

Brucellosis: - Policy and Eradication Issues in Northern Ireland

Owen Denny

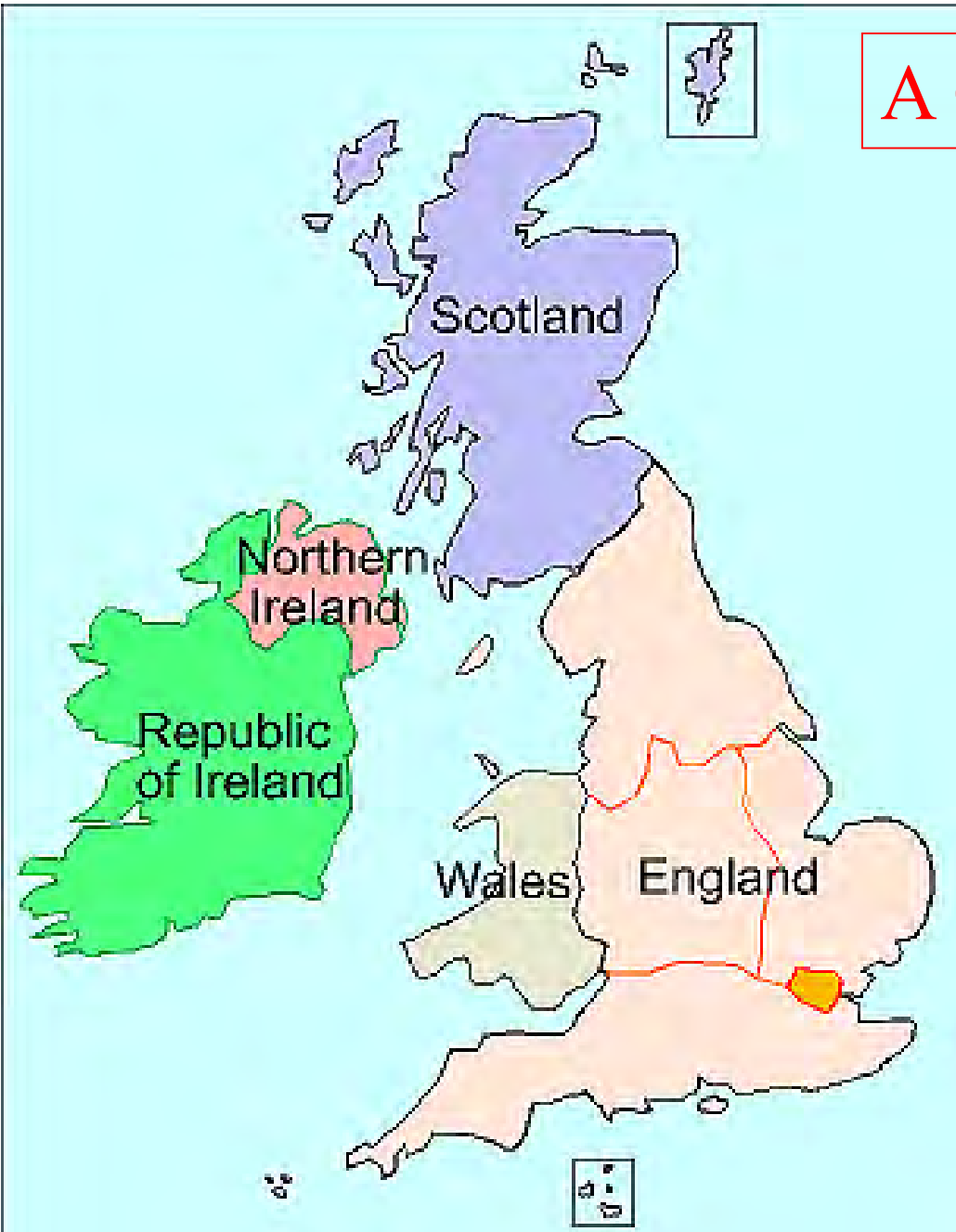
Senior Principal Veterinary Officer



So where is Northern Ireland?



A Clarification !



British Isles = everything on map

United Kingdom = England, Scotland, Wales and Northern Ireland.


Great Britain = England, Scotland and Wales.

Island of Ireland = Northern Ireland and Rep. Of Ireland.









We don't have any of these!



Here is our Apex Predator



(Badger cub) 



And we certainly don't have
any of these!



Legend has it that
Saint Patrick
removed the
snakes from Ireland
in the 5th century

You might want to
invite him to South
Africa!



Northern Ireland

- Northern Ireland is principally a country of grass-based cattle farming.
- Forest cover is low (6.2% compared to European average of 36.9%)
- 75% of land usage is for agriculture.
- Beef and milk production are important agricultural constituents, comprising 51% of the agricultural output in 2005,
- Bovine brucellosis and bovine tuberculosis are the 2 most important diseases of cattle that we are eradicating.





BOVINE BRUCELLOSIS

Decision 2003/467/EC

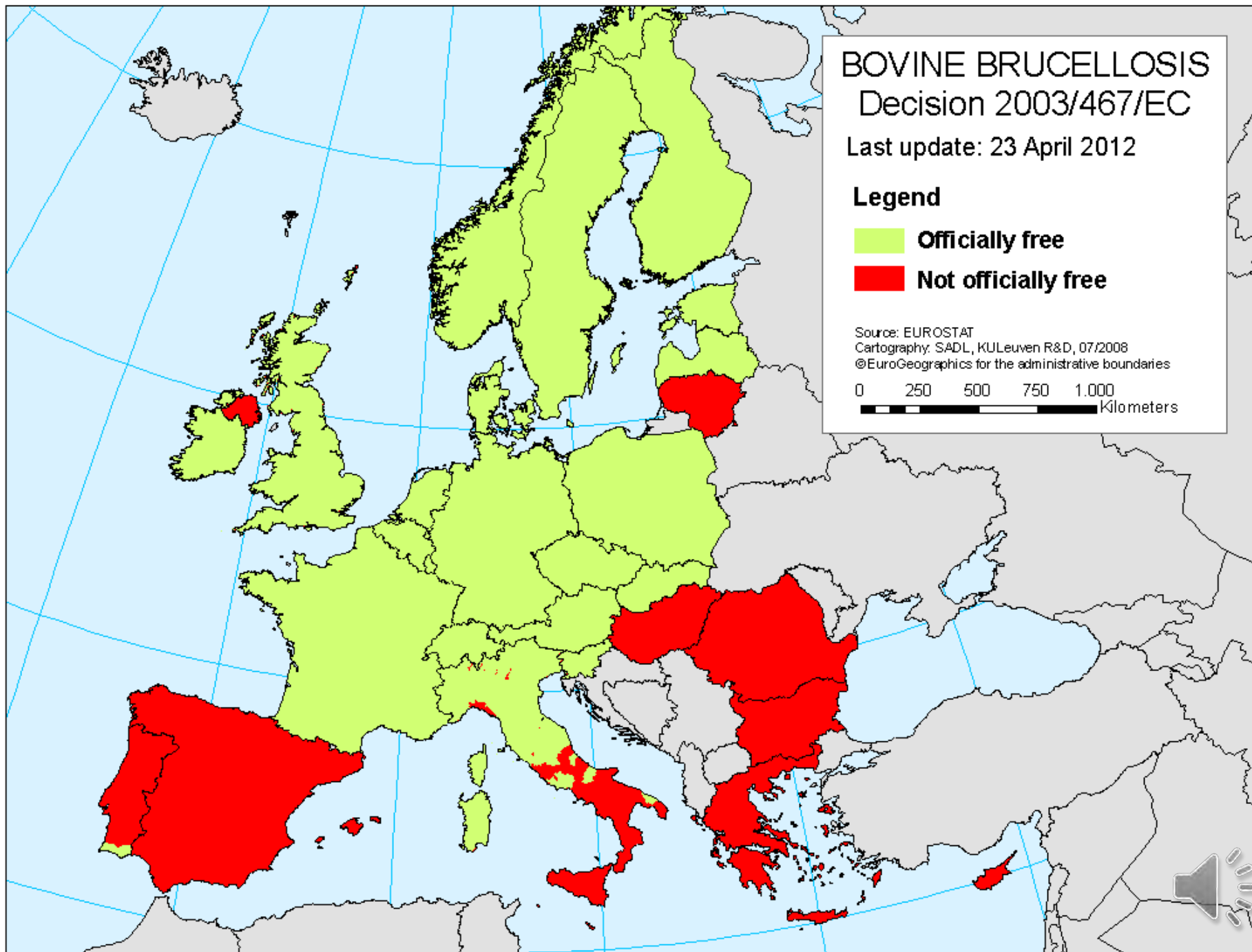
Last update: 23 April 2012

Legend

-  Officially free
-  Not officially free

Source: EUROSTAT
Cartography: SADL, KULeuven R&D, 07/2008
©EuroGeographics for the administrative boundaries

0 250 500 750 1.000
Kilometers



The Brucellosis Eradication Scheme in Northern Ireland



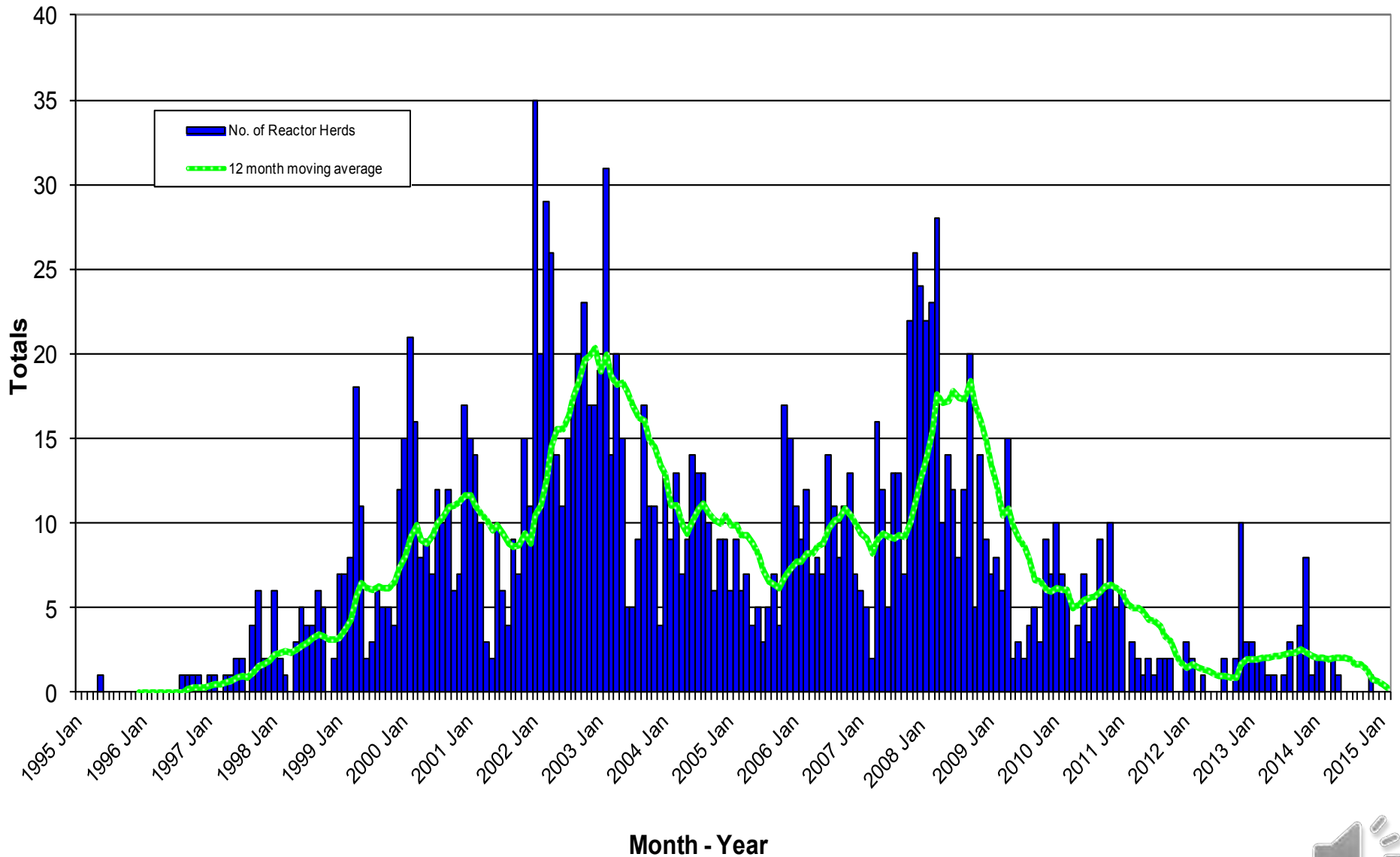
History of brucellosis in NI

- 1930s - 60% of all herds affected.
- 1940s - vaccination of calves with Strain 19 vaccine
- January 1949 - Notifiable disease in Northern Ireland.
- 1950 - pilot eradication scheme on farms selling raw milk.
- 1960s - voluntary scheme. 5-20% of herds infected
- 1963 compulsory eradication. Herd incidence was estimated at between 16% and 20% in dairy herds
- 1970s - scheme tightened-up. Herds depopulated. Herd incidence less than 3% by 1969 and to 0.6% by 1975
- 1988 - 2 yearly testing - <0.2% for 4 years.
- 1997-99 – start of recent epidemic.
- 1999-2012 Intensive eradication programme
- Feb 2012 – last confirmed case of brucellosis in Northern Ireland.



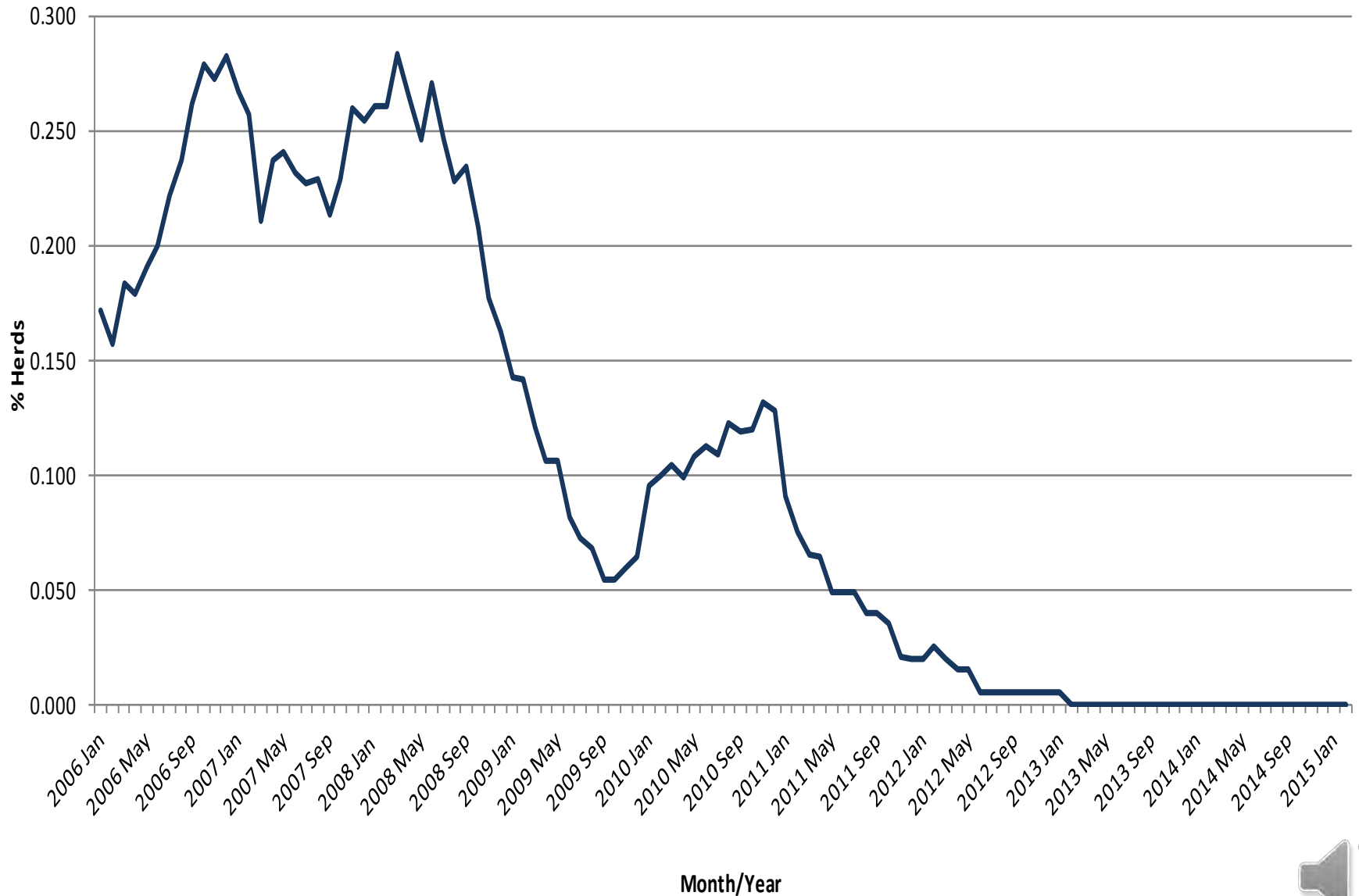
New Brucellosis Reactor Herds: Jan 1995 to Feb 2015

New BR Reactor Herds: January 1995 to February 2015



Brucellosis – Culture Confirmed 12-month Herd Incidence

BR annual herd incidence where infection confirmed by culture: December 2005 to February 2015



This is what we do in the Brucellosis Programme; -

- Test and slaughter programme. (Vaccination not permitted)
- Annual testing of eligible cattle
- Multiple blood tests used (mainly SAT, iElisa and CFT)
- All serological reactors are compulsorily slaughtered with compensation.
- Almost all herds with confirmed disease are depopulated
- Inner and outer ring testing around breakdowns (plus movement restrictions)
- Pre-movement testing
- Forward and Backward testing
- Monthly bulk milk testing
- Abattoir surveillance of adult females
- Reporting of Abortions compulsory in legislation
- Reactor cattle calves are slaughtered.



Issues and Lessons Learned in Northern Ireland

- Complete brucellosis eradication takes a long time

Complete brucellosis eradication takes a long time

Compulsory Eradication of Brucellosis Began in 1963

So it took us 49 years to
eradicate!



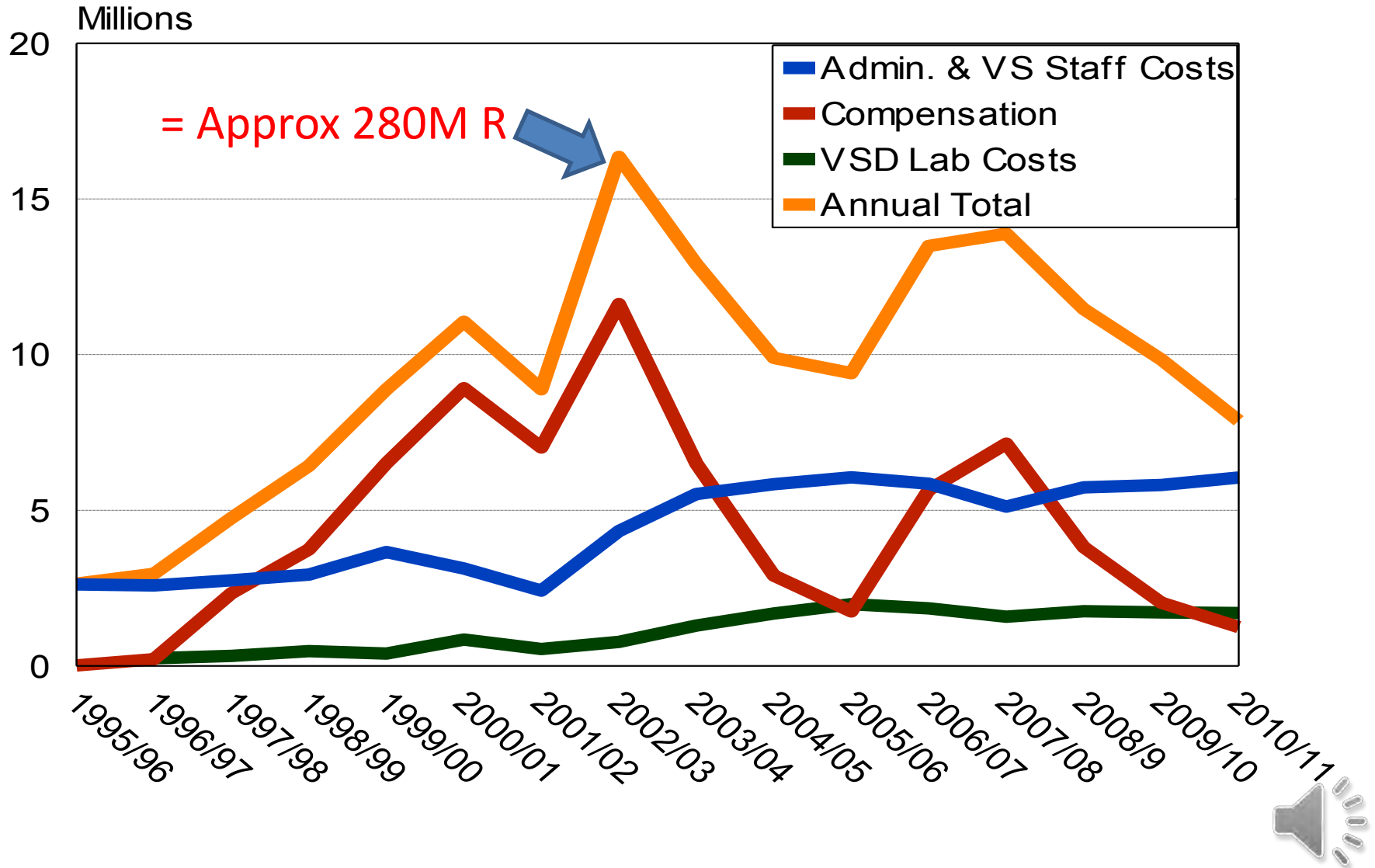
Issues and Lessons Learned in Northern Ireland

- Complete brucellosis eradication takes a long time.
- **Eradication is expensive**



Eradication is expensive

Brucellosis Programme Costs



Issues and Lessons Learned in Northern Ireland

- Complete brucellosis eradication takes a long time.
- Eradication is expensive
- **There are features in N. Ireland that hinder eradication**



There are features in N. Ireland that hinder eradication.

- High cattle and herd density.
- High levels of cattle movement
- Multiple neighbours – 12-15 typical
- Farm fragmentation is extensive.
- Approximately 60% of herds use multiple premises. Therefore herds have multiple neighbours.
- A large proportion of herds utilise outdoor calving systems.
- Movement of livestock between fragments facilitates disease transmission. Infection at multiple premises in 17% of outbreaks.
- So - a potentially high rate of exposure to a disease that may remain undiagnosed for months or years.





0.2 km

Source: R. Harwood, DARD

Abortions



Abortions

- Abortions are notifiable in NI
- **BR Control Order (NI) 2004: “Any bovine foetus or calf born dead or which dies within 24 hours of birth”**
- Veterinary Surgeon and Farmer are required to report abortions
- 2010: >2,600 cattle blood sampled following reports.
- House animal in isolation, spray the area
- Efforts made to increase reporting

Abortions

- Substantial under-reporting of abortions occurs in the province.
- Studies elsewhere have reported abortion rates, from all causes, of 6.2% in Great Britain (Leech, 1962), 5% in New Zealand and 5.9% in Israeli dairy cows (Markusfeld, 1997).
- Even an abortion rate of 3% in Northern Ireland would mean a reporting rate of less than 10%, with significantly lower levels during periods of reduced brucellosis incidence.



Issues and Lessons Learned in Northern Ireland

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- Eradication is expensive.
- There are features in N. Ireland that hinder eradication
- **Local spread is very important in the epidemiology of brucellosis**

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Approx:-

50% at contiguous herd testing

15% at routine testing

15% post abortion

5% Bulk Milk

<1% Pre-movement



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- **Brucellosis can spread very rapidly in a susceptible population**



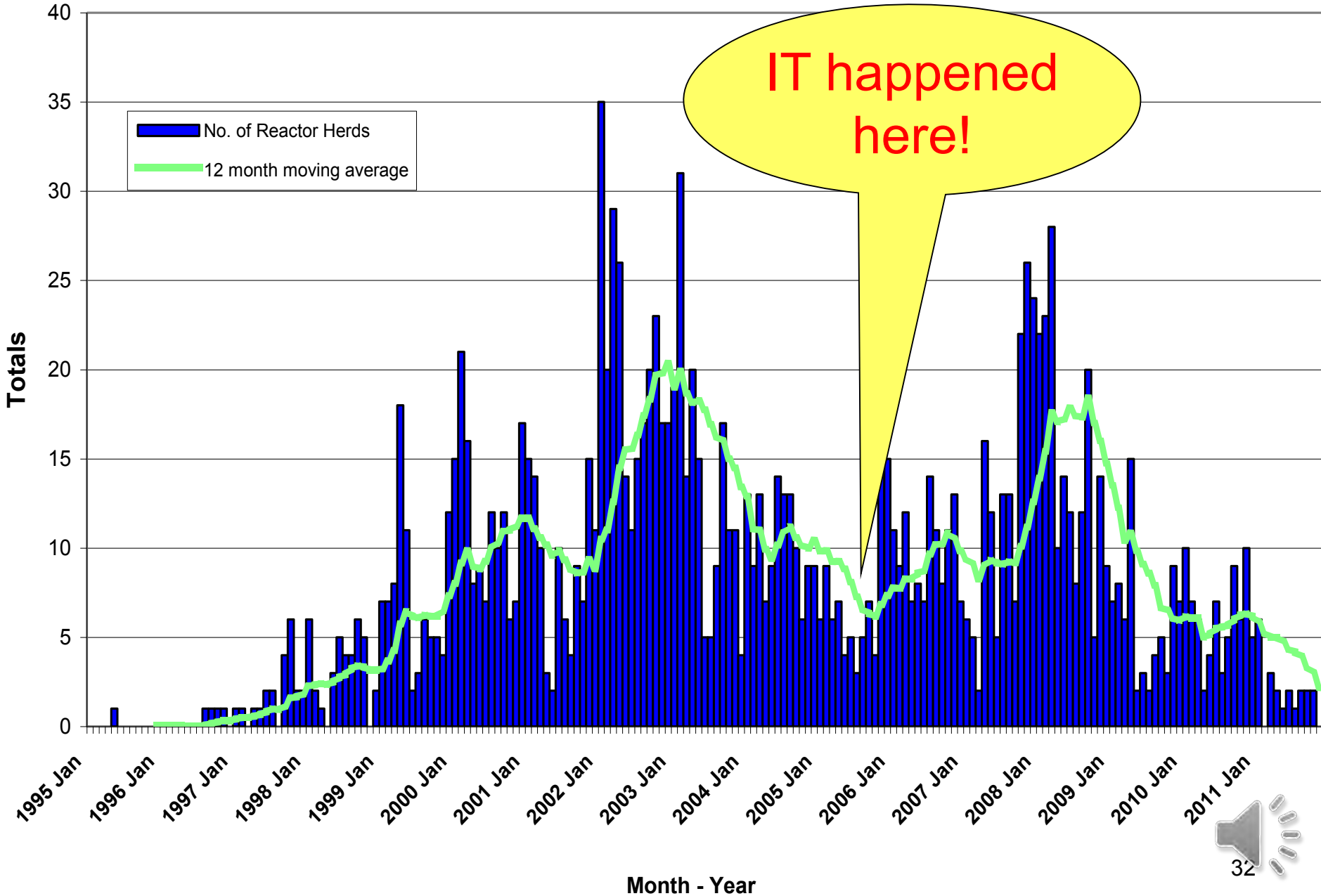
Brucellosis can spread very rapidly in a susceptible population

We have a good example where one primary outbreak spread to at least 38 other herds.

Some of the herds only revealed infection after several herd tests



New BR Reactor Herds: January 1995 to November 2011



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- **Good biosecurity is an essential part of the eradication scheme**

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Breakdowns have been caused by:-

- Straying or mixing of cattle with neighbouring herds.
- Using common grazing in a brucellosis risk area
- Allowing casual visitors on to the farm without cleansing and disinfection,
- Using a shared bull.
- Taking land for grazing in a brucellosis risk area
- Sharing equipment and feed e.g. crushes, fertility equipment, and silage.
- Spreading slurry from other farms on land.

Good biosecurity is an essential part of the eradication scheme.

- Also
 - Animal identification
 - Traceability
 - IT support
 - Legal powers

Biosecurity and these other aspects are important throughout a control programme. And they become even more important as eradication is in sight.

The foundations should be laid at the start of the programme.



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- **Compensation levels should be appropriate.**

Valuation and compensation

- We value cattle on farm before slaughter
- Reactors paid to limit of 75% of average market value
- Contact cattle – 100% value with no limit.
- Salvage value goes to Competent Authority
- Hard to eradicate a disease if it is financially attractive to have it!

Survey to Estimate Fraudulent Infection of Herds

- Confidential questionnaire. Guaranteed anonymity.
- A sample size of 405 seropositive herds:
1 Jan 1999 - 31 Aug 2005.
- Suspicion of fraud existed in almost 13% of outbreaks during the period. A further 9% were thought to have occurred indirectly as the result of fraud in another contact herd.

Abernethy D. (2008). Epidemiology and Management of Bovine Brucellosis in N. Ireland. PhD thesis. University of London





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In 2010

Foetus used in Armagh cattle herd infection bid

An apparent attempt to infect a cattle herd with brucellosis has been described as appalling by Agriculture Minister Michelle Gildernew.

A foetus infected with the disease was found dumped in a field at Lislea, County Armagh.

It was found near feeding buckets where cows, calves and a bull



Brucellosis can cause cows to miscarry

were grazing, but did not come from the herd.

The foetus had been opened from its neck to its belly, with meal placed over it and inside it.

Mrs Gildernew said DNA tests would be used to help track down those responsible.

"DNA samples taken from the foetus and the bacterium itself will be analysed, so that future genetic identification of the source of the infected foetus and the strain of the bacteria is possible.

"As I previously reported, my veterinary officers now have new processes that allow them to explore in detail the disease links between herds, going back over the past number of years," the minister said.

TOP NORTHERN IRELAND STC

- ▶ Robinson faces DUP crunch
- ▶ NI man hurt in Afghan bomb
- ▶ Adams stands over brother



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SHARED READ WATCHED/L

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- 2 Evans in Radio 2 breakf.
- 3 Israel to construct Egyp
- 4 Homeless gay Muslims f
- 5 Shock at credit card mor
- 6 Exam schools open amir
- 7 Crime gangs 'dominate
- 8 Weather and travel in t
- 9 Criminals passing the ta
- 10 Clegg shelving Lib Dem



39

What caused the stories in the news?



“he miraculously found the foetus lying behind bushes on a rented farm, half a mile away from home. The foetus was split open, filled with meal and placed in a position not meant to be found.

I cannot understand how people can stoop so low to infect another man’s herd with brucellosis. It’s obviously potentially financially motivated for them ...”

(Farm Week, Jan 22, 2010.)



“Value for Money”

- Typically 85-95% of confirmed herds are depopulated each year.
- Remind the Industry that there is not an automatic depopulation policy.
- “Value for Money” is simply a convenient publicity and communication label, not a new policy.
- A positive side effect of this approach is that it discourages fraud and deliberate infection.
- Compensation changed in 2012 – 11 years after it was first identified as an issue



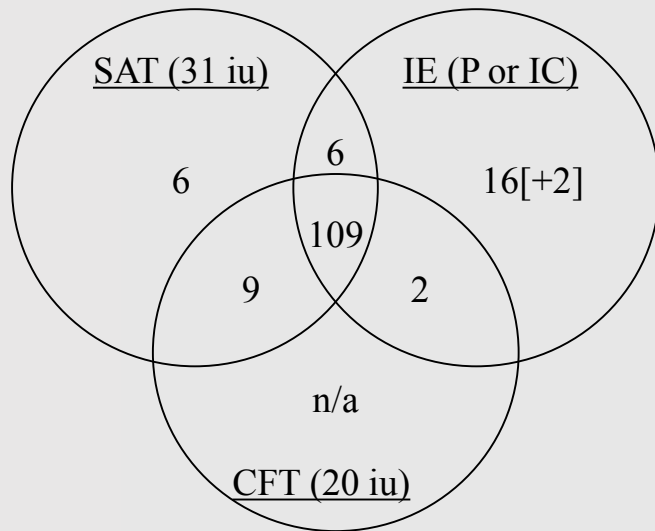
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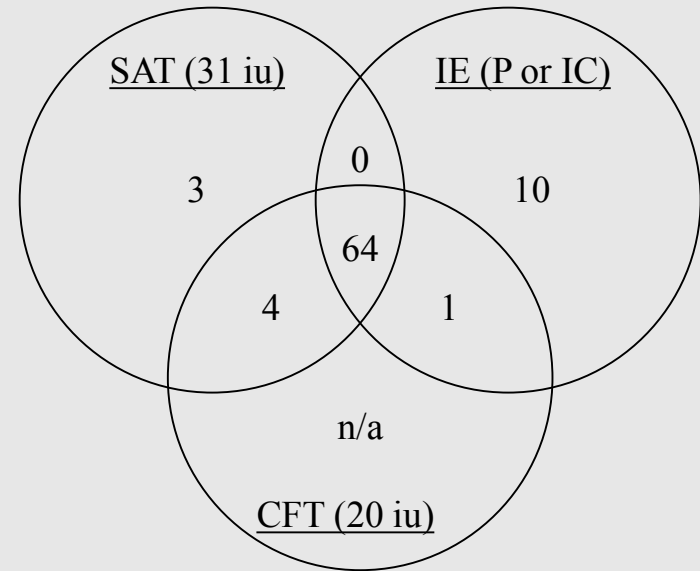


Value in Multiple tests

Analysis (2007): All test data – 300k samples, 4300 herds



150 culture-positive cattle



82 culture-positive herds

(first disclosure test)

* Abernethy et al (2008) Intl. Rsch Conference, VLA, England.

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- **Effective co-ordination of HQ and Field is important**

Brucellosis Programme – Staff & Roles

Owen Denny
Ext. 24649



Admin. Support

Madonna Sexton Ext 31942
Agnes Donaldson Ext 24312

Sharon Verner
Ext. 32224

VSD Liaison
Pre-movement testing
Staff Instructions
Brucellin \ NSI
ASU liaison
SummerWWP
EU Co-financing
Farmer's Liaison
NIFAISS Liaison



Michael Bready
Ext. 61811

Foetus collection

DVO Audits

Testing supplies incl sampling tubes



Judith Graham
Ext. 25214

Breakdown Checking
Breakdown queries
Publicity

Biosecurity
Reporting abortions
iELISA
Reactor removal
DNA Analysis
Strain typing



David Brown
Ext. 35001

Br Manager's Toolkit

OMU Stats
KPIs

Sheep sampling
Cognos



Brendan Hanna
Ext. 60859

AHWI, SAHWI and Group 4 aspects of the Br Programme.

Supplies Management

Tenders\Bids

Sampling liaison with VSD



Barbara Geddis
Ext. 88596

Abattoir Surveillance

Technical advice to NIFAISS

Inter\Intranet
Calving Patterns
BME
Core brief

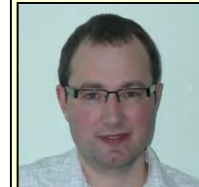


Nigel Trimble
Ext. 32201

Br Mapping

Training

Br Database



Elaine Dickson
Ext. 32941

Specialist VO duties including "Buddy" visits, Brucellin testing



Queries in relation to individual breakdowns should go to Judith Graham in the first instance.

Issues and Lessons Learned in Northern Ireland

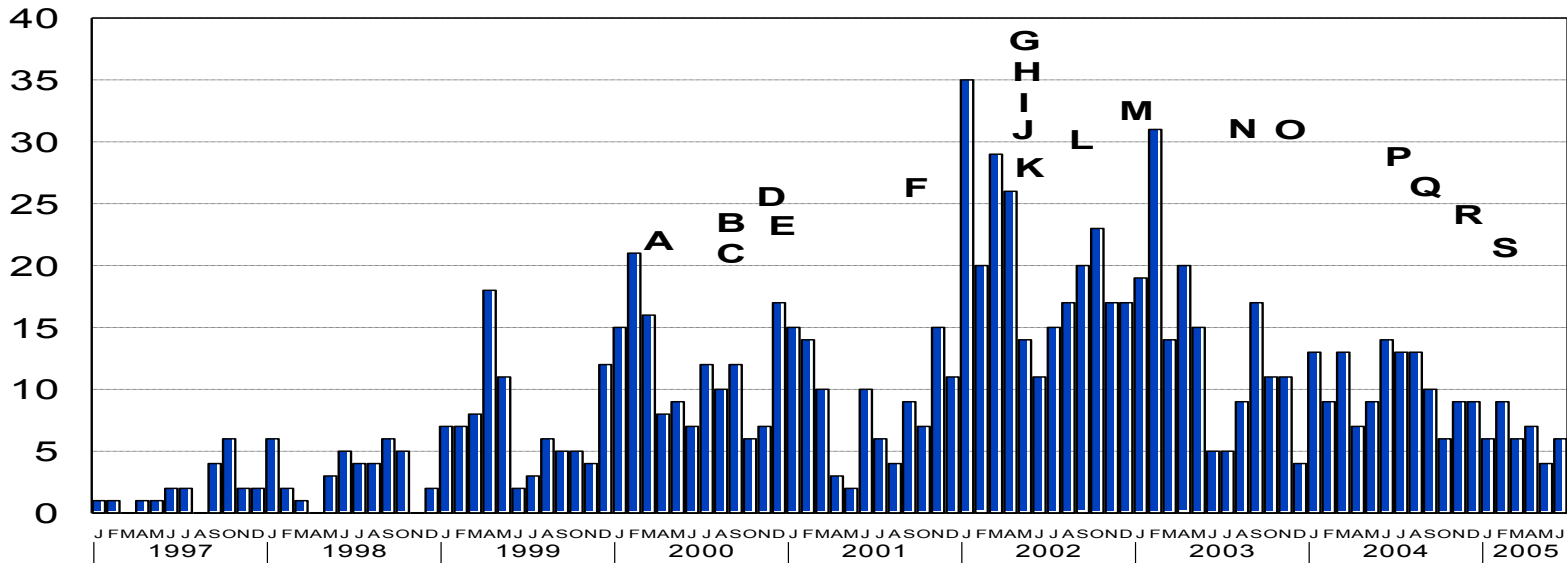
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- **The Programme must be managed strategically and reviewed regularly**



Strategic Response to increased disease - Historic

Brucellosis: new reactor herds.

Jan 1997 - June 2005



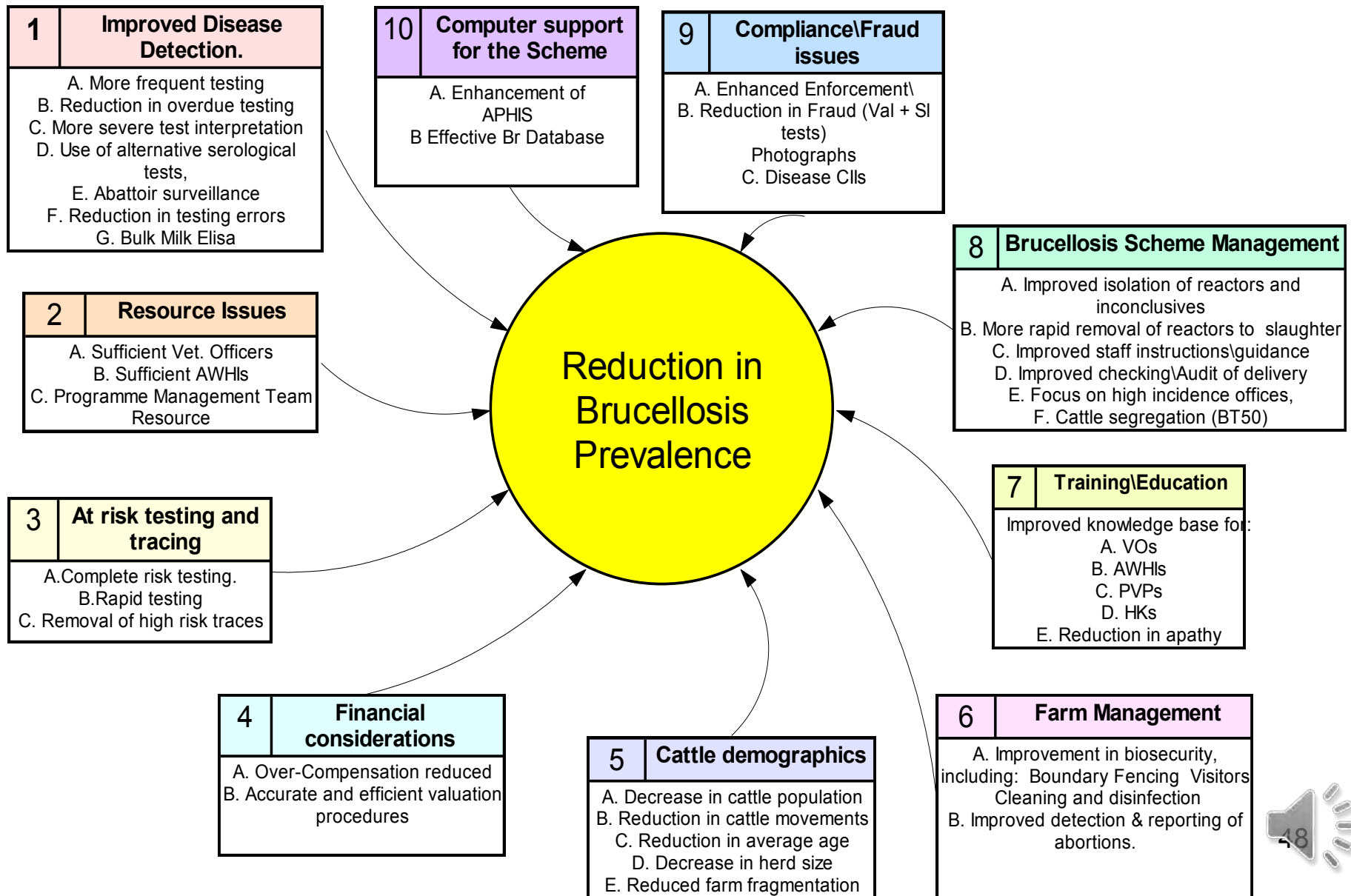
A	Bulk Milk Elisa testing
B	Br Publicity Campaign
C	Staff training and PVP meetings
D	OTMS Abattoir testing
E	Annual testing in 3 high risk DVOs
F	Clls for Br breakdowns
G	Reactor progeny purchase
H	BT50 segregation notice
I	Enhanced restrictions on contiguous herds

J	6 month destocking after breakdown
K	HQ resource expanded to 3 DVOs
L	Updated staff instructions
M	BCI
N	Br database
O	Annual testing in all DVOs (Br Review)
P	Removal of low CFT animals
Q	Modifications to valuation procedure (Br Review)
R	Premovement testing (Br Review)
S	Slurry treatment with lime (Br Review)



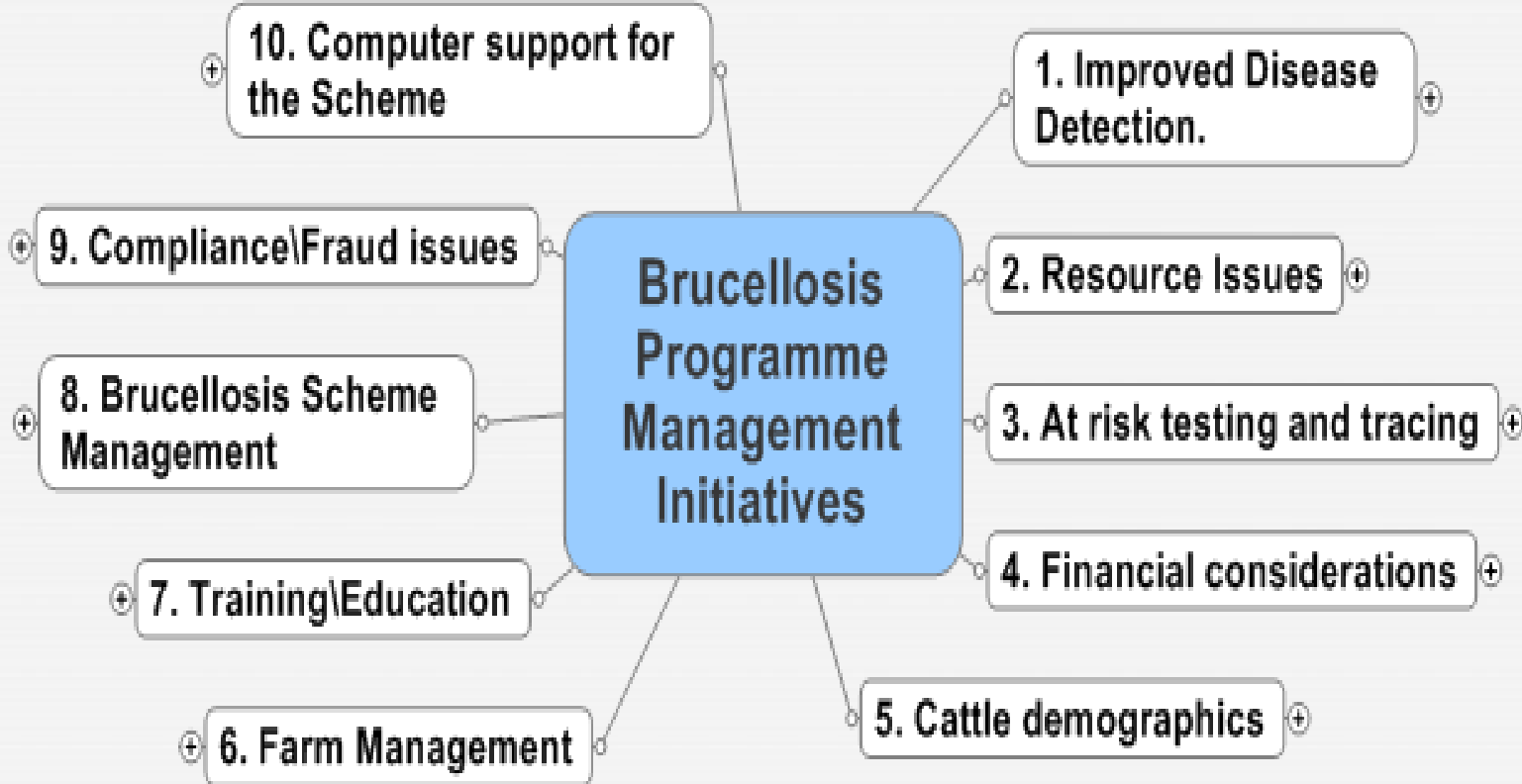
Holistic Approach:-

Factors affecting the level of Brucellosis



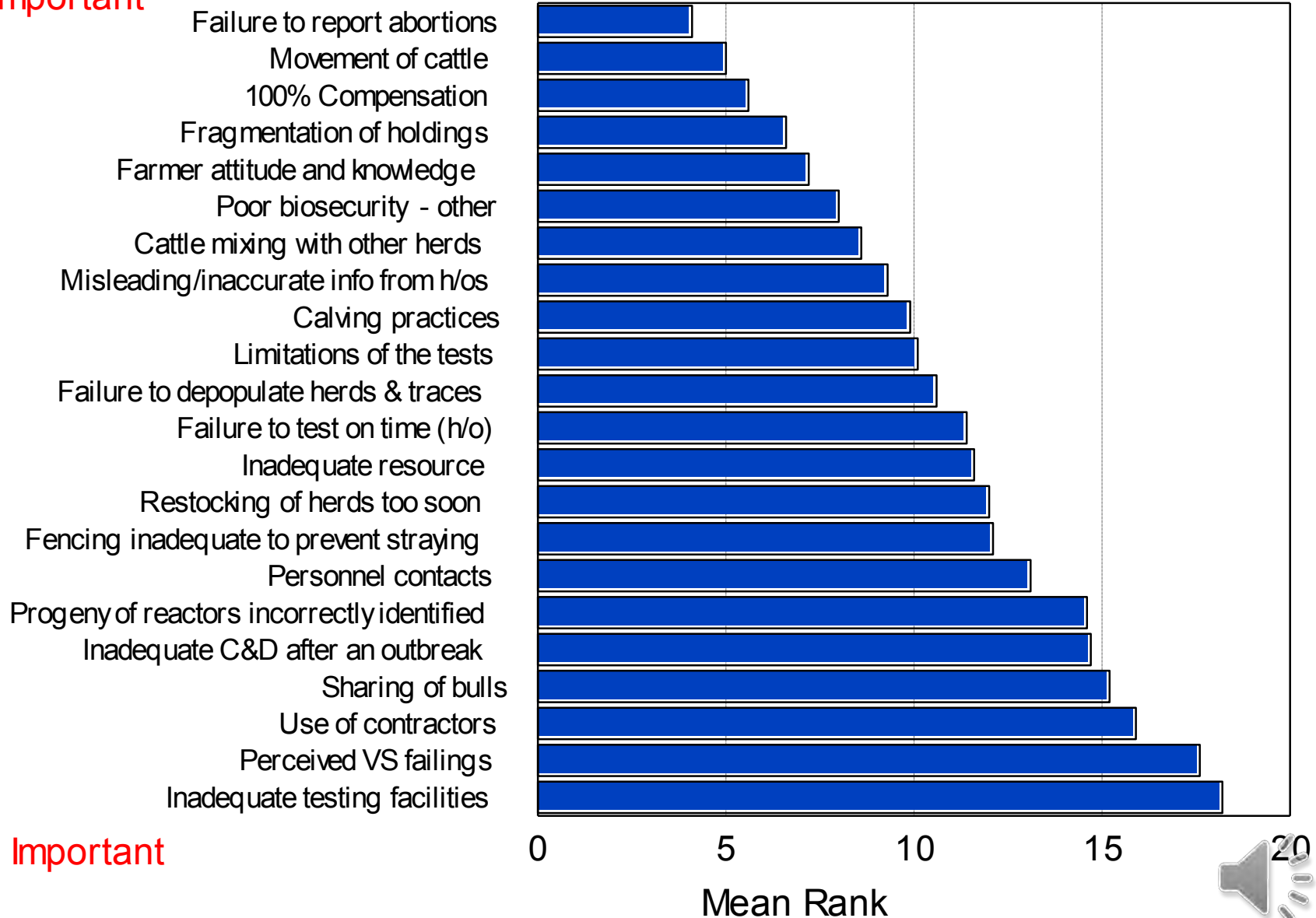
New Brucellosis Programme Initiatives – Oct 2008

- 72 Initiatives based on the 10 categories below



Rank Order of Impediments to Brucellosis Eradication

Most Important



Least Important



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- Effective co-ordination of HQ and Field is important
- The Programme must be managed strategically and be regularly reviewed
- **Quality control and performance checks are essential to ensure important actions are not missed.**

In a nutshell – what gets checked, gets done!



Computer System

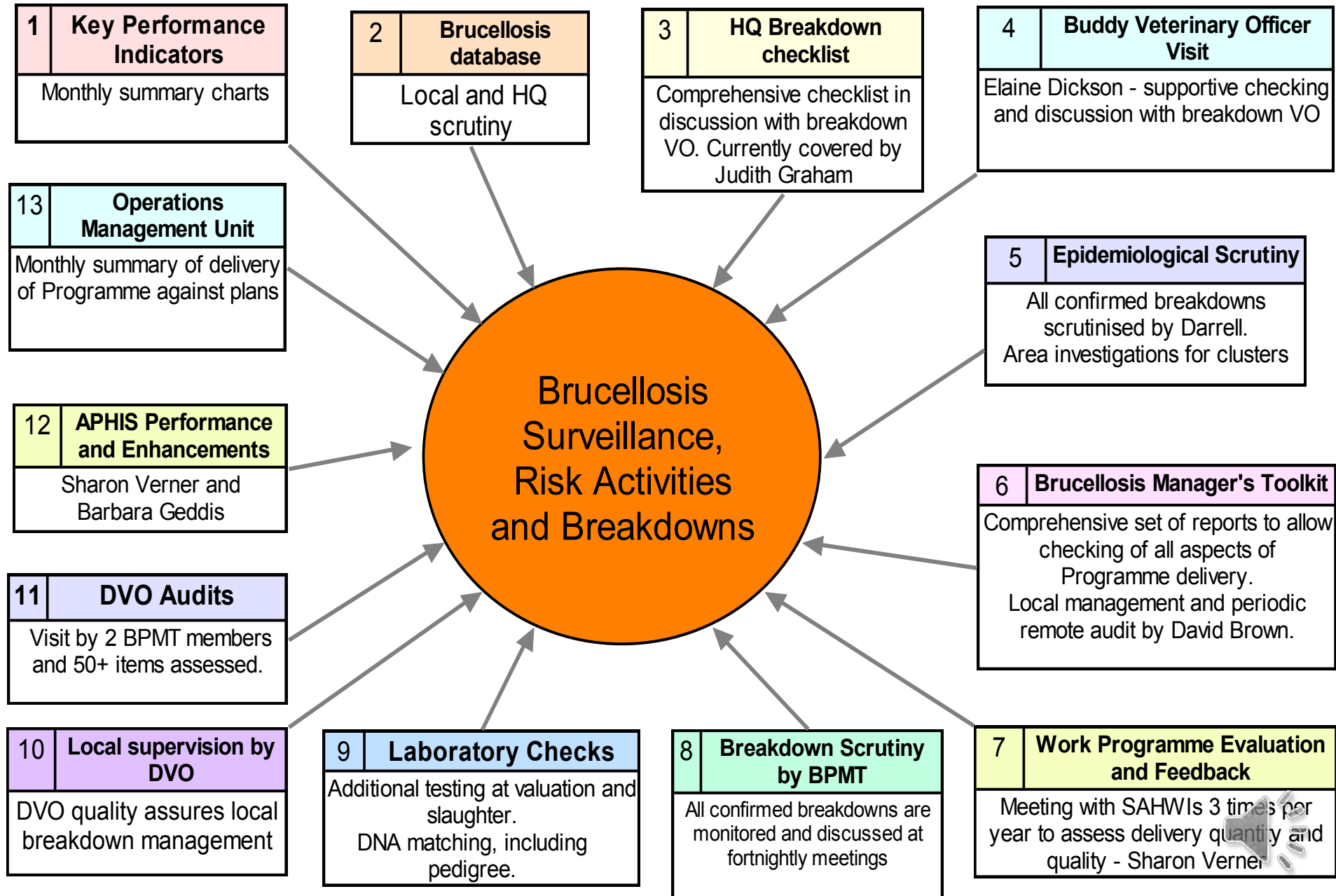
Animal and Public Health Information System (APHIS)
animal identification, movement and test management
database:

- Approx 8,000 users (herdowners, meat plants, Private Veterinary Practitioners (PVPs), auctioneers, dairies, laboratory and VS staff)
- Records all, herds, individual animal identification, all movements
- Records full details of all TB and brucellosis tests, from 1988
- Also holds outfarm information, contiguous herds and PVP details

Invaluable for brucellosis eradication



Quality Control in the Brucellosis Programme



Some additional checks

- Positives are re-sampled at valuation and slaughter. Titres are compared.
- Pregnancy status of all reactors checked at slaughter
- Recently - DNA pedigree checks for all confirmed herds
- Females with no calves in last 2 years are highlighted in risk and routine herds



Brucellosis Manager's toolkit

- Identify key stages in test 'cycle'
- Set targets for each stage
- Measure performance against targets using detailed reports

Management of Brucellosis - range of detailed reports available under the following categories:-

- Are tests allocated correctly?
- Are herdkeepers notified of due risk tests?
- Are tests arranged on time?
- Are restrictions applied for overdue tests correctly?
- Are enforcement procedures in place for o/d tests?
- Are samples processed within target time?
- Are tests being checked in lab on time?
- Are queries at VSD getting sorted out on time?
- Are VOs interpreting/following up tests on time?
- Correct interpretation.?
- Are restrictions applied correctly
- Are admin staff progressing tests?
- Are valuations being completed on time?
- Are valuations processed by admin within target time?
- Are valued reactors/NICs slaughtered within target times?
- Br breakdown follow up tasks:

Operations Division - Br PIs 12 Month Rolling Summary - prepared November 2011

DVOs Result

Measure	All DVOs	01	02	03	04	05	06	07	08	09	10
Testing % of RHTs sampled last month within 30 days of due date	G8	A1i	G+	G8	G+	G+	G+	G+	G8	G8	G3
Testing % of LCI tests sampled last month within 30 days of due date	A1i	A1i	G9	G2	G8	G7	G9	G+	A1i	G3	R1
Testing % of non-LCI risk herd tests sampled last month within 30 days of the due date	A1i	R3	G2	A2	G3	G3	G5	G+	G5	G9	R1
Testing % of routine herd tests sampled last month within 60 days of due date	G4	G3	G2	G4	G4	G4	G3	G9	G9	G+	G2
Testing % of individual animal level tests sampled last month within 30 days of due date	G9	G1	G3	G8	G9	G3	G3	G+	G+	G+	G4
Testing % of CTC tests sampled last month within 30 days of due date	R1	A1h	G4	R1	A1i	G+	G1	G6	R1	G1	R3
Test Cycle Progress % of tests with test date last month confirmed within 3 working days of test date	G+	G+	G+	G+	G+	G+	G+	G+	G+	G+	G+
Test Cycle Progress % of tests with test date last month checked in at Lab within 5 working days of tests date	G+	G+	G+	G+	G+	G+	G+	G+	G+	G+	G+
Test Cycle Progress average lab turnaround. Sample turnaround time - HIGH RISK TESTS only Results prior to Dec -11 relate to all test types and not exclusively High Risk Tests - new measure from Dec-11	G5	G6	G6	G3	G6	G5	G6	G2	G5	G2	G5
Test Cycle Progress % of Br tests with positive results interpreted within 1 working day of result submission	G1	G4	G+	G9	G+	G+	G+	G+	G1	G+	G+



Issues and Lessons Learned in Northern Ireland

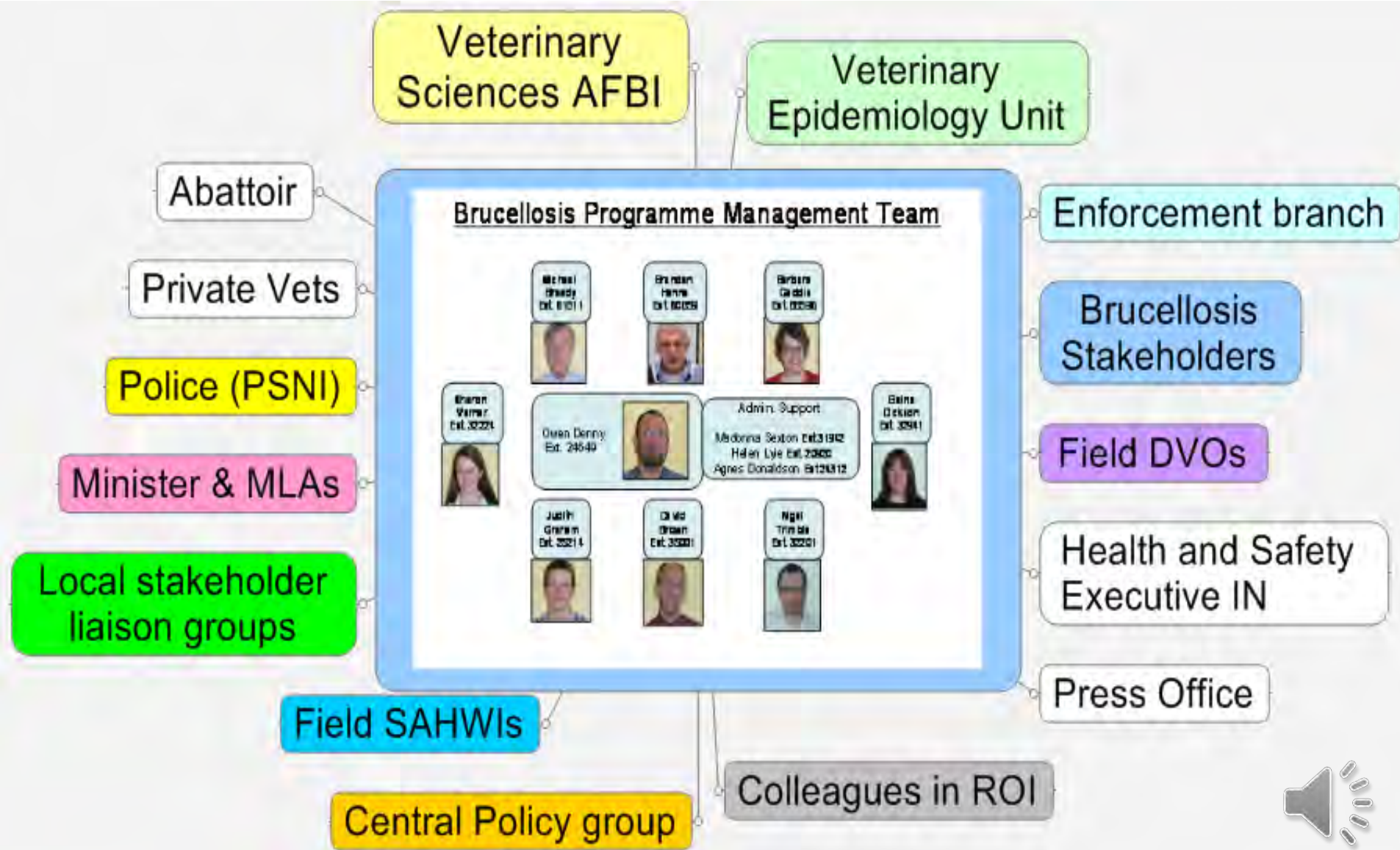
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- Effective co-ordination of HQ and Field is important
- Quality control and performance checks are essential to minimise mistakes.
- **Publicity and communications are important.**

Publicity & Communications

- Press articles
- Stakeholder meetings
- Radio interviews
- Press advertising
- Press releases
- Practical items with brucellosis messages
 - Magnetic calendars, pens, ice scrapers, fridge magnets, coasters, etc.
- Van – “Report all Abortions”



Regular Communications



Working Together to Beat Brucellosis

- Farmers
- The Minister
- Private Vets
- Veterinary Sciences Division AFBI.
- Field Offices
- VPHU



Veterinary and political commitment



Keady Market

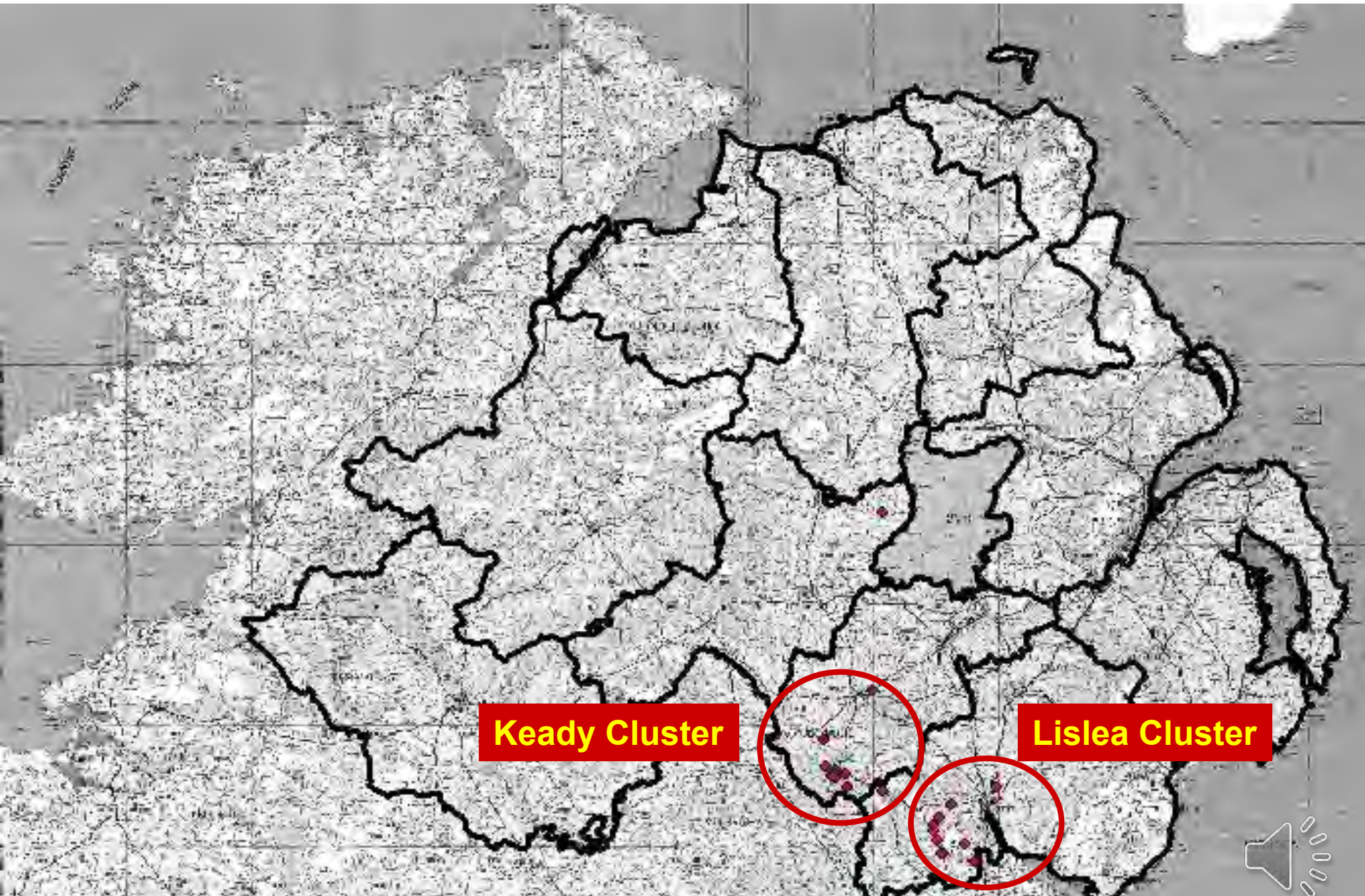


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- No diagnostic tool correctly identifies all infected or non-infected animals;
- Effective co-ordination of HQ and Field is important
- Quality control and performance checks are essential to minimise mistakes.
- The Programme should constantly adapt and improve.
- Publicity and communications are important.
- **Sometimes extreme measures may be necessary**

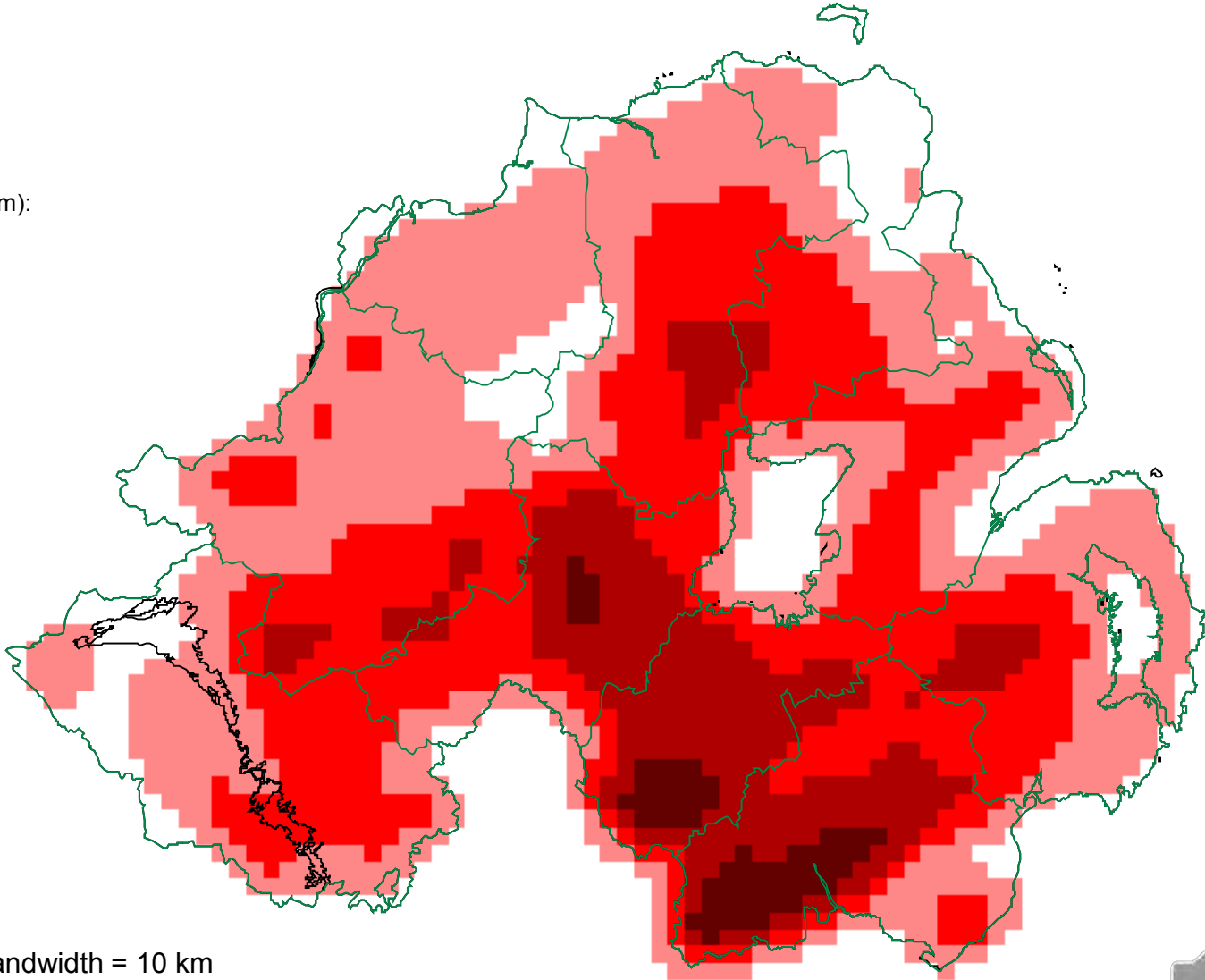


Disease Clusters in 2010



Northern Ireland: Herd Density

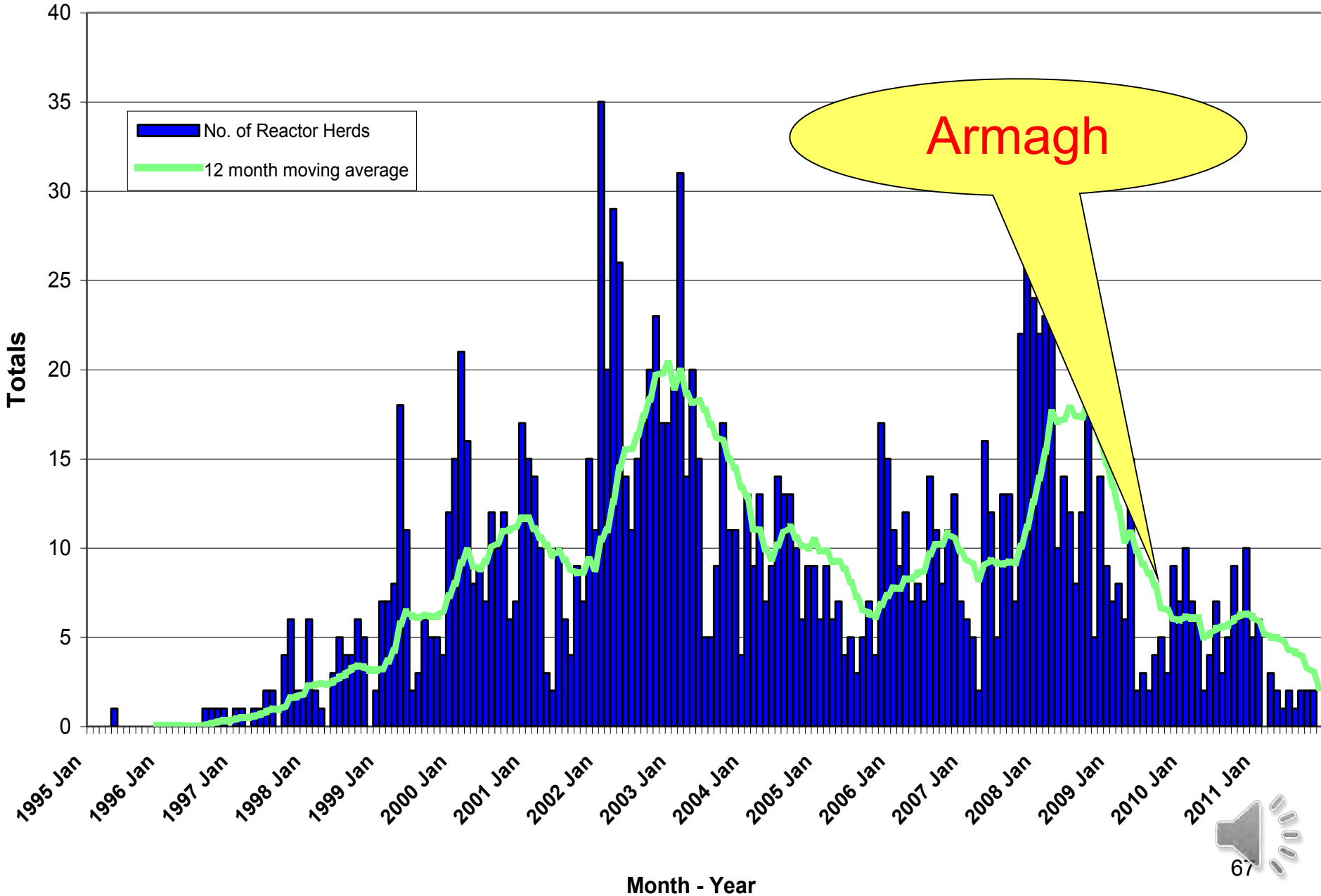
Density (Herds per square km):



Kernel Smoothing: Bandwidth = 10 km



New BR Reactor Herds: January 1995 to November 2011



Additional Area Measures

- Increased frequency of lateral risk testing from 3-4 months to 2.
- Increase in the number of risk tests required before derestriction of inner and outer ring herds (inner ring – 3 tests; outer ring – 2 tests)
- Inner and outer ring herds (approx 70 herds) all movements by licence.
- Forward Tracing of cattle from Inner Ring Herds
- Targeted Abattoir Sampling – flag to meat inspector (40 herds)
- Bulk milk testing every 2 weeks
- Testing dropped to 6 months in risk herds, and zero risk policy with tests.



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- **Last lesson – who caused the brucellosis problem?**

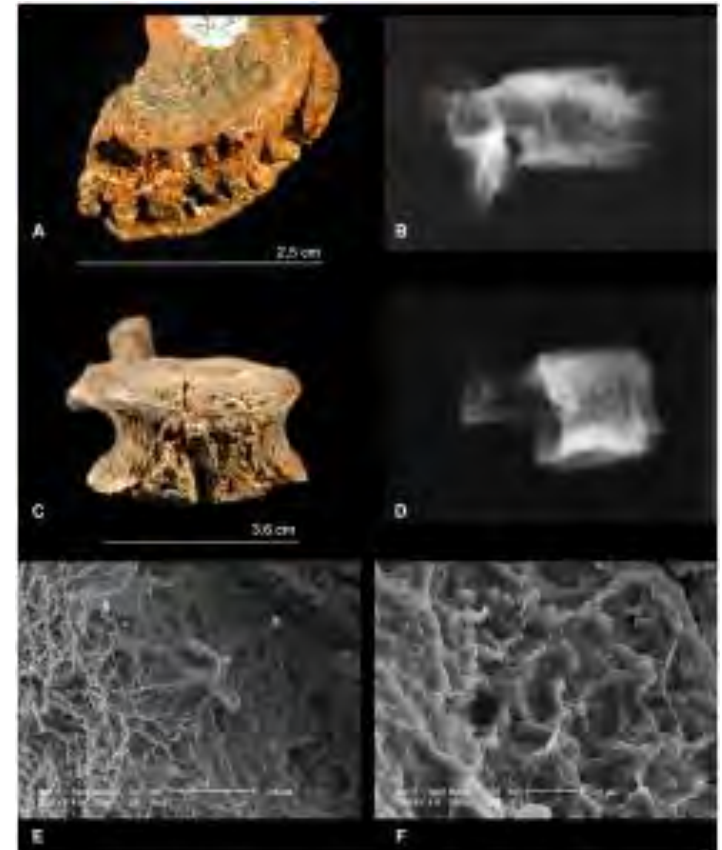


You guys!

Possible brucellosis in a 2.4 to 2.8 million year old hominid
(*Australopithecus africanus*,) from Sterkfontein, South Africa



The macroscopic, microscopic and radiological appearance of the lytic lesions of the lumbar vertebrae is consistent with brucellosis.



D'Anastasio R, Zipfel B, Moggi-Cecchi J, Stanyon R, et al. (2009) Possible Brucellosis in an Early Hominin Skeleton from Sterkfontein, South Africa. PLoS ONE 4(7): e6439.
doi:10.1371/journal.pone.0006439

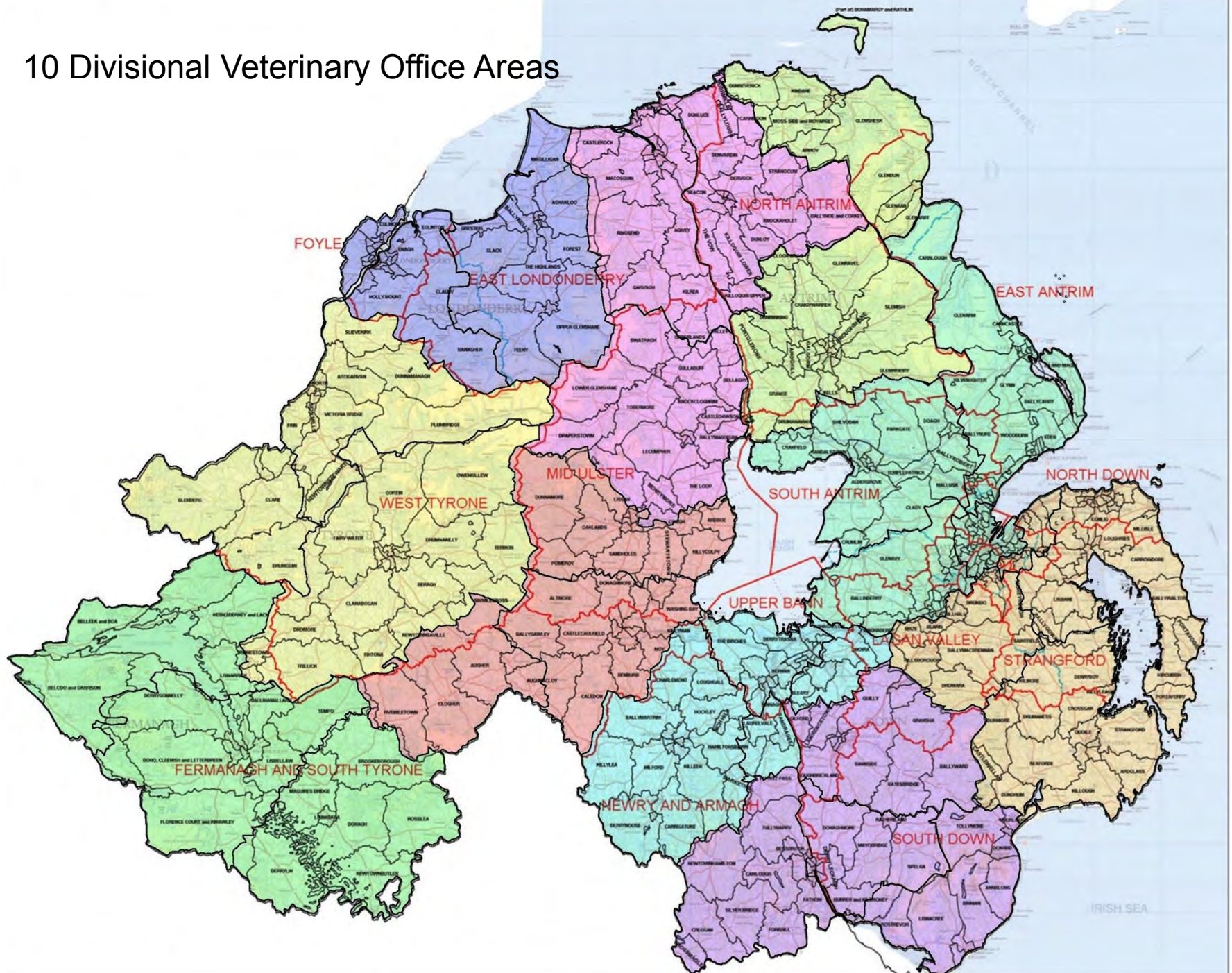




End



10 Divisional Veterinary Office Areas



Animal traceability - live

- **Births** registered from herdkeeper notification (MC1 form, phone, electronic)
 - Colour, breed, sex, DOB, Dam identity, (sire identity)
- All **moves** recorded from herdkeeper notifications and from Market/Abattoir input
 - Holding numbers & dates of movement
- **Deaths** recorded from herdkeeper notifications and Abattoir/Rendering plant input
 - Date of death & means of disposal

Bovine Herds - information

- Herd keeper details – name, address, map reference
- List of animals
- Testing review and preview
- Movements to & from herd
- Tags issued and not yet used
- Movement notification documents issued and not yet used
- Associated herds (epidemiological links)
- Out farms
- Contiguous herds