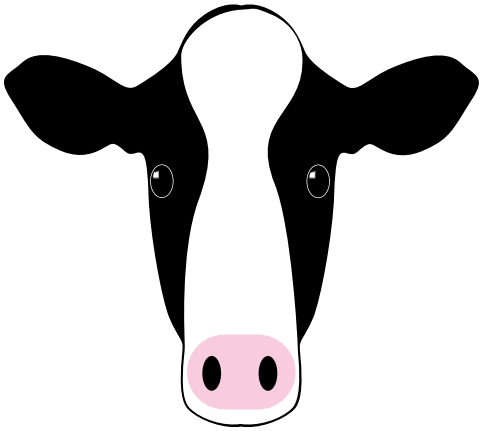

Exposed: the ‘enormous potential for farm to farm spread’ of bovine TB

Why is bovine TB continuing to spread, despite the introduction of pre-movement tests for cattle in 2006? Farmers, many vets and even some scientists blame badgers. But in this report, the Badger Trust reveals that the massacre of badgers in the Republic of Ireland has failed to control bovine TB. Instead, in 2007, the disease rose by 13%. Yet in Northern Ireland, where no badger culling is undertaken, bovine TB has been virtually halved in three years. We then return to Great Britain to expose how the infrastructure of farming in TB hotspots generates ‘enormous potential for farm to farm spread’ of bovine TB. Once more, the Badger Trust confirms that farming practices, not badgers, are to blame for bovine TB.

FACT: The number of TB reactors in the Republic of Ireland in 2007 was virtually identical to those in 2002, when the intensive extermination of badgers began.
(p1, Figure 1)

Eire’s senseless killing fields

According to Professor Simon More from the Republic of Ireland’s Centre for Veterinary Epidemiology and Risk Analysis, the spread of TB by cattle is ‘relatively uncommon under Irish conditions’[1]. Ireland has been killing badgers for many years. But the slaughter was stepped up in 2002[2], when the Republic of Ireland implemented ‘a national programme of wildlife control … focused in areas of higher disease prevalence. In these areas, badger removal [forms] the basis of temporary disease control by minimizing contact between cattle and infected badgers’[1].

It sounds so simple. Kill as many badgers as possible and the disease goes down. The Republic of Ireland is certainly very efficient when it comes to slaughtering badgers. As the Badger Trust revealed last year[3], the Irish Government sets 1.3 million snares for badgers every year. Yet these protected European mammals

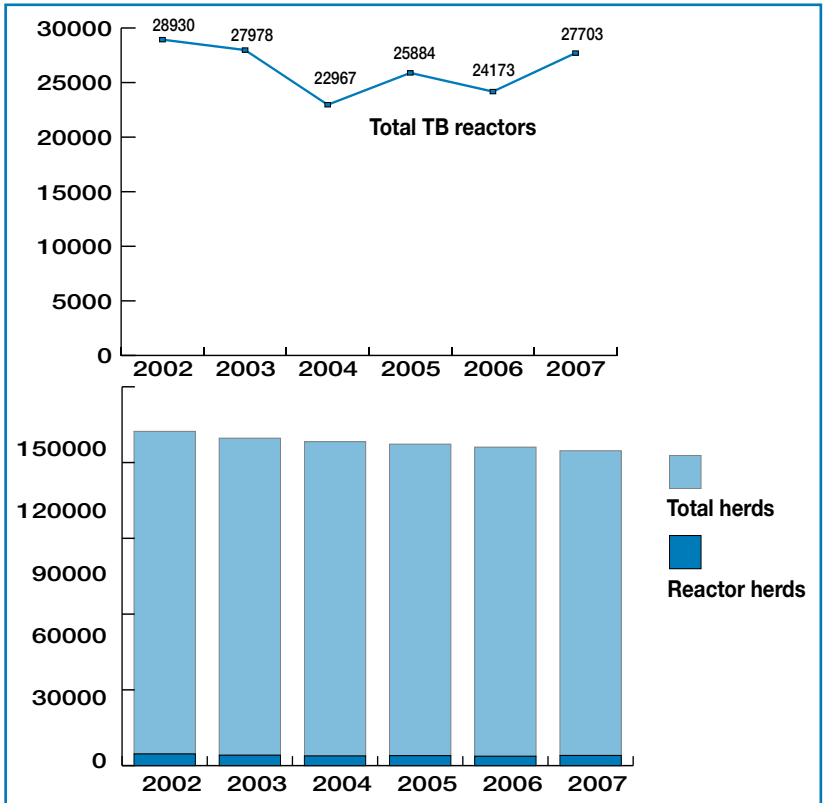

Figure 1: TB incidence in the Republic of Ireland 2002-2007

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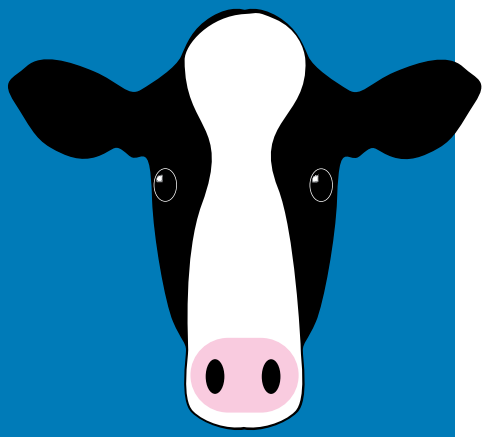


FACT: Bovine TB rocketed by 13% in the Republic of Ireland in 2007, despite a sustained policy of badger extermination.
(p.2., col.1)

are now so rare that only around 6,000 are caught annually.

A simple observational study just published by More and his colleagues[4] reveals that 16 years of killing badgers has only reduced bovine TB by 22%. They acknowledge that this reduction could be an over-estimate.

And when the data is examined in detail, the Irish government was frequently catching less than one infected badger in areas in excess of 200 square kilometres. How could such a tiny number of infected (and not necessarily infectious) badgers possibly be to blame for so much TB in cattle?

But the policy begins to look particularly shabby when the trend in bovine TB since 2002 is examined. The year 2002 was when more badgers than ever before were snared in the 'Emerald Isle' as part of a brutal and sustained campaign. But figures obtained this week from the Republic of Ireland reveal that bovine TB declined briefly, but then rose again. Then, last year, it rocketed by 13%. The number of reactors in 2007 was very nearly the number of reactors slaughtered in 2002. And this is at a time when the national herd has fallen by 200,000 head[5].

Meanwhile, the proportion of herds infected has remained virtually constant. In 2002, 3.64% of herds were infected. In 2007, 3.34% of herds were infected.

Clearly, then, Ireland's repugnant and brutish policy of badger extermination is failing.

Northern Ireland's steady progress

You might expect that across the border in Northern Ireland, where no badgers are being snared, that bovine TB would be raging out of control. It is true that Northern Ireland had the worst bovine TB incidence anywhere in Europe. As in Great Britain, this peaked in the wake of the foot and mouth epidemic in 2001, when the spread of disease within herds led to a dramatic escalation in incidence.

But since 2002, Northern Ireland has virtually halved the number of TB reactors and the decline in infected herds continues*.

As shown in Figure 2, the number of reactor cattle per thousand tested was 6.19 in 2002 but had fallen to 3.14 in the first 11 months of 2007. The incidence of infected herds fell from 9.93% to 5.23% over the same period. This is still too high, but it compares well with the Republic of Ireland where the current herd incidence of 5.74% in East Offaly – the infamous badger culling area – is regarded by the farming press as 'very respectable'.

So what has changed in Northern Ireland? In the following paragraphs, we describe areas of progress without our usual panoply of references. This is because the data is derived from a

** Click here for the latest statistics*

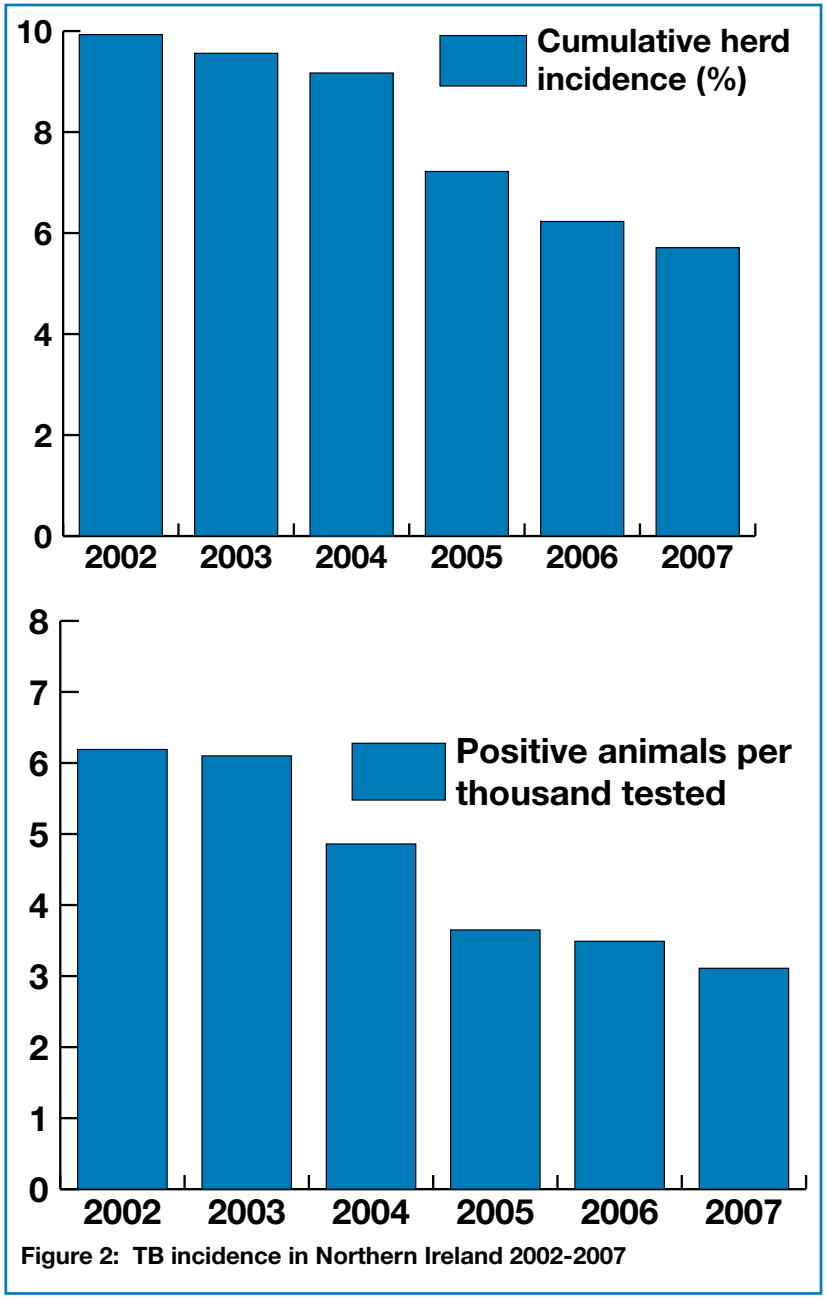


Figure 2: TB incidence in Northern Ireland 2002-2007

Box 1: Advice to veterinary staff in Northern Ireland [6]

'There is significant movement of cattle in the province, both between ("inter-herd") and within ("intra-herd") herds. A 1999 study of 1,500 cattle found that the average number of lifetime moves between herds was 5, while in some animals it exceeded 12. 71% of the sample cattle moved through a market at least once in their lifetime while 11% passed through 3 or more times. Most movement occurred at 2 distinct ages: within the first year, often as young calves, and at 1.5 to 2.5 years, most likely as near-finished beef, pregnant heifers or freshly-calved young cows.

'Intra-herd movement is significant due to small farm sizes and consequent dependence on rented pasture for grazing cattle. This informal movement, between the home-farm and separate holdings or rented pasture, is difficult to quantify or control as licences are only required to cover movement in or out of the herd.

'Farms in the worst affected area (southern Armagh) tend to be smaller than elsewhere, with a greater concentration of suckler herds and a higher use of rented grazing.

'There is also some evidence of unauthorised movement of cattle and interference with identification and tests etc. in this region, which may also be a contributing factor.'

Box 2: Overdue tests in Great Britain [See www.defra .gov.uk/animalh/tb/stats/latest.htm]

In Great Britain, 4,381 herds were overdue for their test at the end of November 2007. As the table below shows, there appears to be a direct correlation between the number of herds overdue for a TB test and the proportion of TB infection in the region / country. This may be because missing a TB test allows infection to spread more widely both within the herd and to neighbouring herds.

Region/country	% herds overdue	% herds under restriction
Scotland	1.60%	1.78%
North	3.05%	4.13%
East	3.93%	5.38%
Wales	7.97%	14.54%
West	8.25%	15.47%

range of unpublished spreadsheets, internal reports and emails obtained under the Freedom of Information Act, rather than from published documents.

- The Badger Trust is extremely grateful to Robin Chambers and colleagues, at the Dept for Agriculture and Rural Development, for compiling this data at short notice and with commendable speed.

Underlying policy trends

Bovine TB policy in Northern Ireland is outlined in detail in a 255-page guide for staff[6]. Although not significantly updated since around 2002, it makes refreshing reading when compared with the guidance available to Animal Health staff in Great Britain. As the Badger Trust reported in 2007, key parts of that guidance had not been updated since 1997!

Most importantly, staff in Northern Ireland acknowledge that whilst TB eradication is an objective, 'a range of factors … mitigate against achieving eradication in the immediate future'. Badgers are of course included in this list, which was written before the results of the Randomised Badger Culling Trial.

But the document also makes a very important acknowledgement, recognising that there is '**enormous potential for farm to farm spread**' exacerbated by a '**high rate of cattle movements**' and '**limitations associated with the [TB] test and its execution**'.

Some of the mitigating factors, including animal movements, are outlined in Box 1.

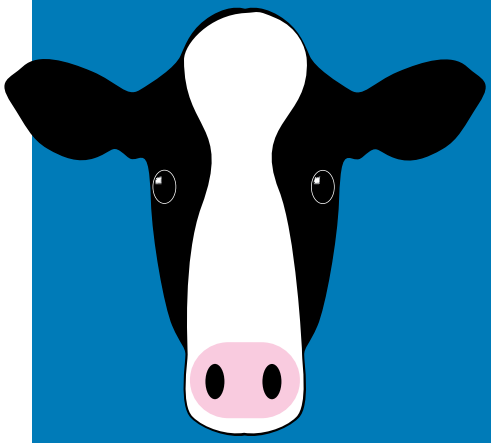
Sophisticated surveillance

The most significant drop in bovine TB in Northern Ireland came after November 2004. Northern Ireland introduced *and enforced* tough restrictions for herds that missed their TB test. The number of herds overdue for their TB test fell from 3,306 in October 2004 to just 358 in October 2005, 'due in part to herd keepers testing more quickly'. This contrasts with the poor enforcement of overdue herd tests in Great Britain (see Box 2).

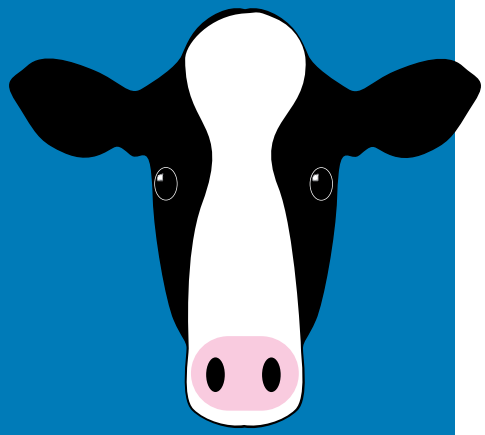
The testing regime is supported by a sophisticated Animal and Public Health Information System (APHIS) – a database-driven IT system capable of tracking and monitoring the status of individual animals as well as herds. This, in turn, supports a carefully structured programme of risk analysis, in which each TB incident is treated as an epidemiological event and investigated thoroughly.

Thanks to APHIS, Northern Ireland's approach to the disease is far more sophisticated than that in Great Britain in a number of ways:

- **Movement restrictions are imposed on individual animals considered more likely to be**



FACT: The worst areas for TB in Great Britain also have the highest rates of herds that are overdue for their TB test at the end of each month."
(p.3, Box 2)



FACT: Between July and October 2007, 8.2% of skin test negative cattle were found to be positive to bovine TB by the gamma interferon test in Northern Ireland.
(p.4., col.3)

infected. In addition to several classes of restricted herds, there are also different classes for individual animals. This can be particularly important with, for example, 'animals of suspect identity';

- **Careful tracing of animals**. Around 9% of tracings back to originating herds result in the identification of TB reactors;
- **Enforcement of cleansing and disinfection.** The advice on the cleansing and disinfection of farm premises is very detailed. Moreover, cattle must not use the facilities and the herd may not be derestricted until an inspection of the cleansing and disinfection has been completed;
- **Mapping breakdown herds**. This detailed process includes mapping all land associated with the herd and identifying other herds within 1km of that land;
- **Associating herds.** Rather than just focusing on the single, infected herd, all 'associated' herds are combined to create a single 'epidemiological unit' (Box 3). This improves disease control, but is not perfect. As DARDNI warns staff: 'DARD cannot insist associated herds be tested by the same veterinary practice or indeed be tested at the same time. Some unscrupulous herd keepers may take advantage of this fact and systematically move animals between associated herds between tests'.

Better testing

Northern Ireland has implemented a very structured, risk-based approach to herd testing. For example, herds that have recently had TB restrictions lifted are not ignored for a year. Instead, a further test is implemented between four and six months after restrictions are lifted, whether or not disease had been confirmed at the time of restriction.

Similarly, herds that are being sold up and dispersed are subject to a TB test – something that has only recently been implemented in Britain as a result of pre-movement testing.

Northern Ireland has been using the gamma interferon blood test for bovine TB following a period of careful trials. Between July and October 2007, on average 8.2% of cattle that were negative to the traditional skin test were found to be positive by the gamma interferon test.

Although in some herds no additional animals were found by gamma interferon, in ten per cent of cases between 20 and 33 per cent of cattle were found to be positive, indicating a huge reservoir of concealed infection in those herds. Significantly, a massive 47% of animals that were deemed 'inconclusive' by the skin test were indeed positive when tested with gamma interferon. In the past, these animals might well have been left in the herd.

Box 3: 'Associating' different herds

Different herds are 'associated' into the same epidemiological unit for a variety of reasons:

- Shared grazing;
- Shared housing;
- Shared testing and/or handling facilities;
- Repeated unlicenced or non-notified movement of animals between the herds;
- Documents issued to one herd but used by another herd keeper.

In contrast, data is not gathered for epidemiological purposes in Great Britain.

Enforcement

Another feature of TB control in Northern Ireland has been the establishment of the Central Enforcement Team (CET) in 2003, 'to handle more challenging and complex investigations and prosecutions, and to respond to the increased demands and expectations'. This followed a report recommending a 'more proactive and higher profile approach to the prevention, detection and punishment of illegal activities in relation to animal health and animal movement violations'.

The primary focus is on the enforcement of Indentification, Registration and Movement controls rather than TB directly, on the basis that 'this in turn underpins the traceability (and reputation) of Northern Ireland's livestock and ultimately the meat produced, providing for animal disease control'.

Between 1 April 2006 and 31 March 2007, 31 persons were convicted in court (including one person convicted twice) with fines totalling £33,560 and three custodial sentences (suspended). The largest single fine, totalling £6,000, was for failure to present animals for brucellosis and tuberculosis testing.

The 'enormous opportunity' for herd to herd spread in Great Britain

In a recent paper published by the Royal Society[7], Green *et al* claimed that badgers are responsible for around 75% of the 'local effects' that cause TB in cattle. The NFU fell on this claim like a pack of blood-thirsty hounds.

But the claim was based on the simplistic assumption that the management of livestock in one- and two-yearly testing areas is no different from that in three- and four-yearly testing areas. This is plainly nonsense.

It ignores, for example, fundamental differences in the very structure of the countryside. Rackham, in his seminal *History of the Countryside*, summarised these

differences by describing 'ancient' and 'planned' countryside. TB hotspots, it turns out, are concentrated in ancient countryside with its more complex structure of small villages and fragmented fields.

Green *et al* also ignored the fact that TB hotspots have the highest densities of cattle compared to those areas with less TB.

And finally, Green *et al* ignored the biggest factor of all: the millions of unrecorded movements of cattle **between separate fields registered to the same Holding** (or Premises), **between the fields of Linked Holdings** and **between fields registered as a Single Occupancy Authority**.

Don't switch off! If you are confused by this terminology, take comfort from the fact that Madders[8] reported in 2006 that 'it is hardly surprising that farmers find the rules confusing'.

Here's the problem that Green *et al* failed to spot. Pre-movement testing only applies to movements off a Holding. Yet **many farm Holdings include fields that are tens or even hundreds of miles away**. Movements between these fields are not recorded and pre-movement testing is not required. And that's just the simple part.

The matter is further complicated by the existence of Linked Holdings and Single Occupancy Authorities. These two categories are authorised by different bodies locally and nationally and set different requirements for the recording and testing of cattle between holdings. Yet they can apply simultaneously to identical groups of holdings and, in terms of disease control, they provide the perfect recipe for a complete dog's dinner.

So hazardous is the situation that when, in 2006, Madders conducted his *Review of Livestock Movement Controls*, he proposed that Linked Holdings and Single Occupancy Authorities be abolished and replaced with an epidemiological (disease monitoring) structure based around a Livestock Management Unit (LMU):

> 'An LMU would in most cases be a single premises or linked premises under the management and control of a single business. But in the case of common land or shared seasonal grazing, there is a case where it would be desirable to allow them to include premises managed and controlled by more than one business. The criteria for defining an LMU are simple. All premises must be linked epidemiologically, biosecure and been found to be so by a qualified person.'

Here, then, was a call for the same epidemiological approach already employed in Northern Ireland. Furthermore, said Madders, LMUs:

- should share such of the farm machinery as comes regularly into contact with livestock;
- should share facilities such as

Box 4: CPHs, LHs and SOAs: chaos in the countryside

Holdings

A Holding is normally a business with two or more parcels of land less than ten miles apart. The Holding has a unique County/ Parish Holding (CPH) number, though it can straddle different parishes, counties and even countries. Land parcels more than ten miles apart should be given separate CPH numbers. But Madders reports that: 'With the pressure to simplify the previous subsidy payment arrangements it is clear that these rules have not been universally applied ... many CHPs have land more than ten miles apart'. This is contrary to EU law[8].

Linked Holdings

Linked Holdings (LHs) are designated by the British Cattle Movement Service to link holdings 'for the purpose of exempting them from reporting the movements of cattle' between them.

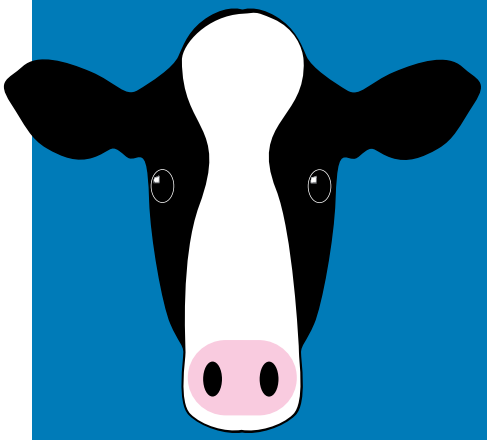
Farmers must record the movements only in their herd farm records. And a pre-movement test is not required if the Linked Holdings are also under a Single Occupancy Authority (see below) or an exemption has been granted by the Divisional Veterinary Manager. Again, there is no derogation for Linked Holdings under EU law (Regulation 1760/2000 and the Cattle Identification Regulations 1998 (as amended)). Madders warns: 'The existence of LH arguably increases the risk of disease spreading […and] Every LH potentially increases the number of premises, which must be assumed as being contiguous to an infected premise, and thus LHs could increase the costs associated with containing a major disease outbreak.'

Single Occupancy Authority

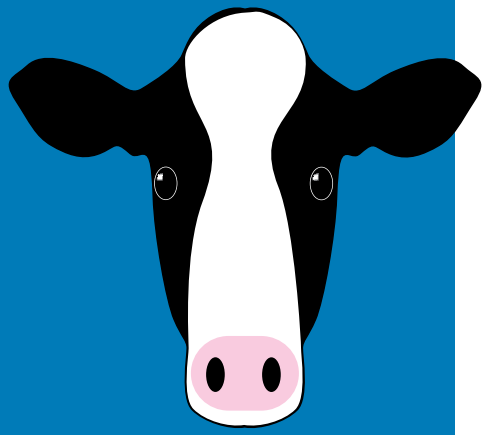
A Single Occupancy Authority (SOA) is granted by the Divisional Veterinary Manager. It permits livestock keepers to move cattle within a group of holdings forming an agreed epidemiological unit. Parcels of land within five miles of the main holding are regarded as part of the main holding. Parcels of land on holdings outside the five-mile boundary can be included in the SOA and there are no distance limits on the premises making up the SOA.

Keepers have to record movements between holdings grouped within the same SOA, unless the holdings are also Linked Holdings. Pre-movement testing is not required.

So, by designating different Holdings as both Linked Holdings and an SOA, herd keepers can avoid pre-movement testing and the requirement to record cattle movements with the British Cattle Movement Service.



FACT: In 2006, a review of livestock movement controls called for the current regime to be abolished and replaced. Nothing has been done.
(p.5., col.2)



FACT: In TB hotspots cattle are routinely moved across tens or even hundreds of miles with no recording or pre-movement testing.
(p.6., map)

cattle crushes;
- should have stock-proof barriers against adjacent land not within the proposed LMU;
- should have a named veterinary practice responsible for livestock;
- where cattle are present in the LMU all the premises must fall either within a one or two year TB testing regime or a three or four year TB testing regime and the herd testing interval on all parts should be that of the 'highest' risk.

These recommendations have not been implemented. Instead, Britain has an excessively complex system which, given the poorly resourced state of Animal Health, makes it impossible to monitor and control bovine TB. And as our map of farm holdings reveals, the opportunities for contact between multiple herds are colossal.

Where's the map?

If no map is visible, try clicking the box above right. If a dialogue appears, choose "Play once" or "add to Trusted favourites".

If that fails, try re-opening this file in Adobe Reader 8 or above. It's free. Download it here.

You may also need the free Flash player. Download it here.

The map above shows a 15 kilometre (9.2 mile) wide block of a typical TB hotspot. The Holdings shown are extracted from large data sets freely available from: www.magic.gov.uk

We have focused on those Holdings which are fragmented. Each of these Holdings is sequentially highlighted in black for approximately two seconds, so you can clearly see where its fields are distributed. Remember that cattle can be moved between any of the fields of each Holding without being recorded or pre-movement tested.

We only show Holdings that have claimed Environmental Stewardship grants from Natural England, so not all holdings are shown here. Gaps may also include hamlets and woodland.

We cannot be sure that all the Holdings have cattle, but Google Earth strongly suggests that they are almost all livestock Holdings.

Contact between neighbouring herds is made easy by the broken condition of hedgerows or their replacement with single barbed wire fences.

We began by giving each Holding a unique colour. But the structure of the Holdings is so complicated that this became unclear in a static map. Instead, we found that the complexity is better illustrated through animation.

Remember that this map only shows individual Holdings. We are unable to say which, if any, of these holdings are also Linked Holdings or Single Occupancy Authorities. In other words, this map shows the minimal opportunity for unrecorded, untested cattle movements.

Some Holdings have contact with up to 18 other holdings many miles apart. In reality, the story is even more complex. Holdings can be linked to share milking parlours and winter housing. Holdings can be divided by a parish boundary, with a very different TB testing frequency in each parish.

Holdings can be divided by a county boundary, with lower enforcement in one county compared with the other.

In the west of England, Holdings can even fall on either side of the country border with Wales.

Conclusion

The NFU, some vets and even some scientists (with very weak datasets) would have us believe that the monitoring of TB in cattle is perfect and there are negligible opportunities for the spread of bovine TB between herds. Badgers must therefore be to blame.

In Northern Ireland, this is rejected. There, the 'enormous potential for farm to farm spread' is clearly recognised and vets are making progress by trying to manage each TB outbreak as a single epidemiological unit.

In Great Britain, in contrast, the structure that is required for effectively controlling bovine TB and other livestock diseases has not been implemented. TB outbreaks are recorded on paper and there is little prospect of Animal Health getting even the most basic grasp of the epidemiology of a TB outbreak when Holding structures are so complex, animal movements so varied and the IT systems so ineffective.

But our report does point to a way forwards for Hilary Benn, the Secretary of State for the Environment:

First, Animal Health needs major resources with which to implement an overhaul of its IT. This must include a Geographical Information System capable of mapping a TB case such that all possible epidemiological links with other farms can be explored in full.

Second, the confusing range of designations applied to Holdings should be abolished and replaced with the Livestock Management Unit model advocated by Madders and the Rural Payments Agency (now part of Natural England).

Then, and only then, will the true extent of the role played by cattle movements become visible and controllable. Unless this action is taken now, it is clear that the chaotic infrastructure of farming will fuel the increasing spread of bovine TB, leading to more significant costs for tax payers in the future.

Against this background, killing badgers would be a very dangerous distraction. As the failure of the Republic of Ireland's bloody badger culling policy proves, badger culling is utterly futile.

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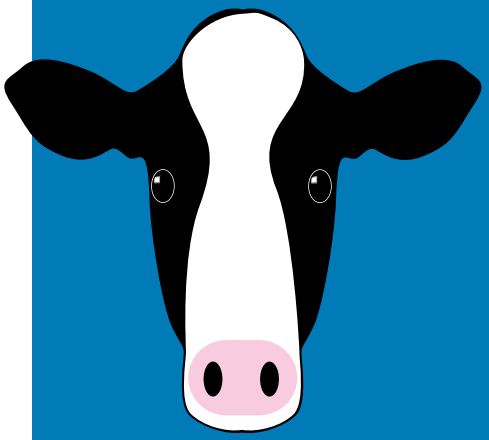

FACT: The current policy of linking cattle holdings increases the risk of disease spreading and the costs of a major disease outbreak.
(p.5., Box 4)