

Photo: Andrew Breed  
Winner of the AB-CRC Photographic Competition 2007



SEPTEMBER 2008

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## CEO REPORT

*Dr Stephen Prowse, CEO*



### Australian Biosecurity Cooperative Research Centre (AB-CRC) economic evaluation

Last month the AB-CRC released the results of an economic evaluation of selected projects which showed that the AB-CRC has delivered \$228 million in benefits.

As we move into our 6th year of operation, the AB-CRC is very focussed on realising impact from our research projects. Projects in diagnosis, ecology and surveillance are delivering significant outcomes. The Application & Linkage and Education & Training teams in the AB-CRC are working with researchers to translate these outcomes into impacts. We use a variety of processes and tools to achieve this including technology transfer, adoption forums and education and training courses.

In 2007 the AB-CRC commissioned Agtrans Research to undertake an economic evaluation of selected projects. The analysis concludes that AB-CRC investment of \$13 million has realised \$228 million in benefits, with a net present value of \$215 million, a benefit-cost ratio of 17.5:1 and an internal rate of return of 12.8%.

The AB-CRC's contribution to the eradication of equine influenza through the development of a diagnostic test resulted in a major part of the return. The \$13 million investment has

paid for the total AB-CRC costs almost three times over. This does not take into account any benefits from other AB-CRC projects not included in this analysis.

The full report on the economic evaluation is available at [www.abcrc.org.au/pages/AboutUs.aspx?MenuID=36](http://www.abcrc.org.au/pages/AboutUs.aspx?MenuID=36)

### The O'Kane review of the CRC Program

The report on the review of the CRC Program was released several weeks ago. The key elements of this report as they affect the AB-CRC are:

- A recommendation that a modified CRC Program continue, with a strong end user focus;
- CRCs working in the national benefit sector have to have strong links with relevant Government portfolios;
- The objective of the Program should be to tackle major challenges with gaps driven by end users;
- The Program should have greater flexibility re: timing, funding and organisation;
- The review process be more rigorous;
- Strong engagement with international research groups be allowed; and
- Funding be aligned with social benefits.

The full report is available at [www.innovation.gov.au/innovationreview/Documents/CRCReviewReport.pdf](http://www.innovation.gov.au/innovationreview/Documents/CRCReviewReport.pdf)

### AB-CRC funded adoption forums

Over the last few weeks I have attended two AB-CRC funded adoption forums. These meetings involve researchers, stakeholders and end users and are an important part of

the adoption process. I find these meetings of immense value. It is a time to review the research outcomes and, perhaps more importantly, get feedback from stakeholders and end users. The Diagnostics Adoption Forum was informative, reviewing the diagnostic tests developed and examining the ways in which they are currently used. We then examined future directions in diagnosis. At the Peri-urban Pig Surveillance Adoption Forum we reviewed information on small holder biosecurity compliance and explored ways in which this could be improved.

I wish to compliment the researchers and the Application & Linkage team for their outstanding efforts in organising these very important events. We recognise that they are only one part of the adoption process, albeit a very important one. You can read more about these forums in our [REPORTS](#) section.

## NEWS

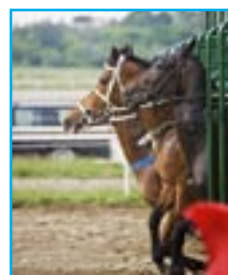
### Hendra Virus (HeV) Update

By Ron Glanville, Chief Veterinary Officer,  
Biosecurity Queensland

Hendra virus (previously known as equine morbillivirus) is a rare, but potentially fatal, zoonotic disease of horses and humans.

Research has demonstrated that bats (flying foxes, fruit bats) are the natural host for Hendra virus and that spill-over to horses occurs as a rare event. The bats appear to be susceptible to infection with Hendra virus, but do not themselves become ill. The route of infection between bats and horses is believed to be from bat bodily fluids, including saliva, urine and birthing fluids contaminating horse feed or water.

Transfer of Hendra virus from human to human, or from human to horse, has not been recorded. There have been 11 clusters of Hendra virus recorded in horses since the virus was first identified in 1994. All but one of these cases has been in Queensland. The case fatality rate in horses is high (greater than 70 percent). A table of Hendra incidents is given at the end of this article.



There have been six confirmed cases of Hendra virus infection in humans since 1994, all in Queensland. All cases have been associated with close contact of people with sick or dead Hendra virus case horses. Three of the six human cases have died, including the most recent death of a veterinarian from the Redlands Veterinary Clinic in Brisbane on 20 August 2008. The case fatality rate for humans remains at 50 percent.

The two most recent Hendra virus clusters in Queensland are unrelated. With test results confirming that all remaining horses at the Redlands Veterinary Clinic are free from Hendra virus and decontamination procedures complete, quarantine at the Redlands Clinic was lifted on 25 August. A total of five horses tested positive to Hendra virus. All of the horses have died or been euthanised; including the seropositive horse 'Tamworth' that was humanely destroyed on 15 August 2008 under an Order to Destroy Notice issued by the Queensland Department of Primary Industries and Fisheries (QDPI&F).

There have been three confirmed cases of Hendra virus at the Proserpine property. Two horses have been euthanised, with a decision pending regarding further actions in relation to a seropositive, recovered horse that remains on the property. The Proserpine property remains under quarantine until testing demonstrates the virus is no longer active. There has been intense media interest in the Hendra virus cases, which has heavily focussed on the human aspects of the disease and the destruction of the seropositive horse.

The current national disease response strategy, *AUSVETPLAN Response Policy Brief for Hendra virus* (30 August 2006), states that the policy for Hendra virus infection is to eradicate Hendra virus in terrestrial animals using destruction and sanitary disposal of all horses or other terrestrial animals, shown, through demonstration of antibodies, to be infected.

Blood from the seropositive horse Tamworth tested positive to a polymerase chain reaction (PCR) test for Hendra virus on at least one occasion. The PCR test detects genetic material from the Hendra virus, indicating recent infection with the virus.

Tamworth also tested positive to serological tests indicating past infection with HeV. The serum neutralisation test (SNT) used is regarded as the gold standard for detection of antibody response to HeV infection.

While the national policy for Hendra virus is, and has always been, that blood-test positive horses should be put down, we did take the time to review this policy in this case. We also seriously considered the option of long term quarantine and monitoring of the surviving horse. However we came to the final view that it should be put down largely based on the advice of medical authorities that it was not worth the risk to human life (particularly the people caring for the horse). This is a highly fatal disease and we know that there is a real risk that it can reappear in an

infected animal at a later time. It was considered that the human health and safety considerations must come first.

This decision was supported by Chief Veterinary Officers from all States and the Commonwealth, the Head of the CSIRO's Australian Animal Health Laboratory (AAHL) in Geelong, the Australian Racing Board, the Australian Horse Industry Council, the Australian Government Department of Health & Ageing (DoHA), Queensland Health and the Australian Veterinary Association (AVA).

In making this decision, it was also noted that the actual information to be gleaned from longer term monitoring of the horse would be relatively limited. However we will learn as much as possible from this horse. People from AAHL attended the autopsy and a wide range of tissues were collected for further analysis.

There are two primary pieces of evidence indicating that Hendra virus infection may remain dormant in the body and re-appear at a later time:

1. There was a human death from HeV infection in 1995 where the person contracted the infection approximately 12 months earlier, had a mild infection at the time, appeared to recover but later succumbed to the disease.<sup>1</sup>
2. Nipah virus is a closely related virus causing mortalities in people in Asia. The ability of this virus to become active again after a dormant period has been well documented in around 10 percent of cases and occurs up to 2-3 years following initial infection. Approximately 18 percent of these cases are fatal.<sup>2</sup>

Tests on tissue samples obtained from a detailed post mortem examination on Tamworth have given PCR positive results in a range of tissues - kidney, urine, spleen, bronchial lymph node,

<sup>1</sup> Allworth A, O'Sullivan J, Selvey L, Sheridan J. Equine morbillivirus in Queensland. *Communicable Disease Intelligence*. 1995;19(22):575. O'Sullivan JD, Allworth AM, Snow TM, Boots R, Gleeson LJ, Gould AR, Hyatt AD, Bradfield J. Fatal encephalitis due to novel paramyxovirus transmitted from horses. *The Lancet* (1997) 349: 93-95

<sup>2</sup> Halpin, K, Mungall, BA. Recent Progress in Henipavirus Research. *Comparative Immunology, Microbiology & Infectious Diseases* (2007) 30: 287-307.

two head lymph nodes, renal lymph node, brain and spinal cord. This test detects the presence of viral RNA, not necessarily live virus.

However the range of positive tissues 40+ days following putative infection is noted as surprising. The post mortem was conducted by a team of expert veterinary pathologists under high level biosecurity containment measures.

QDPI&F has reviewed the Hendra guidelines for veterinarians with considerable input from the AVA and Equine Veterinarians Australia. The Redlands incident has raised a range of issues regarding how private veterinarians will approach possible Hendra cases in the future, including case definition and the use of personal protection equipment and appropriate biosecurity measures. The document has been widely circulated within the veterinary profession and is available on the QDPI&F website – [www.dpi.qld.gov.au](http://www.dpi.qld.gov.au)

Guidelines on Hendra for horse owners is currently under final review with input from the horse industry.

### History of Hendra Virus Incidents

|                        |  |                |
|------------------------|--|----------------|
| Mackay                 | 2 horses & one human                         | August 1994    |
| Hendra                 | 20 horses & two humans                       | September 1994 |
| Cairns (Trinity Beach) | 1 horse                                      | January 1999   |
| Cairns (Gordonvale)    | 1 horse & one human                          | October 2004   |
| Townsville             | 1 horse                                      | December 2004  |
| Peachester             | 1 horse                                      | June 2006      |
| Murwillimbah           | 1 horse                                      | October 2006   |
| Peachester             | 1 horse                                      | June 2007      |
| Cairns (Clifton Beach) | 1 horse                                      | July 2007      |
| Redlands               | 5 horses & two humans                        | June 2008      |
| Proserpine             | 3 confirmed horses & one other possible case | July 2008      |

### AB-CRC scientist steps into bat research leadership role

The AB-CRC's Linfa Wang has recently been appointed as CSIRO Livestock Industries' second Chief Executive Officer (CEO) Science Leader where he will lead research into bats and the viruses they can carry.

CSIRO's CEO Science Leader Scheme aims to attract up to 25 of the best scientists from around the world and provide resources and freedom of research direction to allow them to deliver outstanding scientific impact.

Linfa said emerging new viruses and the threat of bioterrorism has put infectious viruses into sharp focus the world over. While bats have been implicated as the natural host of a growing list of viruses, including Hendra, Nipah, Ebola and Severe Acute Respiratory Syndrome (SARS), they can tolerate viral infection rarely showing clinical signs.

"Bats appear to have some kind of 'viral radar', a highly effective immune system which provides them with broad spectrum protection against viral attack," said Linfa.

Linfa's selection as a Science Leader was based on the track record of his team, strong international networks, a diverse skill base and the availability of world-class biosecurity Level 4 containment facilities at AAHL. He also played a leading role in identifying bats as the natural host of the SARS virus.



AB-CRC's Linfa Wang is CSIRO's second CEO Science Leader

### AB-CRC stars in international documentary

A Canadian documentary film crew flew to Australia in June specifically to film AB-CRC/QDPI&F scientist Hume Field and his work involving bats.

The documentary is a co-production for the English and French networks of the Canadian Broadcasting Corporation as well as for France's public television network.

Jon Kalina, Director and Writer of the one hour documentary *Bat and Man* said he was compelled to include Hume's work in the international documentary as it is instrumental in man's understanding of bats.

"I wanted to include Dr Field in the show as he is one of the most intriguing, articulate and active people in the world and a central figure to bat research given his involvement in Hendra and Nipah virus identification and research," said Jon.

"In the documentary we've looked at the most important research around the world that took things from bats for use with people. However, Hume's work is something we chose to end the documentary on - looking at the larger notion of conservation medicine," added Jon.

"Bats are associated with emerging infectious diseases and are the natural hosts for many viruses. But they can also be viewed as a possible solution for fighting these diseases. They are an ancient species who can carry but not get sick from these diseases, so there is a lot to learn from them. Don't just kill the bats – learn from them," said Jon.

Jon's experience filming in Brisbane was "very interesting as it is one of those rare cities in the world which features the bush right up against a built-up city, proving a unique interface between people and the wilderness".

Hume and fellow QDPI&F/AAHL/AB-CRC colleagues Craig Smith, Carol De Jong and Gary Cramer were filmed catching and collecting samples in the pre-dawn hours as flying foxes returned to their urban East Brisbane roost.

"This was a great opportunity to get the 'One Health' message in relation to bats and emerging zoonoses out to the global audience. There needs to be a broad recognition that the impacts that we collectively make on the natural system – habitat loss, fragmentation and encroachment – contribute to disease emergence from wildlife. It really is a case of 'what goes around comes around'," said Hume.

### AB-CRC scientist's award winning research

AB-CRC PhD student Chris Cowled was among the winners at the Smart Geelong Network's Researcher of the Year Awards dinner held during August in Geelong.

Chris, who is based at CSIRO Livestock Industries' AAHL, won the Geelong Independent Early Researcher Award for his AB-CRC funded research into novel insect borne viruses of livestock where he identified and characterised a new group of viruses of the genus *Orbivirus* isolated from sentinel cattle and insects in northern Australia.

"In recent years, several major international outbreaks of never-before-seen viruses have made us increasingly aware of the serious threat posed by emerging viral diseases," said Chris.

"Through the characterisation of unidentified Australian viruses we have been able to develop diagnostic tests for early detection and rapid diagnosis in the event of an emergency animal disease outbreak," he added.

A number of new viruses have been identified, including Middle Point orbivirus and Stretch Lagoon orbivirus. Diagnostic tests for these viruses have been adopted for routine use by several laboratories undertaking arbovirus surveillance and hundreds of viruses have already been identified as a result.

According to Chris, this project has significantly extended knowledge and understanding of one of the most diverse groups of arboviruses in Australia and provides new direction, information and tools that are anticipated to contribute towards risk assessment, risk management and disease preparedness in the context of emerging viral diseases.

“We are now building on this base to validate a new test for the detection and identification of a large number of different viruses simultaneously,” Chris said. “I plan to use the award money to purchase materials for my research and to fund my attendance at the Australian Arbovirus Symposium, to present my research findings.”



Chris Cowled receiving his Smart Geelong Network's Early Researcher Award. Photo Courtesy of Alan Barber – Barefoot media, photography.

### AB-CRC Veterinary Pathology Training Support Scholarship recipients announced

Animal Health Australia estimates that 125 new veterinary pathologists and laboratory scientists will be needed in Australia over the next 10 years, but at the current level of postgraduate training only 55 positions are likely to be taken up.

As a result, the AB-CRC has awarded two Veterinary Pathology Training Support Scholarships to the value of \$50,000 each. Each scholarship will provide financial assistance for a veterinarian currently employed in a veterinary laboratory in Australia to prepare for and successfully sit the American College of Veterinary Pathologists' Examination or the European College of Veterinary Pathologists' certifying examination.

The AB-CRC is very pleased to announce that Graeme Knowles from the Department of Primary Industries and Water, Tasmania and Jeanine Sandy from the University of Melbourne were the recipients of these scholarships and will take up their awards in 2009.

### AB-CRC scientist participates in Fresh Science 2008

AB-CRC funded scientist Janine Muller recently took part in the 2008 Fresh Science program after being selected for her research into the development of a new test for foot-and-mouth disease (FMD).

Janine said the Fresh Science program, which followed a national competition identifying early-career scientists undertaking new and interesting research, provided her with an insight into what the media are looking for in a story and how best to get your message out there.

“The program was great at making you think about communicating complex project outcomes to the broader community and then gaining the necessary skills to do so,” said Janine.

“You gain knowledge of all aspects of media including television, radio and print media and also how to handle both live and pre-recorded interviews,” Janine added.

“I would certainly recommend training of this type to any scientist wishing to get their project outcomes into mainstream media,” said Janine.

### **Collaborative infrastructure to safeguard Australia**

Recognising the need to deliver infrastructure that supports priority research areas and make it available to researchers across Australia, the Australian Federal Government has developed the National Collaborative Research Infrastructure Strategy (NCRIS).

NCRIS provides the opportunity to develop new ways for Australia to strategically plan and invest in facilities, networks and supporting equipment that meets the needs of researchers and enables world-class research.

A key investment area for NCRIS is developing a better connected national biosecurity system, capable of protecting Australia’s economy, society and infrastructure from a range of threats including natural and man-made disasters, critical quarantine failure and infectious diseases.

Through the capability area Networked Biosecurity Framework, NCRIS is enhancing Australia’s capacity to deal with prevention, surveillance and response. One area of investment is developing the secure microbiological laboratories at CSIRO AAHL, providing 2000m<sup>2</sup> of specialised laboratory space

for biosecurity researchers to work within the Geelong facility on their own projects.

AAHL has an international reputation for excellence in researching and containing exotic animal disease agents. The high biocontainment laboratories and animal facilities allow safe work up to the highest level available (physical containment level four PC4).

NCRIS is investing \$8.5 million to develop the additional PC3 and PC4 laboratory space and technology platforms, available to Australian biosecurity researchers on a merit basis. The facilities will also be available to overseas biosecurity scientists provided their research benefits Australia.

The 300m<sup>2</sup> of high grade PC4 space is scheduled to be available for use in 2010. The additional PC3 laboratory space totalling 1700m<sup>2</sup> should be ready for occupants in mid 2012.

CSIRO Livestock Industries’ AAHL is a core partner of the AB-CRC. The new PC4 facilities will incorporate a specialist microscopy service including live-cell imaging and advanced transmission electron microscopy capability.

According to Australian Biosecurity Intelligence Network Board Chair, Professor Helen Garnett, establishment of this specialist microscopy service – a Linked Laboratory of the Australian Microscopy and Microanalysis Research Facility – is likely to result in a substantial enhancement of our national disease diagnostic capability and a strengthened national biosecurity framework.

To express interest in using the new PC3 and PC4 facilities at AAHL, or to be added to the mailing list for updates on the project, contact AAHL NCRIS Executive Officer, Judith Maunders ([Judith.Maunders@csiro.au](mailto:Judith.Maunders@csiro.au)).



*NCRIS funding is allowing the development of additional PC3 and PC4 (pictured) laboratory space and technology platforms at CSIRO AAHL in Geelong, Victoria. Pictured are AB-CRC scientists Jennifer McEachern and Gary Crameri.*

### **Review of Sentinel newsletter**

**By Corinna Lange, AB-CRC Communications Manager**

Thanks to everyone who responded to the newsletter review survey undertaken on behalf of the AB-CRC by Currie Communications during June.

It was personally very pleasing to read in their report that you say the newsletter contains all the necessary information in about the right quantity, and that it keeps you informed about research outcomes and our progress and capabilities.

This high level of satisfaction relates directly to those people who were generous enough with their time to respond to a newsletter review survey back in 2005, the results of which led to the development of the *Sentinel* newsletter.

Of course, there is always room for improvement, and the results from this latest

survey indicated that there was more we could do aesthetically to make the newsletter easier to read. You will have immediately noticed changes when you received this edition, and those of us involved with producing the newsletter (Kimberley Sakzewski (editor), Malcolm Burt (media producer) and I) hope that you appreciate this new layout.

However, there are also some things we have difficulty in changing for you. Because we deliver the newsletter by email we are restricted in the resolution of graphics we can embed into the attached file because some of our subscribers cannot receive emails larger than 3MB.

While taking this technical limitation into account, the only other limitation we have on including graphics is simply that we can't incorporate what we don't receive. Most newsletter articles are submitted by someone who actually attended the workshop or event, so if that person doesn't have a photo to submit we don't have a photo to print – no one from the newsletter team is able to travel the country to all the events we report on to take photos and write articles.

Finally, the winner of the iPod for participating in the survey was David Pitt from QDPI&F. Congratulations, David!

## REPORTS

### AB-CRC represented at virology congress in Istanbul

10-15 August, International Congress of Virology (ICV), Istanbul

By Linfa Wang, AB-CRC Project Leader

The ICV is held every three years under the auspices of the International Union of Microbiological Sciences (IUMS) and is often thought of as the 'Olympics of Virologists' around the world.

At the recent XIV ICV, AB-CRC scientists gave presentations on bats and viruses (Linfa Wang), SARS virus (Glenn Marsh), novel rhabdoviruses (Ania Gubala), novel FMD virus assay development (Janine Muller) and equine influenza outbreak investigation (Mike Johnson). All the presented works were either directly funded by AB-CRC or linked to AB-CRC funded project activities.

We certainly made a significant impact at the congress, as was evidenced by the numerous responses, requests and enquiries we received both at the meeting and afterwards regarding our work and potential collaboration.

The quality of the science on display was superb and I personally thought the most exciting developments presented at this congress were:

1) Innate immunity: This topic was certainly 'flavour of the month' and many plenary talks and quite a few symposium sessions were dedicated to its discussion. I was most impressed by a talk on symbiotic enhancement of innate immunity, demonstrating that mice latently infected with herpes virus provided non-specific protection against lethal bacterial challenge;

2) Real-time live-cell imaging: For the first time, a Harvard group was able to monitor single-molecule interaction with their state-of-art platform composed of unique dyes, in-house imaging hardware and a very powerful software package. This will undoubtedly revolutionise the way we investigate virus-cell interaction in the future;

3) Structural biology: Study of crystal structures is no longer limited to very basic studies or a few top labs in the world. 'Structural vaccinology' is being adopted by high profile biotech companies for rational vaccine development in this post-genome era;

4) Emerging zoonotic viruses, especially bat-borne viruses (no self promoting here!): The developing trend in this area is for larger and more extensive international collaboration.

Our strategic direction into bat innate immunity (I had the privilege to present our data and vision in one of the plenary sessions) was well received and several international top groups in this field are very keen to collaborate with us.



Congress delegates (L to R): Mike Johnson, Peter Walker, Glenn Marsh, Janine Muller, Ania Gubala, Som Sittidilokratna and Linfa Wang

## AB-CRC DIAGNOSTIC TEST DEVELOPMENT PROGRAM

The AB-CRC continues its strong commitment to diagnostic test development which has been highlighted by the success of recent Application & Linkage and Education & Training initiatives aimed at the animal and public health sectors.

### Diagnostics Adoption Forum

6-7 August 2008, Melbourne

By the Application & Linkage Program team

The AB-CRC Application & Linkage Program's first Diagnostics Adoption Forum was distinctly 'a forum with a difference'; two meetings held back-to-back bringing together over 55 delegates from various government animal and public health organisations, Australian universities and private wildlife associations, all with a professional interest in the application of diagnostic research.

Day One of the forum reviewed six of the maturing AB-CRC funded projects in the 'Technologies for Enhanced Detection' Program, as well as two independent PhD projects and five Application & Linkage projects. Researchers discussed the outcomes of their work; gaining consensus on the most important aspects of the work and any knowledge gaps that still exist, and developing a shared understanding of the potential for adoption in national and international contexts. Panel discussions focussed on moving from research tools to diagnostic tests, a national roll out of a new test, capacity building, and tools for remote and regional surveillance. Lively discussion often returned to the need for validation of various diagnostic tests and the need for collaboration across sectors and organisations.

Day Two focussed on future technologies for disease characterisation and detection. Representatives from the animal and public health sectors presented their perspectives and priorities, before a review of new horizon

technologies and their potential for improving our early warning capability for prioritised diseases. We were fortunate to have Dr Stuart Blacksell, from Mahidol University in Thailand, provide an international perspective on point-of-care tests for field diagnosis.

Feedback from delegates was extremely positive. The forum achieved all of its aims, providing the AB-CRC with suggestions for adoption of research outcomes, and focussing ideas for future diagnostics-related research and early warning research priorities in the proposed Biosecurity CRC Mark II.

### AB-CRC Short Course on the application of diagnostic tests

22-24 July 2008  
CSIRO AAHL, Geelong

By Leigh Cuttell, AB-CRC PhD Student,  
University of Queensland

Diagnostic tests are important tools in aiding in detection of disease and have many epidemiological applications including monitoring, surveillance and screening, prevalence estimation and risk assessment studies. Many AB-CRC supported research projects involve and are at times dependent on these applications and the correct usage and interpretation of diagnostic tests is crucial to the success and relevance of our research.

In recognition of the need to correctly apply and interpret diagnostic tests for use in field epidemiology, the AB-CRC sponsored the short course 'Application of Diagnostic Tests', held in two locations this year – Perth during May and more recently in Geelong.

I attended the course in Geelong hosted at the CSIRO AAHL and with training provided by Evan Sergeant and Angus Cameron of AusVet Animal Health Services. Evan and Angus brought a wealth of skill and knowledge to

the course with extensive training experience in epidemiological data analysis as well as field experience.

The course content provided us with an understanding of measures of test performance (diagnostic sensitivity and specificity) as well as methods of calculation for test validation. Understanding and considering the limitations and pitfalls in test application was also strongly featured. Evan and Angus employ an interactive teaching style and one of the most useful course features was the USB flash-drive each person received containing Epitools – a web based program utilising R (a statistical computing package) for the analysis of epidemiologic data. Being able to enter data inputs for analysis as a group was a great introduction to utilising this program.

The importance of diagnostic tests in many areas of veterinary epidemiology was highlighted by the range of course participants which included veterinarians, research scientists and students representing a range of Australian universities and government agencies. This varied background served not only to provide many examples with which we could think about applying our tests in field situations, but also an opportunity to network, which at course-end all agreed was a worthy reason of attendance.

'Application of Diagnostic Tests' was a great stand-alone course which has provided me with an excellent introduction to the considerations of test development and validation for my own project. Two other AB-CRC short courses, 'R Statistical Environment' and 'Surveillance Systems' would clearly complement this course and benefit any animal health professional or researcher seeking to obtain or analyse veterinary epidemiological data.

## Diagnostic test development within the AB-CRC

By Dr Stephen Prowse, CEO AB-CRC

The recent diagnostic forum highlighted the achievements of the AB-CRC and partners in diagnostic test development. In addition to diagnostic test development, work in this program has provided an evaluation of new technologies, the identification of unknown virus isolates, and the development of sample preparation and collection processes.

The following test capability has been developed through partner organisations including CSIRO, QDPI&F, Department of Agriculture and Food Western Australia, Northern Territory Department of Primary Industries, Fisheries and Mines, Murdoch University and the University of Queensland.

- Avian and equine influenza molecular tests
- A suite of molecular tests for vesicular diseases of livestock including FMD, vesicular stomatitis virus and swine vesicular disease
- A molecular test for Japanese encephalitis
- A molecular test for West Nile virus
- Molecular and serologic tests for surra
- Molecular tests for avian respiratory diseases
- Tests for porcine circovirus
- A molecular test for bluetongue virus in midges
- A molecular test for speciation and the genetic characterisation of *Aedes albopictus*
- A competitive enzyme-linked immunosorbent assay (ELISA) for SARS coronavirus
- Luminex tests for henipa viruses
- An ELISA for FMD antibody that uses synthetic reagents and has the potential to discriminate between infected and vaccinated animals

In addition to these tests, a new process for the detection of virus in mosquito saliva was developed which has the potential to revolutionise mosquito-based surveillance.

During the course of the projects, new technologies were also evaluated. Bead-based diagnostic technologies were shown to be of great potential and, while some tests are in use, further development is in progress. Micro-array technology was also evaluated and found to be a useful technology but of limited sensitivity.

While filter paper has been used extensively for the collection and analysis of nucleic acid samples, the recovery of antibody from filter paper has been unreliable. Scientists at Murdoch University have developed and validated a process for the reliable collection and recovery of antibody from filter paper. This is a valuable technique for sample collection in remote areas.

Investigations in this Program have shown that the development of field or point-of-care tests is not limited by technology but rather by the need to have in place a framework in which to use the tests and the processes to validate and maintain the tests.

Last but not least, test transfer and validation continues to be a very important matter. The AB-CRC will continue to support such activities undertaken within national diagnostic test frameworks. This type of activity was critical for our national influenza response.

Clearly, the AB-CRC's Diagnostics Program has delivered substantial benefits and played an important part in enhancing national disease response capacity and capability.

## **AB-CRC FORUMS CONTINUE TO UNITE STAKEHOLDERS IN AUSTRALIAN BIOSECURITY ISSUES**

[By the Application & Linkage Program team](#)

In addition to the Diagnostics Adoption Forum held in August, the AB-CRC's Application & Linkage team recently funded and organised two further forums bringing together Australia's key players in arbovirus research and pig industry biosecurity.

## **2008 Arbovirus Adoption Forum**

17 June 2008  
DoHA, Canberra

Following the success of the 2006 Arbovirus Adoption Forum, the AB-CRC held a second forum at the DoHA National Office in Canberra in June. Organised in consultation with the National Arbovirus and Malaria Advisory Committee (NAMAC) and funded by DoHA, the Arbovirus Adoption Forum 2008 was attended by 29 invited delegates including members of NAMAC, scientific experts, interested stakeholders from DoHA, AusVet, the university sector, Animal Health Australia, CSIRO and the AB-CRC, with strong representation from both the animal and public health sectors.

Prior to the forum, Professor Sir Richard Feacham (Chair of AusAID's Malaria Reference Group and Professor of Global Health at the University of California, San Francisco and Berkeley) provided an update on global efforts to combat malaria in a talk entitled *Shrinking the Malaria Map - 1990-2025*.

The forum began with AB-CRC researchers presenting results of nine research projects and two independent PhDs funded by the AB-CRC, covering a broad range of AB-CRC arbovirus-related research areas including surveillance methods, *Aedes albopictus* and its role in Chikungunya virus ecology, mosquito vector competency, Kunjin virus infection in birds, methods of characterising unknown arboviruses, and West Nile Virus detection.

A discussion session facilitated by Dr Julie Hall (Chair of NAMAC and Principal Medical Advisor at the Office of Health Protection, DoHA) provided the opportunity to explore significant research outcomes from both researcher and end user perspectives.

Importantly, a number of key recommendations for the AB-CRC were generated at the forum

and there was strong support for continuing the adoption forum model as a means of promoting interaction and linkages between NAMAC, AB-CRC researchers and other stakeholders.

The Biosecurity CRC Mark II Program Development Team is using the forum's report for the development of the CRC Mark II research program.

### **Peri-urban Pig Surveillance Adoption Forum**

21-22 August 2008  
Veterinary Science Conference Centre,  
University of Sydney

Researchers from USyd recently partnered with the AB-CRC to run a two-day adoption forum entitled *Safeguarding Australia's Livestock Industries: Improving biosecurity in pig production systems*. The forum reviewed key findings from an AB-CRC funded research project *Peri-urban and remote regional surveillance for biosecurity for the pig industry in eastern Australia* and sought to improve biosecurity, traceability, surveillance and extension in the pig industry, particularly targeting 'smallholder' pig producers. Thirty-five delegates attended, representing state and federal governments, universities, livestock industries and the AB-CRC.

The forum was coordinated by Patricia Holyoake, Jenny-Ann Toribio, Marta Hernandez-Jover and Nicole Schembri, in partnership with Deb Cousins and the Application & Linkage Program team, and enlisted the talented Nigel Perkins as facilitator.

The AB-CRC research project focused on on-farm and post-farm-gate disease surveillance and biosecurity among pig producers trading through saleyards in this region. Following research presentations by the USyd team,

some lively discussions and debate ensued on the significance of the findings of this project for biosecurity, traceability, disease reporting, trading practices and extension needs of peri-urban and regional pig producers, including potential improvements following the evaluation of current disease surveillance activities at pig saleyards and abattoirs.

A number of actions were agreed upon including some related to the importance of coordinating a national approach to the issue and improving communications with smallholder producers.

The USyd team's commitment to knowledge exchange activities throughout the term of the project were recognised with a knowledge brokering award at the 2007 AB-CRC National Workshop.

### **2008 AB-CRC ANNUAL NATIONAL WORKSHOP**

24-26 June 2008  
Siam City Hotel Bangkok, Thailand

By Dr Peta Edwards, Education & Training  
Program Coordinator

The fifth annual AB-CRC National Workshop in Bangkok was a real international affair, with 120 speakers, guests and delegates attending from all over the Asia-Pacific region. The Workshop was opened by Bronte Moules, Deputy Head of Mission at the Australian Embassy in Bangkok, who spoke about the contributions that the AB-CRC had made to the region and her vision of how to build and extend these linkages if the Biosecurity CRC Mark II is funded.

The theme for the opening day was 'Global Movement'. Both Gardner Murray's Plenary Session and Subhash Mozaria's David Banks

Oration addressed this topic extremely well, emphasising factors that predispose countries to emerging infectious diseases. Excellent connections were made by these presenters to the panel presentations and discussions on avian influenza and FMD, and the talks on Chikungunya and Nipah virus. Julia Landford from AusAID discussed the new Emerging Infectious Diseases research program being developed to be managed in the South-East Asia region, which will enable health professionals, researchers and other stakeholders to participate in long term interdisciplinary projects resulting in policy relevant solutions.

The AB-CRC has grown to such a size that this year concurrent scientific presentations by AB-CRC researchers and postgraduate students had to be introduced for the second day of the workshop. Oral presentations were organised by disease 'themes' and many delegates commented on how much the presenters had improved since the first AB-CRC workshop.

Most delegates agreed that the David Banks Memorial Lecture, delivered by Dr Subhash Morzaria from the Food and Agriculture Organisation of the United Nations was the highlight of the meeting. The Plenary session on global movement and the talk on Nipah virus were also well received. Many commented that the ability of the international speakers to look at the 'bigger picture' was very helpful, and allowed researchers and students to see better how their research fitted with the work being done.

The official dinner that followed the scientific sessions was a very enjoyable and relaxing evening. At the end of the evening, Aileen Plant Awards were made to Vivienne Fischer, for best student oral presentation, Elaine Llarena, for best international student oral presentation, and Susan Walsh for best

scientist oral presentation. The Application & Linkage Program also awarded prizes to AB-CRC researchers who had shown exceptional contributions to knowledge brokering, namely Professor John Mackenzie, Dr Hume Field, and Chris Cowled were acknowledged for their network, program and project knowledge broker activities respectively. Gifts were also presented to Aya Sakamoyo, Polly Cocks and Jarunee Siengsanon for their exceptional contributions to the success of the meeting.

A field day completed the program for this year's workshop. Eighty-four delegates boarded buses bright and early to travel to Ayutthaya, the historic capital of Thailand from 1350-1767. The objective of the day was to see first-hand some of the rural countryside of Thailand, rice farming, animal and birdlife, and temples and buildings dating from the Ayutthaya period.

At Wat Kai, we observed and fed a population of monkeys and were told that the animals are fed at the temple to keep them away from fruit trees in the surrounding area which they previously raided - putting human health at risk from starvation. At Wat Tan-en, we saw bats roosting in the trees and fed the myriads of protected catfish in the river. Later that day we visited an elephant conservation camp.

Our trip finished with a visit to the UNESCO World heritage site at Wat Phra Si Sanphet where we saw the remains of this famous temple stemming from the Ayutthaya period and wandered through the grounds.

Presentations from the 2008 Annual National Workshop can be downloaded from [www.abcrc.org.au/pages/Publications.aspx](http://www.abcrc.org.au/pages/Publications.aspx)



*Stephen Prowse presents Subhash Mozaria with a plaque in remembrance of his presentation of the David Banks Memorial Lecture*

## 2008 AB-CRC ANNUAL NATIONAL WORKSHOP – STUDENT DAY

By Jeannie Robertson, PhD student, Curtin University

The postgraduate students' professional development day was held prior to the official Annual National Workshop and consisted of an exclusive field trip in down-town Bangkok. The aim of the day was to increase student awareness of the interrelationships between human and animal health, poverty, lack of educational opportunities and biosecurity. Professor John Edwards (Dean of the Vet School at Murdoch University) helped students to understand these issues in his preface to the day's events

Bangkok is a major world transport hub and stopover destination for many international travellers. Education and active control measures are in place to help control diseases such as rabies, some childhood infectious diseases and sexually transmitted infections. However there is a significant risk of zoonoses, vector and water-borne diseases in the city and surrounds because of the climate, the close association between

humans and dogs, cats, birds and rodents, water pollution and education availability.

The day began with students filing into a large and colourful bus and immediately, but not unexpectedly, becoming stuck in a traffic jam. When we finally arrived at our destination we started our 'real' excursion - hopping aboard a longtail boat for a trip down the Chao Phraya River. The (very brown) river is a major mode of transportation for locals and a necessity for industry in Thailand. Many canals, or khlongs, branch off the river and the water is used to irrigate rice paddies in the agricultural areas around Bangkok. The banks of the khlongs are densely populated and the waterways play a significant role in the lives of the locals, from transport to washing, bathing and swimming. The river is heavily polluted due to organic run-off from agricultural industry, rubbish and sewerage, so we all tried to keep our mouths shut to avoid any splashes whilst our drivers happily sped along the river.

Eventually we disembarked and it was back into the traffic to visit the Duang Prateep Foundation, an organisation which has provided aid to the urban poor since 1978. We were treated to morning tea while we learnt about the history and activities of the Foundation, and its role in community development and providing educational opportunities for children living in urban slums.

We were then taken on a short walking tour of a nearby slum area which was an eye-opener for many due to the dramatic contrasts in living conditions. There were also a lot of stray cats and dogs, and filthy stagnant water accumulated throughout the drains underneath houses providing a veritable 'hot-bed' for disease. Surprisingly, we learnt that many people were reluctant to move out of the slums even when they had jobs as moving to the outskirts of the city is more

expensive and transportation costs even more prohibitive.

After lunch we made our way to the Rabies Clinic at the Queen Saovabha Memorial Institute. At the Clinic, Professor Visith Sitprija gave us an insight into the burden of rabies on the health system in Thailand. He explained how rabies vaccines and snake antivenin were produced at the clinic, including antibodies produced by administering vaccines to horses at a nearby farm. With more than 150,000 stray dogs in Bangkok alone, Professor Sitprija said that the clinic dispenses over 350,000 post-exposure vaccinations every year to people bitten by dogs.

One of the highlights of the day was the Snake Show where a very charismatic scientist provided a very entertaining, and at times threatening (snakes striking in front of us) presentation about snakes in the region. These snakes help in the production on anti-venin.

Our last stop was the Oxford Tropical Medicine Research Unit at Mahidol University where Vanaporn Wuthiekanun talked about the Centre's melioidosis and leptospirosis research. Claire Deacon from the Soi Cats and Dogs Organisation told us about the group's mission to rehabilitate sick dogs and cats from the streets and temples of Bangkok. The variety and severity of the illnesses seen was surprising and saddening and the work was risky. Claire revealed that most workers pick up an infection of some kind from their work. Dr Daniel Paris then spoke about scrub typhus and other acute tropical fevers.

The final talk for the day was by Dr Stuart Blacksell on the diagnosis of acute tropical fevers and the problems associated with commercial diagnostic tests. Much work has been done on verifying manufacturer's claims about the reliability of their tests and his

research findings suggested that none of the test kits fulfilled their claims. It was an eye-opening lesson on the need for validation, both in labs and in the field, for these diagnostic tests.



*Annual National Workshop - Student Day*

The finale to the day was dinner at Cabbages and Condoms Restaurant. Profits from the restaurant are used to help in the promotion of safe sex practices throughout Thailand, especially to combat the increase in HIV-AIDS in the region and reduce the stigma attached to this disease. Decorations throughout the restaurant were extremely colourful and on closer examination all were found to be made from condoms. The occasion also facilitated another great opportunity for networking.

### **AB-CRC Short Course in the R Statistical Environment**

5-7 August, Brisbane

18-20 August, Perth

By Vivienne Fischer, PhD student, Queensland Health Forensic and Scientific Services; and Johanna Johnson, PhD student, Murdoch University

Scientific research and statistical analysis go together hand-in-hand. However analysis

of large amounts of data can be a daunting prospect and invariably requires the assistance of powerful and sometimes confusing statistical programs.

The AB-CRC recently ran two short courses in the R statistical environment aimed at students, academics, researchers, consultants and government veterinarians - some of whom travelled from interstate, New Zealand and England.

'R' is considered by many to be the ultimate statistical tool. During the three day workshop we were given an introduction to the R language and environment, R fundamentals (such as basic skills and statistics), graphics and some of the more advanced capabilities of R. The major focus was on learning how to use and navigate through the system as well as introducing new users to R's potential.

Those attending the course had varying familiarity with the program and some found it to be an intensive and steep learning curve. However, by halfway through the course, many of us were beginning to see through the statistical 'fog'. By the course's end it was easy to see that R is a valuable tool to learn. We saw that the R statistical environment offers many advantages, containing advanced statistical routines not yet available in other packages, state of the art graphic capabilities, and the flexibility to allow new statistical methods to be programmed – and it's free! In addition to its advanced capabilities, it is also great for producing high quality, professional graphics for publications.



*R Statistical Environment short course participants in Perth*

Overall, the course was well organised (and well catered) and enabled participants to get an overview of R's capabilities and how to use it. Many thanks are owed to our patient AusVet trainers, Evan Sergeant, Nigel Perkins and Ben Madin.

### **AB-CRC supports Control of Communicable Diseases Course**

7 -10 July  
School of Public Health, Curtin University of Technology

By Jo Edmondston, Senior Project Officer  
Application & Linkage

Aileen Plant continues to be missed, and as time progresses and each of her roles are filled, our appreciation of the significant contribution she made to the public health profession grows.

One of the roles Aileen took on each year was running a Winter School called *Control of Communicable Diseases* for the School of Public Health at CUT. In 2008, Professor Charles Watson took Aileen's place as course coordinator. The course was attended by 10 students enrolled in the Public Health Master's Program.

Demonstrating how different combinations of strategies can be used for different communicable diseases, the course focussed on monitoring and evaluation, outbreak control, immunisation, the role of government, and international measures to control communicable disease. In addition to Charles' central role in the course, the AB-CRC was also well represented by staff and researchers who filled the majority of the guest lecture slots. Dr Rochelle Watkins provided a lecture on *Monitoring and Surveillance*, Dr Jo Edmondston gave a lecture on *Emerging Infectious Diseases*, and Dr Lisa Adams provided an overview of *International Aspects of Communicable Diseases*, including a telephone link-up with Dr Angela Merianos from the World Health Organisation in Geneva.

Aileen and Charles' book *Communicable Disease Control - An Introduction* was used as a key reference for the course. For more information on the book, please visit [www.ipcommunications.com.au/iphealf.html](http://www.ipcommunications.com.au/iphealf.html)

## COURSES

### **AB-CRC sponsored short course in surveillance systems**

**28-30 October 2008**

**Curtin Health Research Campus, Perth**

The AB-CRC is pleased to offer a three-day short course in surveillance systems. This course is designed to provide a simple and understandable introduction to surveillance systems for animal health professionals.

It starts with the basic concepts and reasons for undertaking surveillance, then builds on these concepts to develop an understanding of the range of approaches that can be used to undertake surveillance, depending on the specific purpose. Issues associated with planning and subsequent analysis of both random and targeted surveillance programs are covered, as well as the evaluation of surveillance systems.

For more information about the course and details of registration please visit the website [www.abcrc.org.au/pages/Education.aspx?MenuID=44](http://www.abcrc.org.au/pages/Education.aspx?MenuID=44)