

The Deer Initiative

Deer, Habitats and Impacts Conference March 2007

Bovine Tuberculosis (Btb) in wild deer – an overview

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Background information on tuberculosis

- Caused by a Mycobacterium
- Not one 'disease' - several important types
 - *M. bovis* – bovine TB (bTB)
 - *M. tuberculosis* (human TB)
 - *M. avium* (bird TB)
 - *M. avium ssp paratuberculosis* (Johnes disease)
- Slow moving disease, infected animals can become infectious and survive for considerable periods of time (and breed)
- Affects mainly the respiratory system and gut
- Infection is normally via the mouth – breathed in or eaten
 - Oral infectious dose is very high – possibly 1000s of times respiratory dose

Why are we interested in bovine TB ?

- bTB is zoonotic (can infect humans)
 - 30 cases per year c.f. 6500 cases of *M. tuberculosis*
 - *M. bovis* – main driver for pasteurisation of milk
- It infects cattle – would we be interested if it didn't?
- Legal obligations to control it under UK and EU law
- Government strategic framework on bTB
 - Prevent spread, keep clean areas clean

Why are we interested in deer and bTB?

- Anecdote
- Two recent studies have indicated that deer have the potential to act as a source for cattle under specific circumstances
- There are obvious gaps in the evidence base
 - Population abundance
 - Population distribution
 - *M. bovis* prevalence in deer
 - The role of deer behaviour in the epidemiology
 - The role of management in the epidemiology

Background information on bTB in deer

- bTB has been diagnosed in five of the six species of wild deer present in GB - not Chinese Water deer (*Hydropotes inermis*)
- Notifiable in the UK
- SUSPICION of disease must be notified to your DVM
- Control is not harmonised across the EU

Clinical picture of TB in deer i.e. external

- Sub-acute or chronic disease
- Clinical signs within 6 months of infection or may take several years
- Progressive loss of condition and ill-thrift
- May be sudden deterioration or sudden death
- May be lymph node swelling
- i.e. not very helpful Worms etc.

Pathology of TB in deer i.e. the internal picture

- Forms abscesses rather than granulomas c.f. cattle
- Usually thin walled abscesses with fibrotic capsules and little calcification
- White, creamy pus
- Usually lungs, pleura, lymph nodes and diaphragm
- Lymph nodes affected are head, thorax and mesenteric (gut) chain
- May be discharging sinuses from lymph nodes
- Gross lesions = advanced infection
- CAN HAVE INFECTION WITH NO VISIBLE LESIONS
- Can be confused with other disease:
 - Avian TB (*M. avium*)
 - Jöhné's disease (*M. avium ssp paratuberculosis*)
 - Environmental mycobacteria *M. mageritensis* etc.

What does it look like in deer?

Enlarged retro-pharyngeal lymph nodes

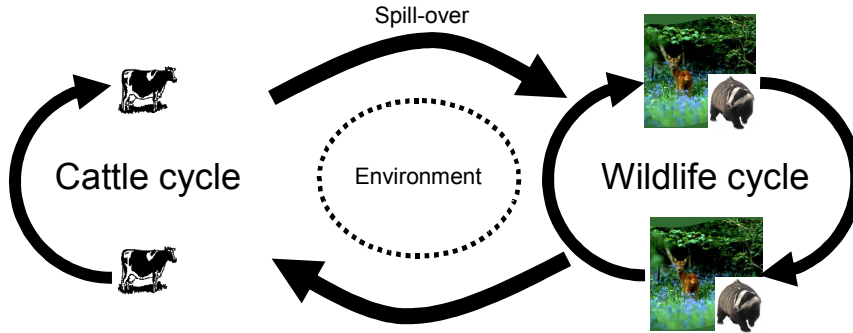
Large lung abscesses – when cut, firm with mild calcification etc

Surveillance for TB in deer

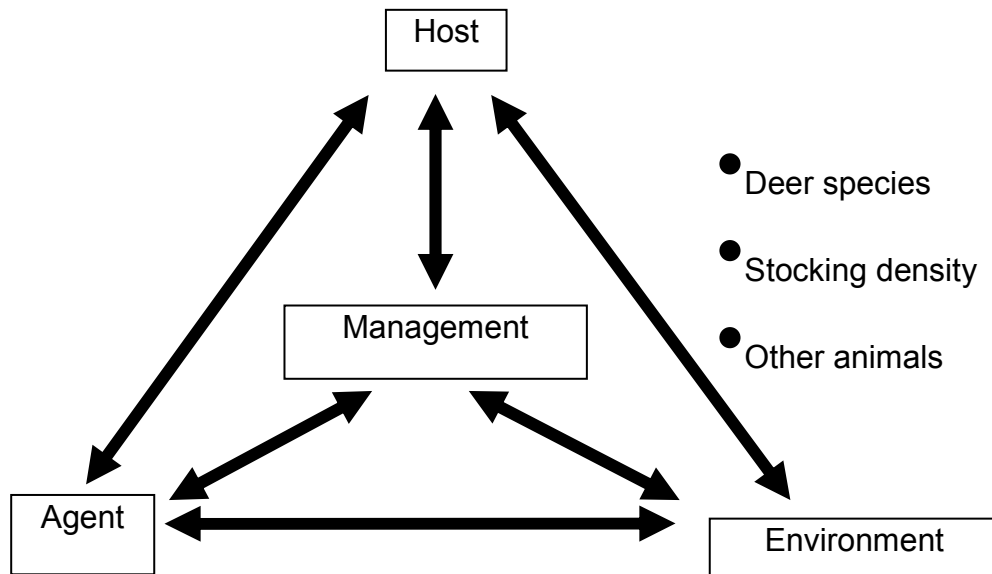
- TB in deer is **notifiable in GB**
- There is **no statutory surveillance** of TB in live farmed, park or wild deer
- The **numbers of farmed deer tested ante mortem** for TB are insignificant.
 - Can be tested by a skin test
 - Largely based on detection of visible lesions at post-mortem inspection of farmed deer carried out by the MHS
 - Inspection of wild carcasses by trained and certified stalkers

- *ad hoc* surveys of wild deer carcasses funded by Defra

Epidemiology of TB in general



What are the risk factors?



Public Health issue of bTB

- The **risk to the general public** in GB arising from live, wild tuberculous deer is **assumed to be negligible** due to:
 - the relatively low prevalence of TB in these species in most parts of the country and
 - the relative rarity of contacts between wild deer and humans.
- The **risk to hunters, game dealers, meat inspectors** and related professions of contracting TB through the regular dressing of carcasses of tuberculous wild deer is low, but needs to be managed by
 - education and regular TB screening,
 - good working practices, wearing of personal protective equipment and good personal hygiene.

Wild boar and deer bTB

- Gralloch
- Act as sentinels

Current Research and the Evidence Base

- Research undertaken recently
 - CSL and Risk Solutions risk assessments
 - SW deer bTB surveys
 - Distribution and abundance surveys

The SW and Cotswold Deer TB Surveys

- 2006 pilot survey
- 2007 survey
 - Objective – to reliably determine if the prevalence of bTB in wild deer is 5% or greater with a 95% certainty

2006 pilot survey

- Objective - to determine if partnership working in disease surveys worked and iron out problems
- Organised at short notice – co-operation and partnership working with DI and Forestry Commission
- Demonstrated that non-scientists could gather good quality samples in the field
- Ironed out practical problems and fitted in with normal practice
- Only on Forestry Commission land in the South-West peninsular
- 126 samples
- 6 suspicious - zero positive - due to other Mycobacteria
- No inferences possible from this sample – too small

Issues

- Sample quality is everything
- How do we know that the samples are good samples?
 - VLA opinion on samples and contamination

- Other Mycobacteria isolated

2006 / 2007 Field Survey

- Started just before Christmas 2006
- Expanded to include private Cotswold estates
- 700 samples at 10 sites (60 + 10) x 10
- 95:5 level of significance
- 150-180 samples so far
- NO confirmed positives so far – early days

Why 95:5?

- It is the level of confidence required for the disease models i.e. fit for purpose
- This requires approximately 60 samples - a manageable sample size
- Stats speak to say “we are 95% sure that we can find the disease if it is present in at least 5% of the population”

What if we don't find any M. bovis?

- If we find other Mycobacteria:
 - Sampling process is OK, disease is at a level of less than 5%
- If we don't find any other Mycobacteria:
 - Need to look for problems

What do the stalkers have to do?

- Samples are taken at the time of carcase inspection / gralloching
- A pre-defined list of LN's are taken and placed in sample pots, together with lesions if visible
- Carcase identified and forms completed
- Put in special postage paid containers and sent to VLA.
- Requires an additional 15-20 minutes

What can go wrong

- Sample quality
 - *** Contamination #1
 - Held for too long before posting / in the post
 - Wrong lymph nodes or tissue
 - Too much muscle / fat
- Paperwork
 - Map references
- Postage
 - Containers dirty or leaking
- Other
 - VLA's roof leaked

Why does it seem to be working?

1. Interested people
2. Fits in with normal working practice
3. Rewarded collection - we pay for quality samples
4. Hunters know what the normal looks like
5. Not over ambitious
6. Answer fit for purpose
7. Health and safety issues no different from normal practice

Important features of the survey

- Partnership working with interested groups
- Role of the DI in organising, co-ordinating and communicating
- One of the few times that non-scientists have been used in this way in disease studies (BTO, RSPB)
- Field training by DI
- Rewarded sample collection
- Compatible health and safety issues

What's to follow

- Field survey to continue until November 2007
- Validation of the STAT-PAK ELISA
- Final results in February 2008
- Communication of results and conclusions
- Incorporation of results into disease models

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Speaker's biography

Andy Paterson currently works as a Veterinary Adviser in the Tuberculosis Control Division of the UK Department for Environment Food and Rural Affairs (Defra). He is an epidemiologist with a background in overseas' development, disease control and international trade. His interests include field epidemiology and risk analysis. He previously worked throughout Africa and Latin America for the PAN Livestock Services / VEERU group at the University of Reading, UK.