Differences between bovine TB indicators in herds in the IAA and herds in the comparison area : First year, 1st May 2010 to 30th April 2011 (Project OG0142)

A report commissioned by the Welsh Government under Project OG0142

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— AHVLA (Weybridge), December 2011

Summary

On 1st May 2010, the beginning of cattle controls in the IAA, the numbers of herds in the IAA and its comparison area were 317 and 1170. The greater number of herds in the comparison group compensated for the lower incidence of bovine TB (bTB) in the comparison group of herds. As explained in an earlier report (AHVLA 2011), it was not possible to find an area of Wales close to the IAA in which herds were unlikely to be exposed to IAA herds and in which the incidence of bovine TB was as high as in the IAA. The proportion of herds that were dairy herds in Wales is less than 20%, in the IAA it is 41% and in the comparison group (despite efforts to maximise it) only 31%.

We attempt to explain differences in various bTB statistics between IAA herds and comparison herds in the 12 months following 1st May 2010, but the differences are small in comparison with the historic variation between years. One can predict that, if differences between the two groups of herds in the expected range do exist, they may not show clear differences from the comparison herds until several years have elapsed. Some graphs (simplified from the body of the full report) are shown below to explain the observed pattern.

According to the design of the IAA, the interval between herd tests in unrestricted herds decreased from 12 to 6 months on 1st May 2010, as reflected in Fig A (from Fig 2.1). Between 2009/10 and 2010/11 the total number of breakdowns per 100 tests on whole unrestricted herds decreased in the IAA, comparison area and in Wales further than 40 km from the IAA boundary, but the relative change in the IAA was larger than the relative changes in the other two groups (Fig B, from Fig 3.1).

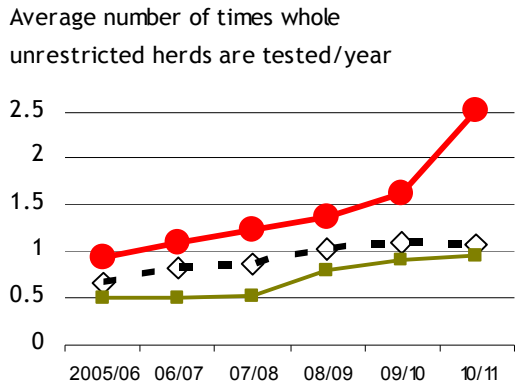

Fig A – Annual number of completed tests per herd not under restriction, 2005/06-2010/11

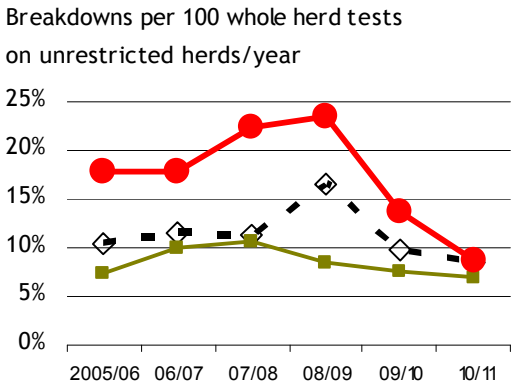

Fig B – All incidents (OTFW and OTFS) commencing in each year per 100 whole herd type tests

All IAA herds — Comparison group — Wales herds over 40 km from IAA

Officially TB Free status Withdrawn (OTFW or "confirmed") incidents per 100 herd tests decreased in all groups between 2009/10 and 2010/11 (Fig C, from Fig 3.2), but the relative decrease for herds in the IAA was not greater than in the other groups. The proportion of herds under restriction in 2011 in the IAA was over twice as large as in the comparison herds, but had changed little since 2010 in the IAA and in Wales more than 40 km from the IAA (Fig D, from Fig 4.1). The slight decrease in the comparison herds could be explained by their being less intensively tested than in the IAA.

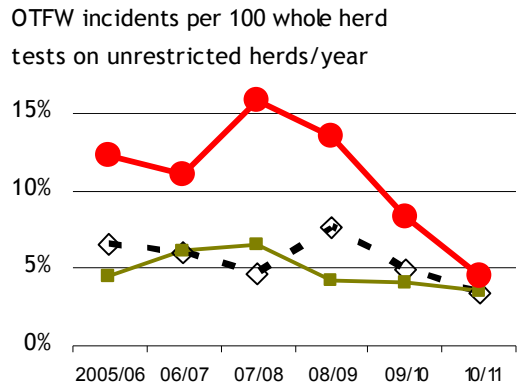

Fig C – OTF Withdrawn incidents commencing in each year per 100 whole herd type tests

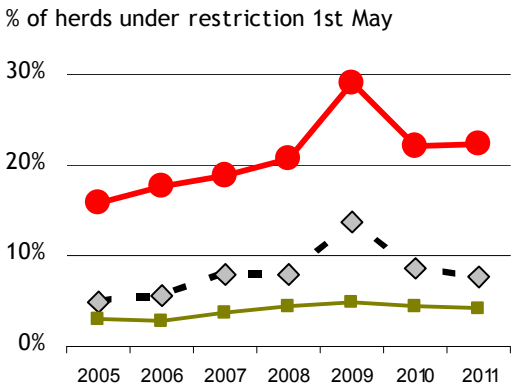

Fig D – Proportion of herds under restriction on 1st May each year, having lost their OTF status

All IAA herds — Comparison group — Wales herds over 40 km from IAA

It was also observed that the duration of OTFW or OTF Suspended (OTFS) bTB incidents did not show a larger increase in IAA herds than in comparison herds during 2010/11 (Figs 5.1 and 5.2). This occurred despite the extra test required in OTFS herds in the IAA before they could be released from restriction.

The proportion of unrestricted herds having new OTFW or OTFS breakdowns decreased relatively less in 2010/11 in IAA herds than in comparison herds (Fig 6.1), which can be explained by the more intensive testing in the IAA noted above. Smaller relative decreases were also seen in IAA herds for the proportion of herds having OTFW incidents and the proportion of animals becoming reactor and slaughtered for bTB control (Figs 6.2, 6.3, 6.4). Reassuringly, the proportion of animals found to have visible lesions or positive cultures decreased to a similar extent in IAA herds and comparison herds in 2010/11 (Fig 6.5), and the number of visibly lesioned or culture-positive animals per OTFW breakdown decreased more in the IAA than in the comparison herds (Fig 8.2).

The number of months observed is too small, and the variability of bTB statistics in all groups of herds too large, to allow firm conclusions to emerge. Even if the anticipated reduction in bTB prevalence in the IAA does occur, it may take a number of years before differences between the IAA and comparison group become unmistakable.

AHVLA (2011). *OG0142: Wales Intensive Action Area, Cattle Analysis: Historical bovine tuberculosis trends and selection of appropriate comparison areas*. Veterinary Laboratories Agency, Report to the Welsh Government, 27th June 2011.

Differences between bovine TB indicators in herds in the IAA and herds in the comparison area : First year, 1st May 2010 to 30th April 2011 (Project OG0142). Body of the report.

— AHVLA (Weybridge), December 2011

0) Introduction

Intensified cattle controls were introduced in the Intensive Action Area (IAA) on 1st May 2010 (WAG 2010). Enhanced biosecurity included restricting cattle movements within the IAA and between inside and outside of the IAA (involving revocation of SOAs with stricter control on reallocation, withdrawal of BCMS linkages between herds, etc); (re)allocation of holding and sublocation numbers; and application of source & spread tracing to OTF-suspended herds as well as those OTF-withdrawn. Other controls required increased animal testing, and had a potential impact on surveillance statistics: use of interferon-gamma test was increased, two successive clear tests before movement restrictions are withdrawn was applied in *all* incidents (not just OTFW); and the frequency of periodic testing of herds was increased to six monthly.

The first 12 months of IAA cattle controls (1st May 2010 to 30th April 2011) is described as 2010/11 in this report, and the earlier periods 2005/06 to 2009/10. The method employed for choosing the comparison area has been given in AHVLA (2011). Statistics for herds in various areas of Wales are shown as line graphs for the period between 1st May 2005 and 30th April 2011. The solid red line with filled round markers represents the bTB statistic for IAA herds and the dashed line with open square markers represents the statistic for comparison herds. Lines for the 2-km and 3-km buffers of the IAA are shown in two shades of blue (note the 2-km buffer is also part of the 3-km buffer). Statistics for herds in Wales further than 40 km from the IAA (therefore outside the comparison area) are shown as khaki lines.

1) The context

The number of herds in the IAA on 1st May 2010 was 317; at that time the comparison group had 1170 herds, the 3 km buffer 175 and Wales further than 40 km from the IAA had 7800. In the following year, the number of herds in these groups decreased by between 0 and 2.6%. The average herd sizes recorded on VetNet were 151, 101, 152 and 80, being heavily influenced by the proportion of dairy herds.

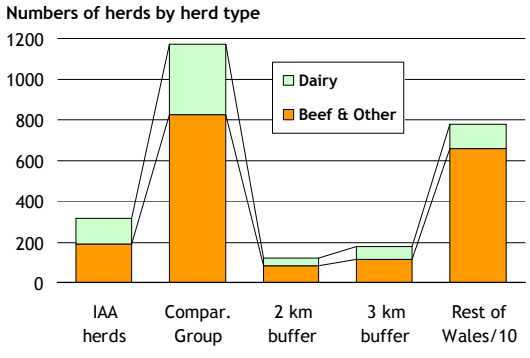

Fig 0.1 – Number of herds (dairy and non-dairy) on 1st May 2010

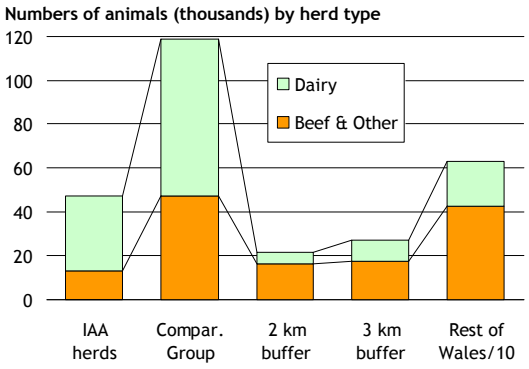

Fig 0.2 – Number of cattle in dairy and non-dairy herds on 1st May 2010

The number of herds and of cattle in the comparison group is 3.7 and 2.5 times greater than the number in the IAA (Figs 0.1 and 0.2). The larger numbers in the comparison group is intended to improve the statistical precision of their results (AHVLA 2011), although it is not possible to find a compact set of herds in Wales that exactly resembles the IAA. On 1st May 2010, the start of cattle controls in the IAA, there were 100 herds under movement restriction in the comparison area and 70 herds under restriction in the IAA.

2) Testing effort

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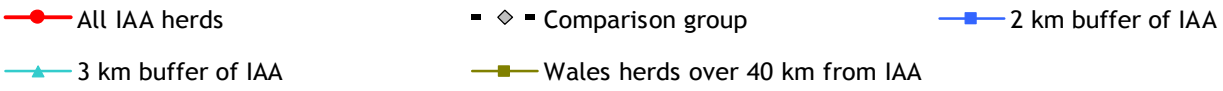

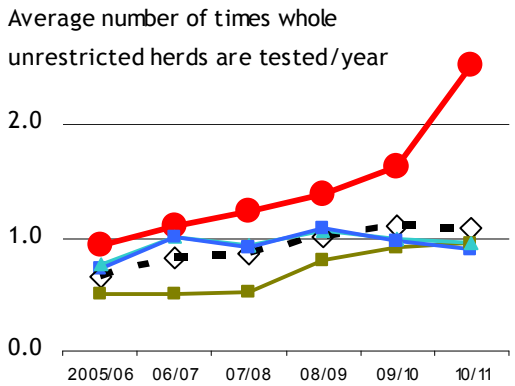

Fig 2.1 – Annual number of completed whole herd type tests per herd not under restriction, 2005/06-2010/11

Up until 2009/10, the large number of tests per unrestricted IAA herd was due the large proportion of such herds that was tested annually (Fig 2.3). In the last 12 months, most herds in the IAA were routinely tested twice yearly.

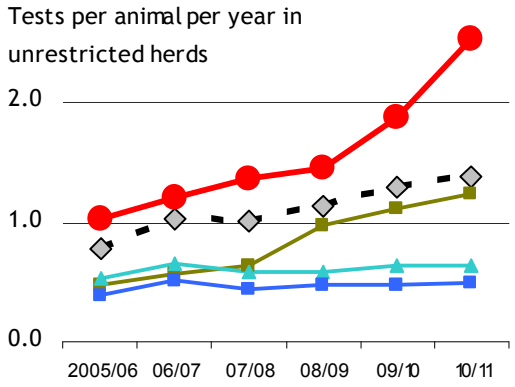

Fig 2.2 – Annual number of tests per animal in the herd, 2005/06-2010/11

For the IAA and comparison group, the numbers of tests in unrestricted herd per animal (Fig 2.2) and herds (Fig 2.1) are broadly parallel.

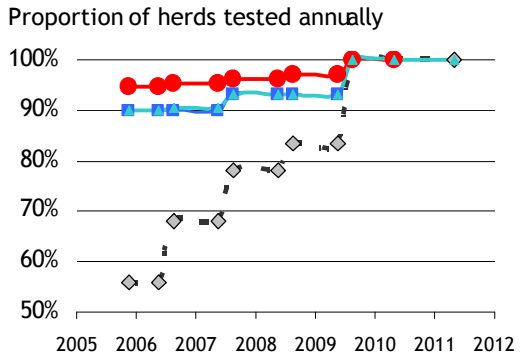

Fig 2.3 – Proportion of herds in yearly-tested parishes, 2005/06-2010/11

Between autumn 2008 and the start of the IAA, all herds in Wales have been tested annually. Before then the comparison herds had been tested less frequently that the IAA; after the start of IAA cattle controls, IAA herds have been tested twice yearly.

3) Breakdowns and reactors per test

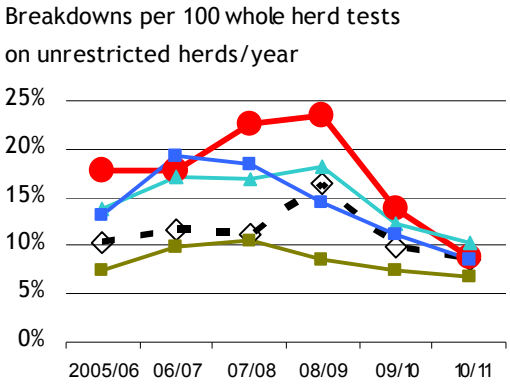

Fig 3.1 – Number of herds losing their OTF status, per complete whole-herd type test of unrestricted herds

Between 2009/10 and 2010/11 there has been a general decrease in the total number of breakdowns per test in Wales. This is especially true in the IAA.

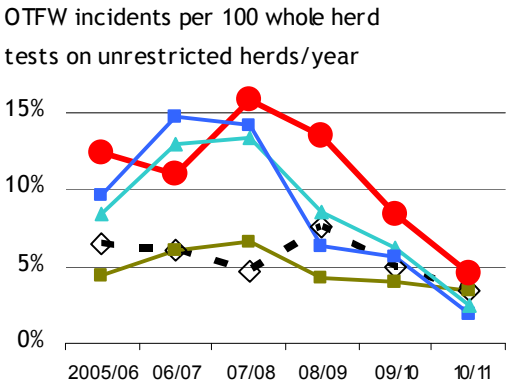

Fig 3.2 – Number of herds having OTF Withdrawn (="Confirmed" Incident), per complete whole-herd type test on unrestricted herds

The trend observed in Fig 3.1 is also seen when OTFW ("confirmed") incidents are examined separately.

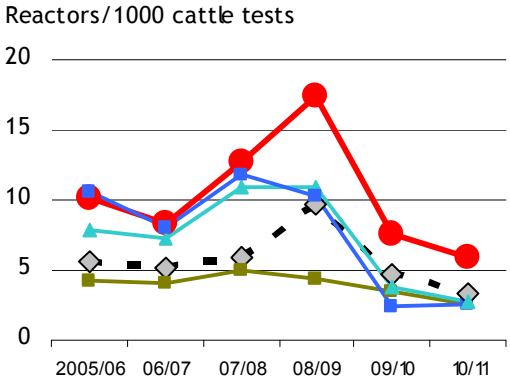

Fig 3.3 – Number of reactors per 1000 animal tests (all tests)

The pattern for reactors per 1000 animal tests – all tests, not just those on unrestricted herds – parallels that for breakdowns per 100 herd tests (Fig 3.1).

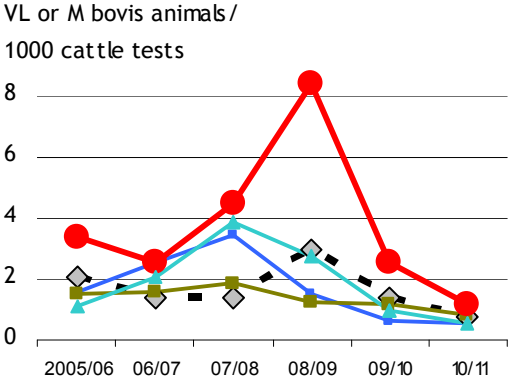

Fig 3.4 – Number of reactors found to have visible lesions or M. bovis per 1000 animal tests (all tests)

The relative decrease in number of evidently infected animals between 2009/10 and 2010/11 was again slightly greater in the IAA than in the comparison herds, buffers or other herds in Wales.

4) Proportion of herds under restriction on 1st May

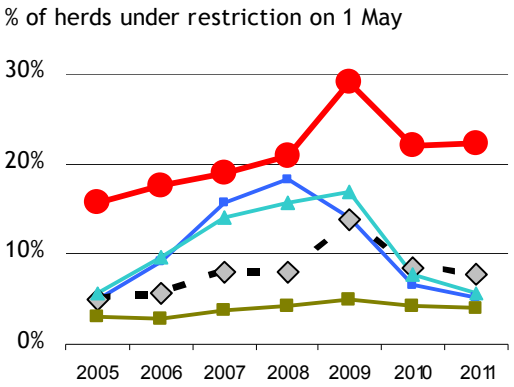

Fig 4.1 – Proportion of herds under restriction on 1st May each year because of loss of Official TB Free (OTF) status (OTF Withdrawn + OTF Suspended, i.e. all breakdowns)

The decrease in number of herds under restriction in the comparison group contrasts with the slight increase in the IAA. This phenomenon may be explained partly by the extra test required in OTF Suspended incidents before herds go clear, and partly the longer time between the test in 2009/10 and the last test in 2010/11 of some herds in the IAA.

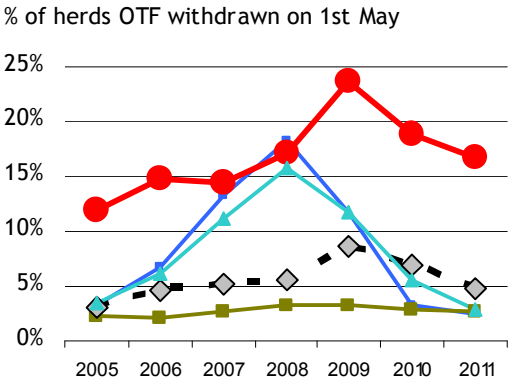

Fig 4.2 – Average proportion of herds under restriction on 1st May each year because of withdrawal of Official TB Free (OTF) status (OTF Withdrawn only, i.e. "confirmed" breakdowns)

The relative decrease in the number of herds under restriction because of withdrawal of OTF status was smaller in the IAA than in comparison area.

5) Duration and lifting of restrictions

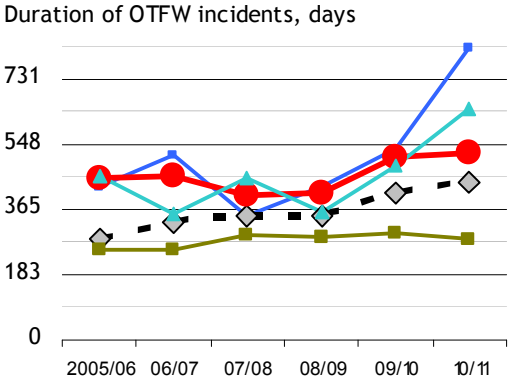

Fig 5.1 – Average duration of OTF withdrawn ("confirmed") incidents ending in each 12-month period

In 2010/11, there was a minimal increase in the duration in the IAA, whereas the duration in the comparison area (and particularly in the 2 and 3 km buffers) increased perceptibly.

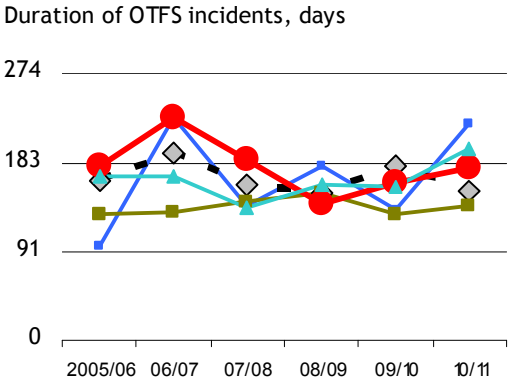

Fig 5.2 – Average duration of OTF suspended ("unconfirmed") incidents ending in each 12-month period

In 2010/11, the relative increases in duration in the IAA and comparison area were similar; therefore the extra test needed to end an OTFS incident in the IAA had no perceptible effect of duration.

The steep increase in the 2 and 3 km buffers resembled that seen for OTFW incidents.

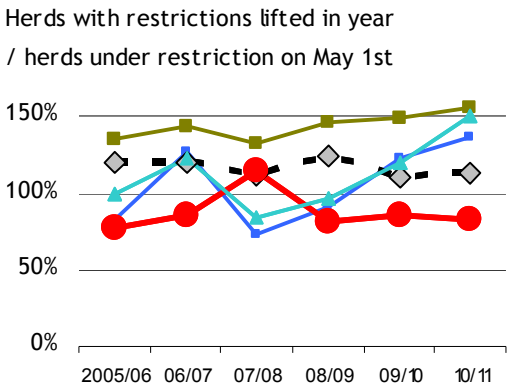

Fig 5.3 – Number of herds with OTFW or OTFS restrictions lifted in 12 months per herd restricted on 1st May

The calculation actually is for the ratio between *all* herds coming off restriction during the 12 months divided by the number of herds under restriction on the previous 1st May, hence values greater than 100% are possible. There was little difference between the IAA and comparison herds, despite the OTFS breakdowns in IAA herds requiring 2 clear tests to end restrictions.

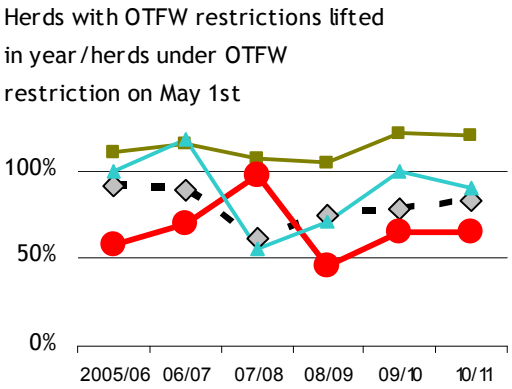

Fig 5.4 – Proportion of herds under OTFW restriction on 1st May that had the restrictions lifted during the next 12-month period

There were similarities with Fig 5.3.

6) Breakdowns per 100 herds and reactors per 1000 animals

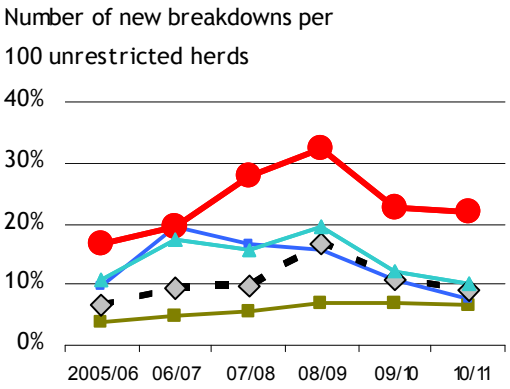

Fig 6.1 – Annual proportion of unrestricted herds experiencing new OTFW or OTFS breakdowns in the 12-month period

The relative decrease in the comparison herds was not matched in the IAA, probably due to the greater testing intensity in the IAA.

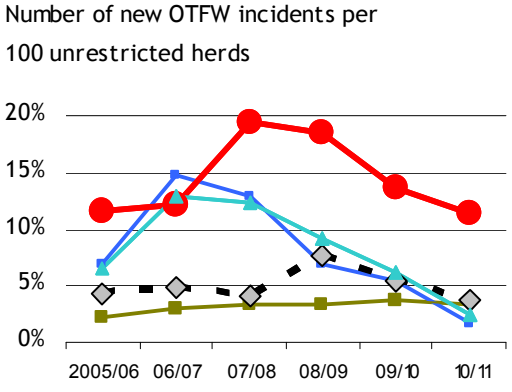

Fig 6.2 – Annual proportion of unrestricted herds experiencing new OTFW breakdowns in the 12-month period

There were decreases in both the IAA and the comparison herds.

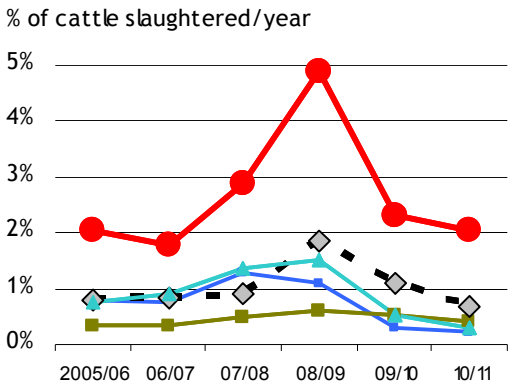

Fig 6.3 – Annual number of cattle slaughtered for bTB control (excluding slaughterhouse cases), per 100 (all herds)

The relative decrease in the comparison herds was not matched in the IAA, probably due to the greater testing intensity in the IAA.

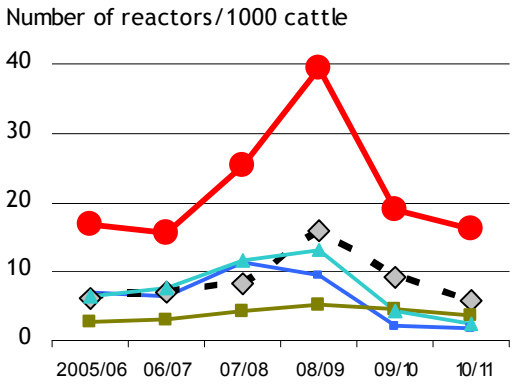

Fig 6.4 – Annual number of cattle becoming reactors, per 1000 (all herds)

An increase in the testing frequency is likely to increase the number of herds in which more than 12 months have elapsed between the last test in 2009/10 and the last test in 2010/11, thus to tending to increase the number of reactors.

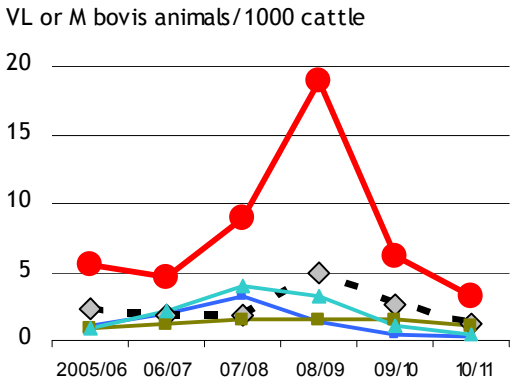

Fig 6.5 – Annual number of cattle found to have visible lesions or M. bovis, per 1000 (all animals in all herds)

The relative decreases in numbers of lesioned or culture-positive animals are similar for both IAA herds and comparison herds.

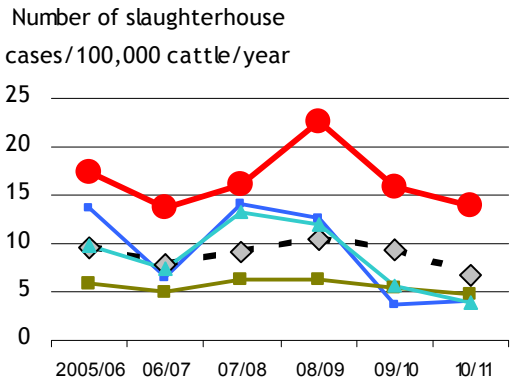

Fig 6.6 – Annual number of slaughterhouse cases found to have visible lesions or M. bovis, per 100,000

Despite the increased testing frequency in the IAA, the relative decrease in proportion of animals becoming slaughterhouse cases was not as large in the IAA as in the comparison area. Slaughterhouse case prevalence appeared to be associated with overall prevalence.

7) Recurrence of bovine TB

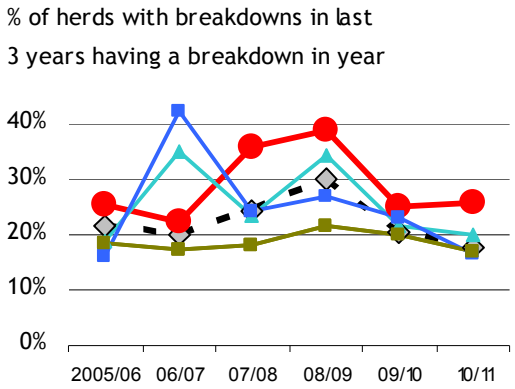

Fig 7.1 – Proportion of herds that had OTFW or OTFS breakdowns in the previous 3 years that had an OTFW or OTFS breakdown in the current 12-month period

Recurrence increased between 2009/10 and 2010/11 in the IAA only, but testing intensity had been increased, as explained above.

8) Number of reactors per breakdown

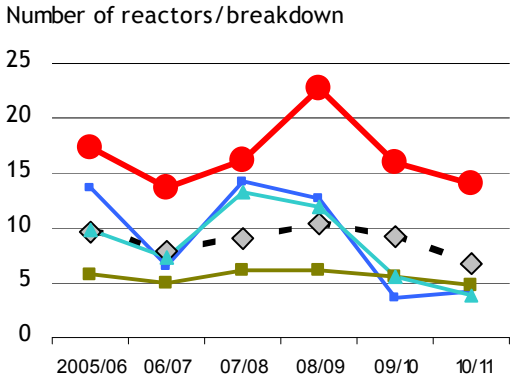

Fig 8.1 – Number of reactors (by skin test or IFN-gamma test) per OTFW or OTFS breakdown starting in the 12-month period

The larger relative decrease in number of reactors per breakdown in the comparison herds than in IAA herds parallels changes the number of reactors (Fig 6.4). The proportion of reactors detected by the interferon-gamma test was 7.5% and 5.9% in IAA and comparison herds respectively in 2010/11, a relatively small difference unlikely to skew results.

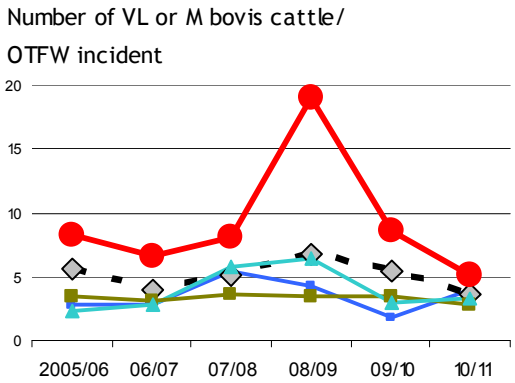

Fig 8.2 – Number of reactors (by skin test or IFN-gamma test) that had visible lesions or M. bovis, per OTFW breakdown starting in the 12-month period

Relative decreases in the per-OTFW incident number of animals with lesion or culture evidence of bTB are slightly greater in the IAA and the comparison herds (as seen in Fig 6.5).

9) References

AHVLA (2011). *OG0142: Wales Intensive Action Area, Cattle Analysis: Historical bovine tuberculosis trends and selection of appropriate comparison areas*. Veterinary Laboratories Agency, Report to the Welsh Government, 27th June 2011.

WAG (2010). *Progress and implications of the additional cattle control measures implemented in the Intensive Action Area (IAA)*. Welsh Assembly Government, 16th July 2010, 7 p.