
Modelling the Spread of Vector-Borne Animal Disease

Mark Stevenson^a, Richard Bradhurst^a, Shumoos Al-Riyami^a

^a Faculty of Veterinary and Agricultural Sciences

^b Centre of Excellence for Biosecurity and Risk Analysis

The University of Melbourne, Parkville Victoria 3010 Australia

[mark.stevenson1 @unimelb.edu.au](mailto:mark.stevenson1@unimelb.edu.au)

Roadmap

- Introductions
- CEBRA project 1608B
- Bluetongue
- Workshop aims and objectives





VICTORIA

Melbourne

Flinders Street Station, Melbourne, Australia.



Footy.



Trams.



Canola.

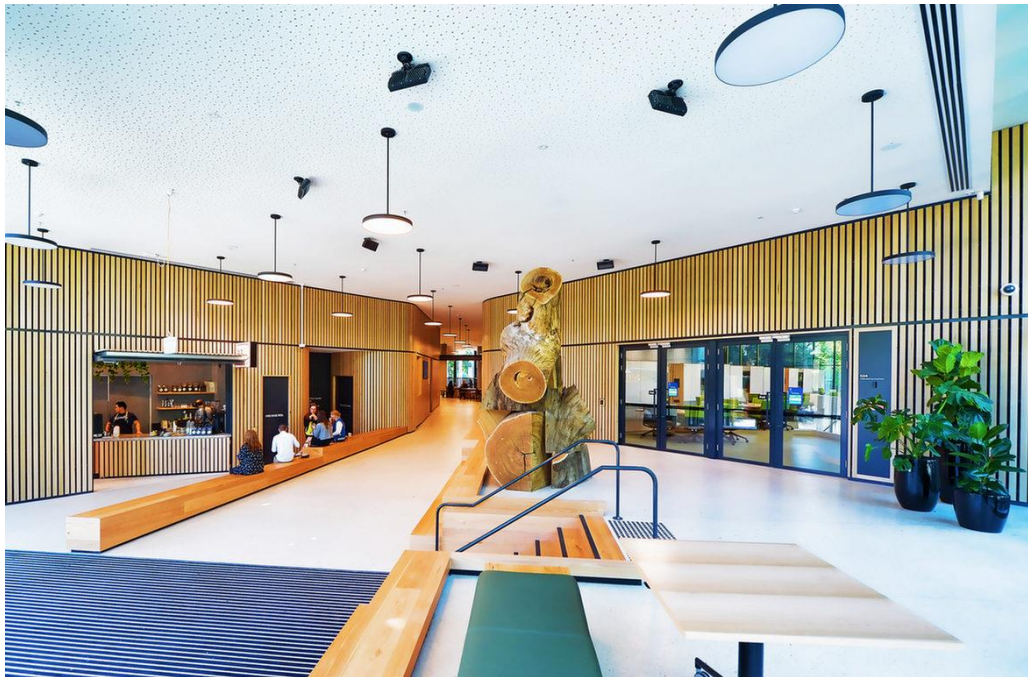


The University of Melbourne.

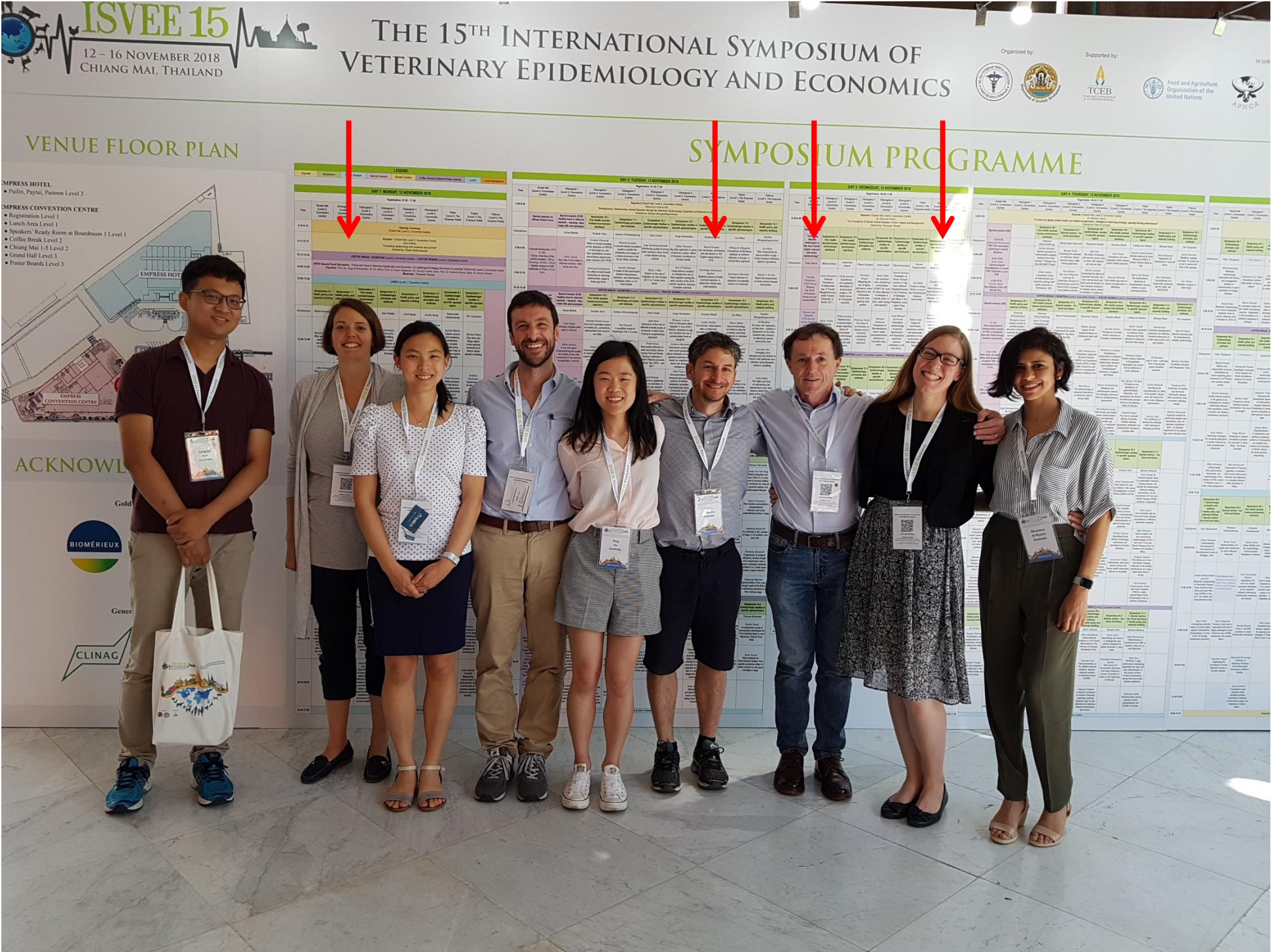


The University of Melbourne

- Australia's second oldest university, founded 1853
- ~45,400 full time students [cf ~33,400 at CSU]
- Melbourne Veterinary School
 - one of the seven Australian vet schools
 - two campuses – Parkville and Werribee
 - 4 year DVM program ~120 students per year

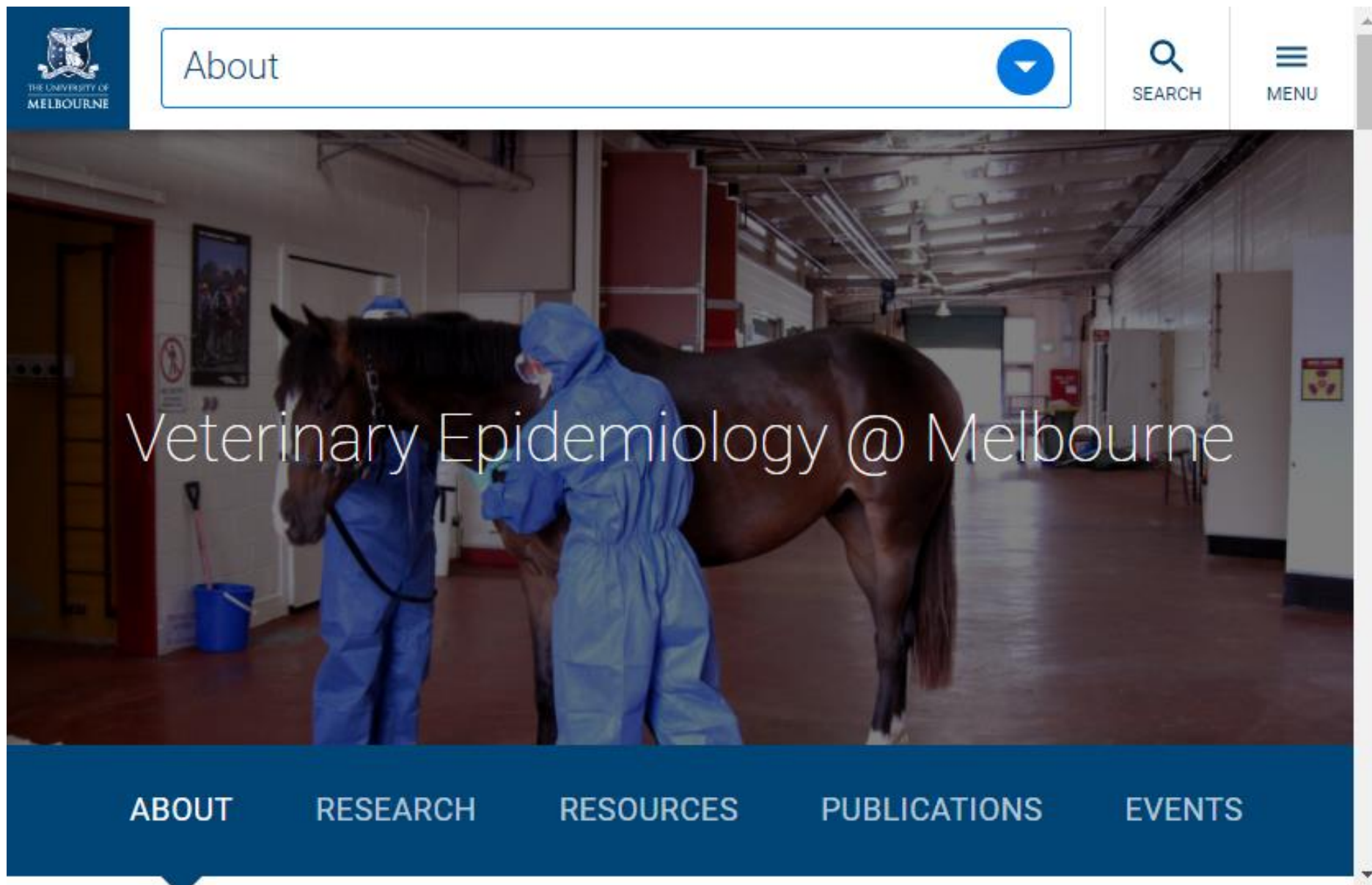


Veterinary Epidemiology @ Melbourne at ISVEE 15, Chiang Mai November 2018.



Veterinary Epidemiology @ Melbourne at ISVEE 15, Chiang Mai November 2018






Veterinary Epidemiology @ Melbourne


- Collaborators
 - state and federal Departments of Agriculture
 - The Australian Animal Health Laboratory (AAHL)
 - The Australian Rickettsial Reference Laboratory (ARRL)
 - University of Queensland, University of Adelaide, Charles Sturt University, University of Sydney, Massey University
 - National Institute of Animal Health (Japan)
 - Department of Animal Health (Vietnam)
 - FAO (Indonesia, Vietnam), OIE

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CEBRA



SEARCH



MENU

CEBRA

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CEBRA project 1608B

- Aim: Enhance the Australian Animal Disease (AADIS) model to allow it to simulate the spread (and control) of vector-borne diseases of livestock such as bluetongue
- The project combines a one-year CEBRA project with a three-year PhD research program

CEBRA project 1608B

- The one-year CEBRA project involved development of facilities to estimate insect vector abundance within and external to AADIS
 - simulation of vector abundance within AADIS allows deployment of models to assist rapid decision making at the national level
 - externally generated estimates of insect vector abundance allows subject matter experts to develop (and then deploy) vector distribution models better suited to support decision making at finer spatial scales

CEBRA project 1608B

- Tasks for the 3-year PhD program
 - (a) verify and validate the AADIS vector module as a means for estimating insect vector abundance;
 - (b) verify and validate the Kelso and Milne (2014) *C. brevitarsis* vector distribution model
 - (c) develop appropriate program logic to allow bluetongue virus (BTV) to spread within a vector population and to allow transfer of infection from the vector population to a livestock population at risk and *vice versa*

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Bluetongue in sheep and goats.



Bluetongue in cattle.



Bluetongue

- Why is bluetongue important for Australia and the USA?
 - imposition of importation of animals and animal product from [BTV-free] trading partners
 - ongoing cost of vaccination if BTV8-like serotypes become established
 - clinical signs similar to FMD

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Bluetongue disease zone lifted but China still shuns dairy heifer exports from northern Victoria

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ABC Rural


By Warwick Long

Posted 17 January 2018 at 10:08 am

The lucrative trade of exporting live dairy heifers to China continues to be on hold for some farmers despite authorities declaring northern Victoria free of bluetongue disease.

Agents say hundreds of cattle have been rejected from export to China, costing the industry hundreds of thousands of dollars.

Bluetongue is an endemic disease to northern Australia but is not found in southern regions.



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Bluetongue

- BTV-8 in northern Europe widely considered to be the best documented example of disease emergence due to global warming

PERSPECTIVES

OPINION

Climate change and the recent emergence of bluetongue in Europe

Bethan V. Purse, Philip S. Mellor, David J. Rogers, Alan R. Samuel, Peter P. C. Mertens and Matthew Baylis

Abstract | Bluetongue, a devastating disease of ruminants, has historically made only brief, sporadic incursions into the fringes of Europe. However, since 1998, six strains of bluetongue virus have spread across 12 countries and 800 km further north in

of up to 100 days⁴. Nevertheless, since its arrival in Europe in 1998, bluetongue (BT), the disease caused by BTV, has caused the deaths of more than one million sheep^{5,6}. In addition to morbidity and mortality, BT disrupts the trade in animals and animal

Islands from Tunisia or Sardinia. In view of this potential for extremely rapid spread⁸ and its serious consequences for the international trade of animals and animal products, BT is classified as a List A disease by the Office International des Epizooties (OIE), the world organization for animal health (see the Online links box for further information).

Vector-borne pathogens are particularly sensitive to climate¹¹, a fact that has led to widespread and continued speculation that anthropogenic climate change will increase the incidence and intensity of their transmission^{12–14}. There is, however, little evidence supporting such speculations^{11,15,16}, while at the same time there is an increasing realization that other non-climatic abiotic and biotic factors can also affect disease dis-

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Workshop aims and objectives

- Provide US colleagues with an update on modifications of AADIS to allow simulation of vector-borne animal disease
- Obtain peer review and comment on our approach for simulating transmission of BTV between animal hosts and insect vectors
- Develop an AADIS model for simulating the spread of insect vectors in the US

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COMMONWEALTH OF AUSTRALIA

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