Challenges of controlling emerging diseases case study

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Abalone Viral Ganglioneuritis in Tasmania

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Setting the scene

Why AVG?

- Infectious disease of abalone caused by abalone herpesvirus
- At time of first detection limited or no knowledge
- Affects both wild and farmed abalone
- Affects multiple regions
- Disease control efforts at both a facility and regional level
Setting the scene

*Australian abalone*
Setting the scene

What is AVG?

• Disease of balone caused by a previously undescribed herpesvirus (Hooper et al, 2007)

• First reported in Australia during 2005

• One of only two members within the family Malacoherpesviridae (Savin et al, 2010)

• Characterised by cellular inflammation within nervous tissue (Hooper et al, 2007)

• High morbidity and mortality (>50%), paralysis, +/- protrusion of radula and excess mucus production.
Setting the scene
Tasmanian industry

- Wild fishery
- Aquaculture
- Day-boats
- Mother-boats
- Live-holding facilities
- Live export
- IQF processing

Image of Earth and Tasmania.
Setting the scene
Tasmanian industry

- Harvested from entire coastline and surrounding islands
- Multiple live-holding facilities (closed and semi-closed)
- Farms located on coast (semi-closed)
- Highly regulated
- Strong State border biosecurity
Dealing with disease 2008

- Closed live-holding facility containing wild abalone
- +VE PCR but inconsistent with histopathology
- Clinical signs and mortality not consistent with reports in Vic.
- No identified pathways from Victoria
- Tracing identified several priorities for surveillance in Tasmania
Dealing with disease 2008

Challenges - diagnosis

• Why did clinical expression differ between groups and Victoria?
• Why was PCR and histopathology not consistent between groups?
• Which test/s do we use for diagnostic purposes?
• Diagnostic case definition required
Dealing with disease 2008

Challenges - biosecurity

• Method to decontaminate infected premise?
• How do we check our process was successful?
• What biosecurity advice do we give to industry?
Dealing with disease 2008

Challenges - surveillance

• Where did infection originate?

• Which test do we use for surveillance purposes?

• Design of surveillance program
  • Prevalence, test spec./sens., test population.

• Case definition – surveillance purposes

• Industry attitude
Dealing with disease 2008

**Surveillance results**

- One positive PCR result (ORF 49, CT 35.8) from 1860 wild animals tested
- Positive result direct trace from IP
- Samples retained
- No reports of clinical disease
Dealing with disease 2008

Surveillance results

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Dealing with disease
2009

• Infection of second live-holding facility
• Tanks not previously stocked
• Flushing and drying of tanks reduced problem, but re-emerged following restocking.
• Characteristic histopathology but negative PCR (ORF49)
• Need for reporting
Dealing with disease 2009

Challenges - diagnosis

• Is test fit-for-purpose?
• Do we need to revise diagnostic procedures?
• Do we need to change our case definition?
• Why has this occurred?
• What is the viability of the virus outside the host?
Dealing with disease 2010/11

- Detection in multiple processors associated with a single consignment
- Spread of disease to a neighboring farm
- Surveillance picked up infection in other processors but no clinical problems
- Difference in clinical presentation between species
- Identification of multiple strain types
- Need to confirm reservoir of infection
% Mortality (kg), (uncorrected)

Stock on hand (kg)
So where we go from here?

Environment

- Water
- Animal

Fishing activities

- Movement between regions
- Transport stress

WCLH

- Mixing of abalone
- Shedding of virus

Farms

- Naïve populations
- High density

Reservoir of infection

- Multiple virus strains
- Variable regional susceptibility
- Variation in species susceptibility

High density
So where we go from here?

Further investigation required

- Development of additional tests
- Validation of tests
- Improved knowledge of epidemiology
  - Prevalence
  - Incubation period
  - Viability
  - Virus susceptibility
  - Strain types
  - Pathogen susceptibility
Figure 2: Phylogenetic analysis of nucleotide sequences obtained by AbHV AB1213 PCR
Further Investigation

Abalone Health Accreditation Program
• Recognition of compartment status
• Water still and issue
• Use of sentinels as a monitoring tool still an issue
• Comparative susceptibility
• Development of specific ‘sentinel lines’
References

• Hardy-Smith (2006) Report on the events surrounding the disease outbreak affecting farmed and wild abalone in Victoria, Report commissioned by the Department of Primary Industries Victoria.


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