Biosecurity, Foot and Mouth Disease ... and the real world

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Topics covered

• Biosecurity...what it is
• FMD
• UK FMD outbreaks and key biosecurity principles
• Living in the “real world”
What is biosecurity?

“What procedures or measures designed to protect the population against harmful biological or biochemical substances”

(Oxford dictionaries www.oxforddictionaries.com)

• Security from transmission of infectious diseases, parasites and pests (...genetic material?)
• A raft of measures to help achieve the above
• The collective action as the above measures are implemented
• A way of thinking and good practice

... or Common Sense?!
“Common sense is not so common”

Voltaire

“Common sense is the collection of prejudices acquired by the age of eighteen”

Albert Einstein
“Alternative” views on biosecurity...

- Complicated and expensive
- Impacts on the smooth running of business
- Not practical
- “Over the top” / not needed
- Common sense – practised all the time as standard
- Only applies in an outbreak of notifiable disease
What does biosecurity do?

• Depends upon one’s viewpoint!

• *Farms, abattoirs, markets, food processors, food suppliers, exporters, importers...*

• Farmer vs. Government

• Prevents/Lowers* the risk of introduction and onward transmission of infectious diseases
  - Reduces the impact of disease
  - Improves efficiency, welfare
  - Reassures others...markets...other countries

• Benefits for individual and/or large group
• Important to identify what the “biosecurity measures” are covering
  ✓ bacteria
  ✓ viruses
  ✓ mycoplasmas
  ✓ rickettsiae and other intra-cellular organisms
  ✓ fungi and yeasts
  ✓ parasites – protozoa; helminths; insects
  ✓ transmissible spongiform encephalopathies
  ✓ (Non disease “things” e.g. genetics/breeding lines)

• Many of the above may have a symbiotic relationship with their host and do not cause disease...do you even need to worry about controlling it?...where to get advice?
Keep it simple...

• What are you trying to achieve?

Which Disease and why?

How will this be achieved? ...
Biosecurity “measures”

For each disease it is important to:

• Know if you want to **minimise** its effects or **eradicate** it

• Understand its **epidemiology**
  - Incubation period?
  - Can it be spotted via clinical exam?
  - Transmission method...live animal, faeces, animal products, fomites (people, equipment), vectors (eg flies), wind-spread, reservoir hosts e.g. wild birds...etc

• Identify control points (**always** identify multiple ones)
  - Identify the **main** points

• Do effective **surveillance** for it
• Know the herd health status of all livestock on farm (consider the farm cat, dog, staff)
• Know the health status of livestock to be brought on – ideally pre-movement check/tests (be aware of validity of any checks done)
• “Closed herd” ideal … often different definitions
• No sharing of vehicles, equipment (protective clothing), staff, mixed business on site, minimise visitors…
• Double fencing…be aware of neighbouring livestock
• Vectors/aerosol spread of disease…
• BUT we all live in the real world
• Be vigilant, know who to contact for advice and when …the most important aspect re FMD?
At which “level” are the measures to be applied?

- **Several levels:**
  - Animal level on a premises
  - Building level within a premises
  - Whole Farm or other premises level e.g. zoo
  - Entire Farm groups or within a company e.g. “pyramid”
  - Regions within countries
  - Individual country
  - Groups of countries e.g. EU

- **Mandatory or voluntary?**
Options for “control”...

- The options available are:
  - Treatment
  - Vaccination
  - Slaughter or kill the animals
  - Live with (ignore?) the disease
  - Keeping disease OUT... don’t purchase the animals!
  - Keeping disease IN... don’t sell/move the animals!

- Or a combination of them

- Dependant upon the driver behind the need to control...individual vs. Government

- “Risk appetite” ... may change (e.g. outbreak)

- Back to FMD... eradicate, slaughter +/- vaccination
Foot and Mouth Disease refresher

• A virus! (picornavirus – 7 distinct serotypes O, A, C, SAT1-3, Asia 1 …note no cross-protection)
• Cloven hoofed animals (over 70 other spp. recognised, but some are subclinically affected)
• Acute phase ~ all body secretions/excretions are infectious

Vesicles:
Mouth, muzzle, dental pad
Coronary band of feet
Teats
Foot and Mouth Disease refresher

• Inactivated <pH6 or >pH9, starts to deactivate above 50° C
• Resistant to some disinfectants particularly if organic matter present (hence “C and D”)
• Incubation period 2-14 days (usually 2-5) (Note OIE and EU definitions)
• Extremely contagious!

• How much can we expect from farm level biosecurity with regards to slowing/preventing spread of FMD?
The Real World!

• UK experiences re FMD...2001 & 2007
• Movement rules
  ➢ Within country
  ➢ Between countries
• Animal identification
• Surveillance
• Biosecurity messages...Government, industry, private vets (vet schools)
• Requirements **will change** in an outbreak of FMD
  ➢ FMD associated EU Directives/Regulations
  ➢ OIE third country
  ➢ Non-statutory (e.g. “biosecurity zone”)
Foot and Mouth Disease 2001

- Extremely contagious - spread rapidly by vehicles and animals
- Complacency to biosecurity? ~ no major outbreak since 1967 (1980s)
- Expense of disinfection
Foot and Mouth Disease 2001

• Effect on the countryside – tourism
• Misunderstanding of risk?

• Biosecurity “blue box” concept
FMD 2007

FMD: Location of the Protection, Surveillance Zones in the UK and the Restricted Zone around mainland Britain.
Day 16, 19 August 2007

Legend
- Restriction Zone around GB
- Protection Zones
- Surveillance Zone
- Countries
- Indicates separation of epidemiological units

CREATOR: RADAR Team, Defra
DATE CREATED: 19 Aug 2007

SOURCES: Ordnance Survey and NDI reports
FMD confirmed August 3rd 07

- Beef finishing, 64 cattle (3 locations)
- 4.5 km from Pirbright laboratory complex
- Aug 6th Virus typed as O1BFS

(Only present in FMD ref laboratories)
FMD 07 ~ a “small” outbreak

• Only 8 infected premises ...
  ➢ 1581 animals slaughtered (mainly cattle and pigs)
• 1200 visits
• 60,036 surveillance samples tested –
  800 goats, 21,000 sheep, 26,500 cattle

• 125 to 400 staff ~ 50 vets, 50-150 Animal Health officers
• Nationwide monitoring through
  ➢ report cases (>220),
  ➢ >6million animals at abattoirs,
  ➢ 766 welfare visits, 1600 licensing inspections
• Plus – 307 premises in 20 to 150KM zones around outbreak
August 2007 cluster

3 Aug: PZ and SZ established
2 IPs (IP1-IP2)
Last case 6 August
24 Aug: PZs lifted
8 Sep: SZ lifted

September 2007 cluster

12 Sept: PZ and SZ established
6 IPs (IP3 – IP8)
Last case 30 September
17 Oct: PZs lifted
5 Nov: SZ lifted
First infected premises cattle looked similar to this...

Detection reliant on high professional skills of farmer and his correct knowledge of who to contact and when
Total number of PZ/SZ blood samples

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Premises</th>
<th>Blood samples collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>August</td>
<td>454</td>
<td>5,767</td>
</tr>
<tr>
<td>September</td>
<td>751</td>
<td>42,462</td>
</tr>
<tr>
<td>Total</td>
<td>1,205</td>
<td>48,229</td>
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</tbody>
</table>
FMD freedom - Additional sampling within 150 km of Pirbright

- 95% confidence of detecting 1% prevalence of sheep flocks and beef cattle herds
  - = 307 herds
  - 20 - 30 km = 51
  - 30 – 40 km = 51
  - 40 – 90 km = 51
  - 90 – 150 km = 154

<table>
<thead>
<tr>
<th>Number of blood samples taken per species</th>
<th>Grand total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>4,467</td>
</tr>
<tr>
<td>Sheep</td>
<td>7,160</td>
</tr>
<tr>
<td>Goats</td>
<td>180</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11,807</strong></td>
</tr>
</tbody>
</table>
Foot power...

Surveillance/Foot Patrol progress 07-11-2007

<table>
<thead>
<tr>
<th>Stock Checks and Foot Patrols Completed</th>
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<tbody>
<tr>
<td>1km² Tiled Foot Patrolled</td>
</tr>
<tr>
<td>Premises Stock Checks - to Verify No Stock</td>
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Legend:
- Foot Patrols
- Surveillance Mapping Coverage
- Non RLR Land
- Non-Agricultural - Accounted for
- Urban
- Woodland
- Lakes
- Reservoirs

FMD September 2007 - Stock Checks and Foot Patrols
Staffing at the LDCC - August to November 2007

LDCC Resources - August and September Outbreaks

First “cluster”  Second “cluster”

Final SZ surveillance

Dates
Fomite Spread?
High risk vehicle movements from Pirbright
September cluster - Additional Assurance Areas

Additional Assurance Area 1

Additional Assurance Area 4

Additional Assurance Area 3

Additional Assurance Area 2
Control measures can become tricky to understand...
Biosecurity in FMD outbreak

• Very important concept
  ➢ Limit/stop further spread via further movements
  ➢ Be able to control the disease (without being crippled by biosecurity requirements)

• Operations between “peace time” and “war time” ideally remain the same
  ➢ Try to have optimally biosecure operations all the time

• Have a plan for “ramping up” biosecurity
  ➢ Be ready for disruption
  ➢ Constant cycle of training/exercises – local and national
  ➢ Clear staff instructions
Ensure Biosecurity Messages are Clear

- Defra website ...
  zone and licensing information
- Helpline
- Info leaflets
  (Government and Farm Industry roles)

- “Biosecurity boxes/zones”
Biosecurity of Staff

- Biosecurity team in LDCC
- Case officer – AHVLA staff on gate of every infected premises
- Clean vs dirty staff
- Licensing – everyone is accounted for
- All disposal lorries officially escorted, leak tested, police aware of route
- Paperwork from suspect and confirmed premises handled in a safe way
- All samples packaged on farm
- Use of “non-permanent resource”...rapid training
Toilets, mess facilities and office space provided by two mobile site units (nearly 50 people working out of the site)
‘Detox’ units (19) ~ 4WD vehicle plus pressure washer, disinfectant cube and water bowser
15 mobile handling units deployed
Real World...

Biosecurity on Cattle Farms: A Study in North-West England
Brennan ML, Christley RM (2012)
PLoS ONE 7(1): e28139. doi:10.1371/journal.pone.0028139

- Conducted 2005, 56 cattle farmers (100km² area)
- Questioned about on-farm biosecurity practices
- Majority didn’t isolate livestock brought on
- Many did treatments post-move (vacc’ns, wormers)
- 24/56 shared equipment...only 50% performed C&D
- Biggest variation seen in visitor biosecurity

  Cleaning of clothing by Personnel that went into animal areas
  - 96% of private vets
  - 4% deadstock collectors (90% didn’t)

- Only 7% farm workers carried out personal biosecurity between different management groups
An exploration of the drivers to bio-security collective action among a sample of UK cattle and sheep farmers


- Conducted 2006, 121 cattle & sheep farmers (Wales & SW England)
- Questioned about attitudes to biosecurity measures and regulation
- Most useful biosecurity measure?... “none”
- Least useful biosecurity measure? ... “2001 FMD measures”
- Private vet seen as primary source of information, then other farmers
- 57% thought biosecurity rules should be compulsory
- 22% thought most of the rules should be compulsory
- (Only 14% thought “Government” should regulate)

J. Ellis-Iversen, R. P. Smith, J. C. Gibbens, C. E. Sharpe, M. Dominguez, A. J. C. Cook
Veterinary Record (2011) 128 doi: 10.1136/vr.c6364

- Case control study (7/8 IPs, 22 control farms ie similar to IPs, within the PZ but tested negative)
- Infection of secondary farms ... windborne and fomites
- Higher proportion of young stock on primary case farms
  – Curiosity and erupting permanent teeth cited
- Secondary case farms significantly more calvings outdoors than control farms
- Visitor car parks away from livestock areas were more common on control farms

- Suggestions...
  – Move youngstock away from perimeter fields
  – Avoid calvings outdoors
Biosecurity measures

Some of the most effective measures are cheap and apply common sense

Liebig’s Law of Minimum
Don’t fool yourself

• Use your common sense and be objective
• Start with the basics – not at the top
• Evaluate your situation – every farm is different and the risks are different
• There is no “one size fits all” solution – you have to have a strategy and know what you want to achieve
• “No pain, no gain” – you will have to implement it (so keep it realistic)
and finally “practise what you preach”!
Do you think the term “biosecurity” has had its day?

Thank you for listening