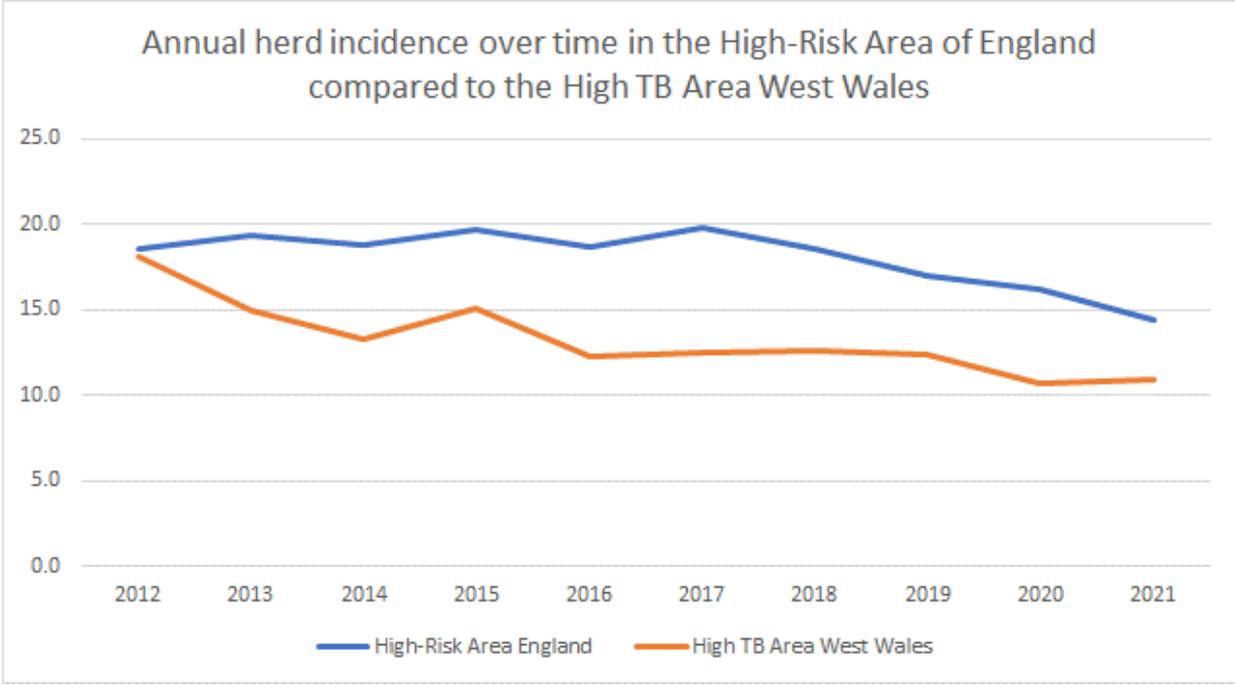
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
England	9.8	10.0	8.6	9.8	10.2	11.0	9.3	9.4	9.4	8.8
Wales	10.0	8.4	8.2	8.2	7.0	7.8	7.5	6.9	6.6	7.1
High-Risk Area England	18.5	19.4	18.8	19.7	18.7	19.8	18.5	16.9	16.1	14.4
High TB Area West Wales	18.1	14.9	13.3	15.1	12.3	12.5	12.7	12.4	10.7	11.0

\* Herd Incidence: New incidents per 100 herd years at risk. Table 1 presents the annual herd incidence of TB for different regions from 2012 to 2021. These regions include England overall, Wales, the High-Risk area in England, and the High TB Area West Wales. This TB herd incidence rate is calculated as the number of new herd incidents (breakdowns) detected during the reporting period, divided by the total time that herds under surveillance during that period were at risk of infection. [Please see the Bovine TB herd methodology notice published here for further information.](#) It is also important not to read too much into short term trends as fluctuations are to be expected in the figures.

**Figure 1: Herd incidence in England and Wales for each year from 2012 to 2021**



**Figure 2: Herd incidence in the High-Risk Area of England and the High TB Area West Wales for each year from 2012 to 2021**



The actual incidence of bovine TB in the High-Risk Area of England between 2012 and 2021 appears to have fallen less than in the High TB Area West of Wales. The reduction in incidence over the period has been achieved in Wales without badger culling.

While progress has been made in reducing TB overall in Wales, regional variations do exist, with some areas experiencing higher levels of the disease than others. I fully understand the impact TB has on the health, well-being and livelihoods of farmers and their families, underscoring the need for ongoing efforts to address this pernicious disease.

Farmers are a vital part of Welsh life, and our programme for eradicating Bovine TB is centred around partnership working with our farmers and vets. With the assistance of the Technical Advisory Group, and the TB Programme Board in due course, we aim to make further inroads into the understanding and tackling of this complex disease.

It is also relevant to note that other recent studies involving the mathematical modelling of data from Whole Genome Sequencing of *Mycobacterium bovis* (the causative organism of bovine TB) have provided new insights and evidence on the different routes of TB transmission and spread within and between cattle, and badgers<sup>2,3</sup>.

Van Tonder *et al* (2021), concluded “*that the estimated rate of transmission from badger to cow was approximately two times higher than from cattle to badger & the rate of within species transmission considerably exceeded that.*”

They also identified “*that the transmission clusters in different parts of South West England that are still evident today were established by long distance seeding events involving cattle movement, not by recrudescence from a long established cattle reservoir.*” and that “*Clusters are maintained primarily by within species transmission with less frequent spillover from badger to cattle and cattle to badger.*”

Whole Genome Sequencing is used to compare the DNA differences between the organism found in different samples and provides a way of determining genetic similarity, or difference allowing better understanding of breakdown origin. Within species transmission referred to above is cattle to cattle or badger to badger.

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<sup>2</sup> Van Tonder *et al.* (2021). Inferring *Mycobacterium bovis* transmission between cattle and badgers using isolates from the Randomised Culling Trial. Plos Pathogens.

<sup>3</sup> Crispell *et al.* (2019). Combining genomics & epidemiology to analyse bi-directional transmission of *Mycobacterium bovis* in a multihost system. *elife*, 29 Dec 2019.

Recent epidemiological analyses by the APHA Wales Epidemiology Team show evidence of both long distance and shorter distance cattle movements playing key roles in the establishment of new clusters of TB infection in North Wales, through the combined use of WGS information, cattle movement data (from CTS) and detailed, farm-level veterinary investigations.

It seems right and appropriate to focus on tackling the risk of cattle-to-cattle transmission by utilising more sensitive tests to prevent disease spreading both between and within herds, and promote robust biosecurity, informed purchasing and post-movement isolation practices to prevent introducing infection.

The Birch paper also acknowledges that there are other means of controlling TB transmission between badgers and cattle including badger vaccination, fertility control and biosecurity that may be equally as effective, as has been seen in field studies involving badger vaccination in Ireland<sup>4</sup>.

While mass culling of badgers is not allowed in Wales, our TB Eradication Programme does not ignore badgers and addresses the involvement of wildlife in several ways. The All Wales Badger Found Dead scheme, the Badger Vaccination Grant Scheme and support for research into TB including wildlife factors are all examples. Going forward we will need to consider whether the targeted vaccination of badgers in specific areas could be further utilised, and the best means to deliver this.

Officials will continue to work and engage on our TB Eradication Programme and the epidemiology of the disease in Wales, led by the science, and we will also utilise the new bovine TB Technical Advisory Group (TAG) to seek their views and expertise as we continue to move forward.

Finally, we also all know that Government cannot eradicate TB alone. Partnership working with our farmers and vets is the only way to reach our shared goal of a TB-free Wales by 2041. We recognise the critical role that farmers and veterinarians play, their expertise, commitment and collaboration are essential for implementing effective disease control measures and achieving lasting success.

I hope this analysis is useful.

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<sup>4</sup> Martin, S. W. *et al.* (2020). Is moving from targeted culling to BCG-vaccination of badgers (*Meles meles*) associated with an unacceptable increased incidence of cattle herd tuberculosis in the Republic of Ireland? A practical non-inferiority wildlife intervention study in the Republic of Ireland (2011–2017). *Prev. Vet. Med.* 179, 10. (2020) <https://doi.org/10.1016/j.prevetmed.2020.105004>

Yours sincerely,

A handwritten signature in black ink, consisting of several fluid, overlapping strokes that form a stylized representation of the name.

**Huw Irranca-Davies AS/MS**

Ysgrifennydd y Cabinet dros Newid Hinsawdd a Materion Gwledig  
Cabinet Secretary for Climate Change & Rural Affairs