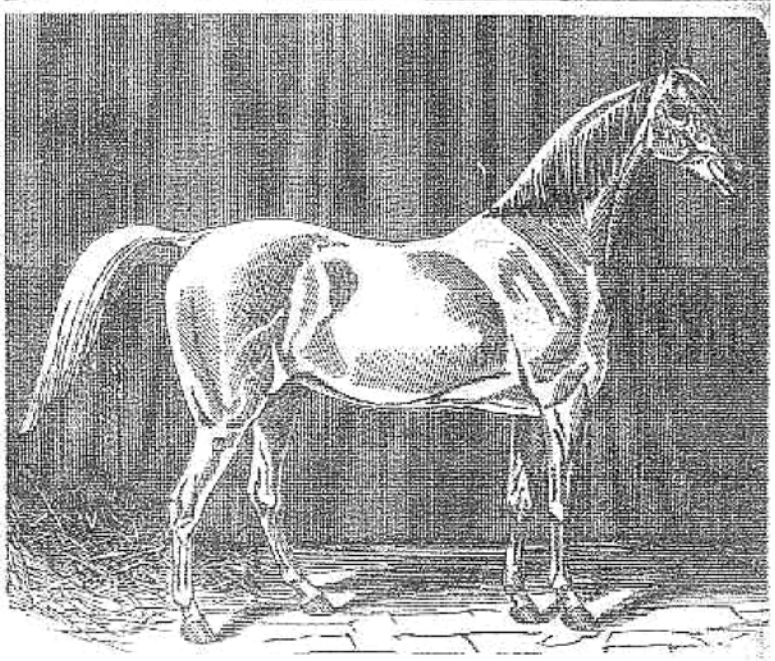

AUSTRALIAN VETERINARY HISTORY RECORD

July 2015 – NUMBER 71

The Australian Veterinary History Record is published by the Australian Veterinary History Group in the months of March, July and November.

Please take the opportunity to visit the **AVHS web** page
www.vetsci.usyd.au/avhs
also the **Australian Veterinary History Record** when you log onto
http://ses.library.usyd.edu.au/handle/2123/222

Hon Editor: Dr AJ Turner, 25 Garton Street, Princes Hill Vic, 3054
Email: ajturner@bigpond.net.au; Tel. (03) 9380 1652.

The Australian Veterinary History Group is a Special Interest Group of the AVA [AVHG].
All who are interested in any aspect of veterinary history may join. Annual subscription is $60.

Please direct enquiries and correspondence to the President, Professor Mary Barton, University of South Australia, GPO Box 2471, Adelaide, SA 5001,
Tel. + 61 8 8302 2933. Email: marybarton@unisa.edu.au .

KENDALL'S
VETERINARY INSTITUTE,

42 Brunswick-street, Fitzroy,

MELBOURNE.

THIS ESTABLISHMENT is now approaching completion and will shortly be fitted up with all the latest improvements, including an

EXTENSIVE AND COMMODIOUS INFIRMARY

for the reception of invalid horses or other animals for treatment, operating yard, dispensary, consulting room with telephonic communication, shoeing forge, and all the requisite offices and appliances for a complete and useful institution.

Arrangements are also being made for obtaining qualified professional assistance, and for the reception of pupils; also for giving lectures during the winter months.

OPERATING DAYS—MONDAYS, THURSDAYS and SATURDAYS.

CONSULTATION HOURS { Before 10 a.m.
From 12 to 2, and after 5 p.m.
Wednesday mornings—Free.

Fee for consultation by letter or telegram—Half-a-Guinea.

OUTSIDE CALLS PROMPTLY ATTENDED TO.

VETERINARY MEDICINE CHESTS AND INSTRUMENTS
Supplied for Stations, Farms or Ships.

Horses and Other Animals Examined Prior to Purchase or Shipment.

Imported Animals Inspected Before Landing.

HOSPITAL CHARGES:

Horses admitted for *medical* treatment, including advice, medicines, keep, and attendance in Hospital, at 3 guineas per week.

Horses requiring *surgical* treatment, including minor operations, applications, keep and attendance, at 2 guineas per week.

Special operations according to arrangement.

All operations are performed at the owner's risk.

Subscribers of one guinea per horse per annum are entitled to have sick or lame horses admitted for treatment, including medicines and operations, without further charge except for keep whilst in the Hospital.

Dogs or other animals are received at proportionate rates.

MEDICINES DISPENSED AT THE INSTITUTE.

CONTENTS

Australian Veterinary History Society
A Special Interest Group of the Australian Veterinary Association Ltd

Minutes of the Annual Meeting of the Australian Veterinary History Society, a Special Interest Group of the Australian Veterinary Association Ltd held at the Brisbane Convention Centre on Monday 25th May 2015.

The President Mary Barton welcomed the members and visitors to the meeting with a special welcome to Robert Gumbrell from the New Zealand veterinary history group.

1, Present :
Members: Ivan Caple, Tony Davidson, Helen Jones, Andrew Turner, John Aspley Davis, Bruce Parry, David Marshall, Allen Petrie, John Armstrong, Jan Hills, , Anne Jackson, Mary Barton (Chair)
Visitors: Robert Gumbrell , Randall Lemin,
Apologies: Richard Rubira, Neil Tweddle, Geoff Reed, David Lindsay, Pat McWhirter, Jeff Brady, Dick Roe, Tom Hart.

2, Minutes of the 23rd Annual Meeting at Cairns, QLD 25th May, 2013 – published in the Australian Veterinary History Record No.68, July 2014. The Minutes were approved by the meeting.

3, Business Arising from the Minutes- Nil

4. Report of the President

The President thanked the speakers in the history program. The speakers were Prof Peter Windsor (Contributions by Australia veterinarians to FMD control and eradication in SE Asia), Emeritus Prof Ian Caple (John Kendall – WW1 veterinarian) and Dr Tony Davidson (VetLab: from private patronage to private enterprise). She noted the assistance of Kendall Croker in providing information about the role of vets in the current defence forces. She noted that it had been a quiet year with activities focussed around the Veterinary History Record, which Andrew Turner had managed superbly, and the program for the conference. In addition she had continued discussions with the AVA President and CEO about an appropriate home/structure for the group bearing in mind that it did not serve the role that other SIGs did in that it did not provide services to members but rather provided a service to the AVA and the profession. An on-going issue is that the SIG does not meet the current governance requirements for the Association in terms of roll-over of committee positions, quorate meetings, professional development for SIG members and so on. The AVA had indicated strong support for the role of the group and the services it provided. There had been no feedback from AVHS members about the suggestion to change the SIG to an Advisory Group to the Board but still producing the Record and the program at the AVA conference. In addition the group could provide oversight of the historical collection and the archives and continue its role with the library. She noted that the centenary of the AVA in 2021 was an opportunity to promote veterinary history in Australia. She expressed a concern that we were not collecting important historical information such as the role of the post WW2 vets in establishing veterinary practices in regional Australia. She will now proceed to make a formal submission to the AVA(after clearing it with the committee).

The meeting accepted the President's report.

5. Report of the Honorary Secretary/Treasurer

Once again, the income for the year came from member *subscriptions, with a small increase in income. The expenditure* mainly related to our newsletter.

The Australian Veterinary History Society continues to operate with a positive cash flow. Thank you to Dr Mary Barton again for her work as President of our group.

Also, thank you to Dr Andrew Turner for his work editing & coordinating the Australian Veterinary History Record for the group.

I hope that the Scientific Program at the PanPac/AVA Conference in Brisbane is a success and apologies for not being able to attend the Annual Meeting.

Annual Financial Return for the period ending 31 December 2014.

Statement of Financial Performance

	2014	**2013**
INCOME		
Membership Subscriptions:	3,098.83	2,915.55
Conference	100.00	0
TOTAL INCOME	3,198.83	2,915.55
EXPENDITURE		
Association Management		
Administration:		
Postage	170.22	285.34
Printing	359.47	615.73
Stationery		53.06
Merchant Fees	12.82	172.40
Meetings & Seminar		40.08
Total Administration		
TOTAL EXPENDITURE	542.51	1,166.61
NET INCOME/(EXPENDITURE)	2,656.32	1,748.94

Jeff Brady Honorary Treasurer 20 May 2015.
The meeting resolved to accept the report of the Honorary Treasurer and expressed thanks for his efforts in this role.

5. Report of the Honorary Librarian

Tom Hart sent a written report: I have spoken to Anne Jackson about the Max Henry Memorial Library (MHML) and sent her the document about the history of the library and the lease with the University of Melbourne. Anne seems keen to curate the historical collection such as it is and is arranging its display. I am pleased she is interested in the library as well as the historical collection.

It appears that closure of the Gilruth is looming although as far as I know there has been no formal notification to the AVA. I think it would be a good idea for us to ask the CEO to approach the MU and have this clarified. A condition of the lease is that suitable and secure accommodation must be provided for our books. If MU can no longer guarantee this and if we now have suitable accommodation it may be possible to end the lease prematurely. The lease ends in 2021 otherwise.

There has been no interest by members in the MHML this year and since Tammie Goates retired as Gilruth librarian I have had little to do with it. Understandably, the current staff of the Gilruth do not have the same passion for history as Tammie.

The ideal outcome for the library would be for us to reclaim it and display it. Anne Jackson would be the ideal person to act as librarian. I have seen my role as mainly keeping track of the library and lease because I realised that the people involved in 2006 would move on one way or another and nobody would know what happened by 2021. This seems to be coming to pass as I expected. Now that Anne seems happy to take the baton I would be pleased to pass it to her.

The meeting resolved to accept the report and expressed thanks to Tom with acclamation.

6. Report of the Honorary Archivist – No report

7. **Report of the Honorary Editor**, Australian Veterinary History Record.
   Andrew Turner reported, noting that there had been 3 versions of the History Record had been prepared and sent out to members. He has sufficient material for another 2 or 3 publications.

8. **Election of Office Bearers**: (current office holders in brackets)
   Current committee – President (Mary Barton), Secretary/Treasurer (Jeff Brady), Librarian (Tom Hart), Editor (Andrew Turner); Committee (Paul Canfield, Keith Hughes, Helen Fairnie, Dick Roe, Pat McWhirter, Tony Davidson, Bruce Parry. Jan Hills was elected as an additional member.
   It was noted that there was still no representative from Tasmania.

9. Other Business

9.1 **Anne Jackson –** update on the History collection at AVA House and the Max Henry Library.

Anne showed a number of photographs of the national office. The Board room has historical photographs of past Presidents and some valuable historical books. There is room for more books. Another room houses the historical collection with some material in glass-topped cabinets. There is more material in boxes. In addition some shelving has been freed up which could accommodate more books and other material.

9.2 **Andrew Turner** expressed concern about the position of the group within the AVA. He indicated that he felt the AVA was not supportive of the group. He noted that attendance at the SIG meetings had been declining. He suggested that members found one-day registration to allow attendance at the SIG program and AGM was too expensive. As a solution he suggested:

A. The AVHS hold its scientific and annual meeting on either the Saturday or Sunday preceding the AVA Annual Conference and invite interested persons to attend.
B. The AVA allow interested members of the general public to attend and contribute to recording veterinary history as members

of the Group; such members be not allowed to fill Executive posts of AVHR if that will help this transmission.

C. If the AVA will not accede to these requests, the group members vote to disassociate from the AVA and establish a corporate body to pursue veterinary history.

It was noted that the attendance at this meeting was much higher than it had been for several years. The meeting did not accept that it was sensible for the group to disassociate from the AVA and supported the proposal that President should pursue changes in the positioning of the group within the AVA.

Andrew also expressed concern that the AVA had not pursued alternative sources of funding for an extended history of the AVA – such as Universities and Veterinary Boards. It was noted that the SIG (particularly the President) had not submitted a formal budget proposal to the AVA but rather had communicated informally with the Board. Comments were made that the Universities were unlikely to fund such an initiative. It was noted that the AVA centenary occurs in 2021 and this could provide an opportunity to raise this issue more formally with the Board and that there was time to get a proposal underway.

9.3 **Jan Hills** raised the issue of the historical collection and expressed concern that the membership did not have easy access to the collection. She suggested that the AVA establish a veterinary history museum. Such a museum could be a tourist attraction as well as raising the profile of the profession. She suggested that the museum should be in a regional centre rather than in a capital city as access would be easier. She noted that such a location would provide opportunity for local community groups to support the museum. She suggested that the AVA could seek sponsorship. Andrew Turner suggested a road show to take the historical collection around Australia.

9.4 **Randall Lemin** raised the issue of a collection of journals and papers on paper that was fading and wondered if students or others

would be interested in digitising the collection and assisting in practice open days.

9.5 **Women in veterinary science** – Helen Jones: Helen reported on progress with the book, noting that she had found someone to critically read and provide advice on editing and that she has decided that the best approach was to publish the book on-line in 3 sections.

10 Location of next AGM. The next AGM will be in Adelaide in May 2016.

Mary Barton, President
28 May 2015

Contributions of Australian veterinarians to FMD eradication and control in South East Asia

Professor Emeritus Peter Windsor
Faculty of Veterinary Science,
University of Sydney, NSW, Australia

Introduction

Foot-and-Mouth Disease (FMD) incursions into Australia are suspected to have occurred in the early 1800's and the early 1870's. Although in the earlier event there is doubt as to whether the disease was in fact FMD, in1871-72 there were at least five episodes in which FMD was diagnosed in cattle either bound for Australia, in quarantine or, most seriously of all, in a bull which had been landed for 2 months. The last case demonstrated the need for complete prohibition of imports from known regions of FMD infection and 'the alarming inadequacies in the implementation of existing regulations governing importation' (Fisher, 1984).[1] Since then, Australia has been fortunate to have remained free of FMD although the potential for incursions, particularly from endemic infections in neighbouring countries, has been of concern. Retaining FMD freedom in Australia is a highest order priority for animal health management, with estimates of revenue lost from a major outbreak that suspends livestock trade for an extended period, now revised to be in the

order of $50b (ABARES, 2013).[2] Protecting Australia from FMD, improving regional food security, and assisting with rural poverty alleviation, have been major drivers that have motivated Australian veterinarians to work in developing countries in the region.

Australian veterinary scientists have a 40-year history of providing significant contributions in regional animal health research and development aid projects aimed at prevention, management and control of regional FMD. This has frequently been in association with international organisations, particularly the World Organisation for Animal Health (OIE) and the United Nations Food and Agriculture Organisation (FAO). Australian activities in FMD initially included support for FMD control and eradication in Bali in 1974, with subsequent assistance to prevent re-infection in Central and West Java leading to successful eradication of FMD from the Indonesian archipelago. Indonesia has continued to remain free of FMD for several decades. The success of this work encouraged the further support of projects such as the Eastern Islands Veterinary Services Project (EIVSP) to improve animal health services and disease surveillance capacity in the islands from Bali eastward including Lombok, Sumbawa, Sumba, Flores, West and East Timor, those islands being very close to the largely remote Australian northern coastal region (Windsor, 2011).[3]

Success in the Indonesia FMD campaign encouraged the provision of funds for a significant FMD control and eradication campaign in the Philippines following the incursion of a porcinophilic strain of the virus in 1994. Again, this aid project was a successful enterprise, leading to evidence of the economic benefits of vaccination programs and the eventual eradication of the disease with no cases recorded since 2005 (Windsor et al., 2011).[4] This campaign contributed to major improvements in the animal health surveillance and response capacity for other important livestock diseases of the Philippines, with better trained farmers, traders and veterinary scientists. In addition, several veterinary leaders from the Philippines have progressed to senior positions in regional animal health agencies in South-East Asia.

Australian veterinarians have made important collaborative contributions to the success of these FMD eradication campaigns in Indonesia and the

Philippines, with Indonesia declared free of FMD without vaccination in 1990 whilst the Philippines obtained freedom with vaccination in 2011. In the late 1980's and early 1990's researchers from Australia also conducted FMD work in Pakchong and Lampang in Thailand, and in Vientiane in Laos PDR. Australian research contributions in SE Asia have continued to grow with Australian Centre for International Agricultural Research (ACIAR) and Australian International Aid Agency (AusAID) support, providing useful information in support of the challenging South East Asia and China Foot and Mouth Disease (SEACFMD) roadmap, developed for control of the disease in the Greater Mekong Subregion (GMS) (Windsor, 2011).[3] In an informal meeting with Colin Wilks in Phnom Penh in mid-2014, the considerable efforts of Australian veterinary scientists over many years on FMD control in the Asian region was discussed. It was suggested that a document be prepared, recording the various roles of the numerous Australian veterinarians who have worked on FMD control in SE Asia, recognising their inputs through the various funding and coordinating agencies, including ACIAR, AusAID, OIE, and FAO. It is hoped that this document will enable these efforts to be more generally recognised.

Methodology

In addition to examination of the published literature and the fortunate identification of the Indonesian campaign report[5] (Bain, 1982) in the Sydney University Camden Campus Library, discourse with numerous colleagues with known interests in regional transboundary animal disease (TAD) control, led to development of a list of relevant contacts that received an email in late 2014 and early 2015. Although the list was as comprehensive as was feasible in the time allowed, it could not include all contributors and apologies are offered for any offence to those inadvertently excluded and those providing material that was inadequately or incorrectly edited with important sections omitted. Those contacted were requested to provide a few short statements of their roles and timelines on FMD control in SE Asia, including major contributions, reflections of highlights and lowlights, plus considerations on the future of regional FMD control. Brief responses to the following questions were requested:

- What have been your roles and timelines in FMD control in SE Asia (& now China)?
- What do you consider are your major contributions (e.g. influencing key national staff)?
- What are your key reflections on the highlights and lowlights of this experience?
- What are your thoughts on the future progress towards FMD eradication in SE Asia?

Responses were generously provided by email with contributions from Peter Black, Angus Cameron, John Copland, John Edwards, Tony Forman, Paul Freeman, Bill Geering, Laurie Gleeson, Chris Hawkins, Denis Hoffmann, Jim Kerr, Karan Kukreja, Gardner Murray, John Stratton, Ray Webb, Harvey Westbury and Jim Young.

Indonesian eradication campaign, 1974-81

In 1973, FMD had been endemic in parts of Indonesia for over 90 years, with several difficult FMD years resulting in 19,683 cases reported that year, including spread to Sumatra, South Sulawesi, Kalimantan and Bali from illegal cattle and buffalo movements from East Java (Bain, 1982).[5] Although an outbreak occurred in Jembrana on Bali in 1973 and was controlled by slaughter of 250 cattle and buffalo, a fresh outbreak occurred in 1974 involving more than 6,000 cases. Following an Indonesian government request for aid to eradicate the Bali outbreak, an Australian inter-departmental team was sent to examine the feasibility of a project of eradication by vaccination of large ruminants, commencing in Bali and moving back through eastern Java. The Australian project team was led by **Bob Bain** (deceased) of Sydney University. **Bill Gee** (deceased) as Director of Quarantine and later as Head of the Australian Bureau of Animal Health (ABAH) was responsible for the field control program, and 'maintained friendly interest throughout the program' (Bain, 1982).[5] Parallel studies in vaccine production and supply were conducted in Melbourne by **Bill Snowdon** of the CSIRO Divison of Animal Health with support from Mr K Harcourt of CSL and Mr Lionel Moy from the Department of construction. Dr Noel Mowat of AVRI Pirbright visited Indonesia on 3 occasions and gave valuable advice as a project consultant (Bain, 1982).[5]

There were 315,981 cattle and buffaloes, 7,951 sheep and goats and 444,978 pigs on Bali in 1974 and the prospects of success were considered a remote possibility (Bain, 1982).[5] However the project proved to be extremely successful, with no cases seen in Bali after 1974. Economic, cultural and political concerns demanded that 'slaughter-out' of clinical cases and dangerous contacts should not be attempted. Vaccination of all cattle and buffaloes with imported vaccine tested for potency and safety against the outbreak O strain, proved to be an efficacious strategy, despite concerns about the mostly unrestrained pigs that had close contact with cattle.

Figure 1. RVS (Bob) Bain

It was decided not to vaccinate pigs due to uncertain efficacy in this species and the daunting prospect of catching, restraining, identifying, vaccinating and revaccinating them, despite the large potential reservoir of virus in bovines that might infect pigs if the circumstances allowed (Gee, 1995).[6]

The Indonesian national eradication program was based on the Bali experience of extinguishing the disease by vaccination of 80%of the cattle and buffalo populations but not sheep and goats, although pigs were sometimes vaccinated when in close contact with an outbreak in the latter stages of the program outside of Bali. The National FMD eradication approach was only to vaccinate cattle & buffalo with one round in Bali (although there may have been more in Bali as Dinas Peternakan liked the program), Sumatra and South Sulawesi 1977-78 and three rounds in Java. The program involved high compliance with mustering and vaccination, considered due to old regency system consolidated by Japanese central control and involving the military.

Bob Bain was first invited to Indonesia in 1963 under the Sukarno regime prior to the 1965-66 ‘Year of Living Dangerously' when communists were eliminated during the Suharto regime. He was involved in 1967-68 in the development of a haemorrhagic septicaemia (HS) vaccine in Bogor (now Balitvet) and taught local personnel in the manufacture of HS vaccine. The vaccine enabled swamp land to be used for buffalo grazing. His strong capacity building approach gave him access to Dr IGN Teken Temadja (Indonesian Directorate of Animal Health), resulting in a request to assist with FMD. Bob knew that a slaughter-out policy wouldn't work as he understood the role of livestock as an asset bank for smallholder livestock farmers. He approached AIDAB to source funding for an FMD vaccination program, with Australia to provide training, vaccine, and a cold chain supply and delivery resource (funds for cool rooms, back-up generators, then fridges, eskies, a Land Rover vehicle for each district, and motor bikes), with the Indonesia government to provide human resources inputs (staff to muster and vaccinate and organise the large coordinating committees down to village level).

Selection of the vaccine with an appropriate serotype to provide protection was an important task and Bob visited manufacturers in many countries. He also assisted with reporting, conference presentations and managing training and equipment. A difficulty was the provision of the Land Rovers as these had stayed in Surabaya (reputedly used by provincial people and their wives). Bob threatened to stop Australian aid via AIDAB until this was resolved, resulting in a ‘stand-off” for about 6 months until late 1978 when the Land Rovers were distributed and aid recommenced. Bob also participated in the dialogue surrounding Indonesian concerns that vaccination wouldn't eradicate FMD so a local vaccine production facility should be developed in Pusvetma (Pusat veterinaria farma) in Surabaya. However, FMD eradication was achieved with international vaccine in 1981 and before domestic production commenced. Declaration of FMD freedom was delayed until 1983 to ensure there was no further introduction of disease, particularly from Malaysia and the Philippines that were also infected at that time (Bain, 1982).[5] The success of the national program was considered to have been dependent on the results of the Bali campaign involving an informed

decision to leave the substantial pig population unvaccinated (Gee, 1995).[6]

Bill Geering was Principal Veterinary Epidemiologist (Exotic Diseases) in the newly formed Australian Bureau of Animal Health (ABAH) in 1977 and for the next 30 years was involved with control of major epidemic diseases, including FMD in Asia through his work for the Australian Government, FAO, and OIE. Commencing in 1978, he was involved in training programmes and workshops over many years, on disease control, planning and co-ordination and epidemiological methods for Asian veterinarians, mainly in Indonesia and Thailand. Bill was the Australian permanent delegate to (and for several years Chairman of) the FAO Animal Production and Health Commission for Asia and the Pacific (APHCA), enabling close contact with CVOs and other senior officials in Asian countries, and the FAO Regional Office in Bangkok. Through the various meetings, contacts, and visits to the countries, he assisted the planning and monitoring of FMD control programs throughout the region and was also involved with OIE in programs aimed at enhanced disease reporting in the region. In the mid-1980s, Bill was the FAO appointed member of the joint FAO/ASEAN team tasked with assessing national freedom of Indonesia from FMD. This involved epidemiological investigations, risk analyses and serological surveys throughout the country and helped Indonesia attain international recognition of FMD freedom. He subsequently participated in other FAO/ASEAN teams to assess national or regional FMD in Malaysia, Thailand, and the Philippines. The Malaysians, notably the DG Mustapha Babjee, were most upset when his team reported that Malaysia should not qualify for FMD freedom, although this was resolved a few months later by an FMD incursion from Thailand. FMD assessments in the Philippines included some bizarre locations including the Tawi Tawi archipelago in the south, a hot bed of separatism at the time, with the main industries smuggling, piracy and kidnapping. The Australian government refused to let Bill go there unless the Philippine government guaranteed his safety, resulting in an escort of two troop carriers of heavily armed Filipino marines dispersing into defensive positions around the farms he visited. Bill considers he was more frightened of them than any potential kidnappers.

Philippines eradication campaign, 1995-2005

FMD was initially diagnosed in the Philippines in 1902 and the first recorded major outbreak was in 1908, associated with infected animals imported to Manila from Hong Kong and became established after spreading to 25 provinces in the following two years. During the following 90 years, three serotypes (O, A and C) were identified and major epidemics occurred, with long inter-epidemic periods in which little clinical disease was reported. From the mid-1970's, the FMD situation improved and areas of the country, mainly south of Luzon were identified as being disease free and achieved recognition and accreditation by the Association of Southeast Asian Nations (ASEAN). In Mindanao, FMD freedom enabled substantial investments in livestock production with rapid expansion of the pig industry and of cattle feedlot production. Between 1991 and mid-1994, there were only two reported outbreaks of FMD, although it is likely that it was occurring sporadically in parts of Luzon. From the early 1990's FMD was restricted to Luzon and, since it was at a very low prevalence, the time appeared opportune to plan for national eradication. However, the FMD situation changed dramatically when in September 1994, the disease was reported to the west of Manilainn Rizal Province in central Luzon. An epidemic emerged that spread to numerous provinces including the southern Bicol region of Luzon where it was detected in March 1995. The situation deteriorated further, with a total of 1553 field reports of disease outbreaks from all regions of Luzon involving 98,604 clinical cases. The disease involved a porcinophilic strain of FMD type O virus (Cathay topotype) that mainly affected pigs and caused major losses for the swine industry of the Philippines, estimated at USD 80million in the first 12 months.

Reports of this rapidly spreading epidemic resulted in the establishment of a specific National FMD Task Force to manage and coordinate the FMD control. An FMD Technical Advisory Committee (consisting of government, private sector, academia, police, military, and the information agency) was established by, and answerable to, the Agricultural Secretary. A National Plan for the Control and Eradication of Foot and Mouth Disease (NPCE) was approved in September 1996. The success of FMD eradication in Indonesia encouraged Australian support for the FMD NPCE campaign in the Philippines, with funding provided from the Australian Agency for International Development (AusAID) and

administered by the FAO. The NPCE plan proposed three phases including establishing:

- A disease control buffer zone in Bicol to prevent the southern spread of the disease from Luzon to the two southern regional island groupings of the Visayas and Mindanao;
- Control of the disease in central Luzon and implementation of procedures enabling an application for FMD freedom for the Visayas and Mindanao Provinces and possibly Bicol;
- Procedures enabling an application for the remainder of Philippines to be declared as free of FMD.

Figure 2 FMD public awareness activities in the Philippines frequently relied on working with women's community groups.

The general effectiveness of FMD control, both at a national co-ordinating level and at a local field level, dramatically improved with clear indications that efforts at movement control, disease containment and prevention were being undertaken as indicated by the NPCE. In May 2001, the island of Mindanao received the status of FMD freedom without vaccination, followed shortly by the island groups of Visayas, Palawan and Masbate in May 2002. The last reported outbreak of FMD in the Philippines occurred in December 2005 in Lukban, Quezon province in central Luzon, with eventual OIE declaration of freedom with vaccination in 2011 and without vaccination in 2015. The eventual success of the NPCE program was considered to be driven by the incentives of export marketing opportunities for large-scale commercial producers, with the government actively seeking assistance of the private sector to help finance the eradication program (Randolph et al., 2002).[7] The total cost

of the eradication program was US$ 12million. Australian support was particularly important in assisting the creation of the Bicol surveillance buffer zone in southern Luzon, preventing spread beyond the northern region of the country, and capacity building of the veterinary surveillance system. Although vaccination was used, movement controls, enhanced surveillance and public awareness were considered more effective contributors to success in the Bicol surveillance zone (Windsor et al, 2011).[4]

Denis Hoffmann was an ACIAR Research Program Manager for several years until his appointment from 1995 to 2004 as Senior Animal Production and Health Officer for FAO in the Regional Office for Asia and the Pacific (RAP), Bangkok, Thailand. He was responsible for managing the AusAID - FAO Philippines project from 1996-2001 and considers this his biggest single contribution to regional FMD control. As the fourth Secretary of APHCA between 1997 and 2002, he encouraged the 16 member countries to focus on FMD, running workshops on FMD and arranging co-funding workshops with OIE and other agencies, by providing an important regional leadership and coordination role.

Ray Webb served as the FAO Chief Technical Adviser to Bureau of Animal Industries (BAI) in the Philippines from December 1996 until May 2000 and was located in Manila where he developed strong linkages with the national FMD Taskforce. His aim was to build the confidence of the Taskforce, strengthening laboratory and field interactions, introduce quality assurance programs to the FMD diagnostic laboratory, promote recognition of a swine-adapted strain of FMD with introduction of targeted vaccination of pigs only with monovalent Type O rather than polyvalent vaccines, introduce computerized Disease Information Management Systems using Epi-Info and Epi-Map, strengthen laws and acts to improve the legal basis of disease control and eradication activities, plus introduce effective disease control without reliance on 'stamping-out' activities that were unacceptable to local communities. An important initiative was to divert funds for a project Landcruiser to local construction of 'jeeps' to provide practical transportation for field animal health workers to enable disease outbreak investigations and surveillance in all 77 provinces. Further, he promoted both the transfer of successes with FMD eradication to other

national disease control programs (e.g. rabies, HPAI), the development of a professionally managed FMD public awareness program for the range of target audiences. Between 2002 and 2011, Ray also conducted numerous short-term consultancies for FAO to the Philippines BAI, assisting preparation of submissions to OIE for official recognition of FMD for specific zones and for preparation of contingency planning for FMD control in declared disease-free provinces.

Paul Freeman was the FAO Veterinary Field Officer (VFO) based in the Bicol region for the AusAID funded pilot FMD eradication program, commencing in May 1997 and continuing until June 1998, when he was replaced by Peter Windsor. Although centered on the 7 provinces of Bicol, the project worked synergistically with the NPCE to enable more rapid progress in eradication of FMD and enable a broader spectrum of project activities than were originally envisaged. In 1997 the VFO role was to establish an effective field office in Bicol (located in the National Department of Agriculture Regional headquarters near Pili), provide resourcing and develop strong regional networks and linkages with various stakeholders in the livestock industry. This included managing opposing political patronage of key individuals in each of the 5 levels of government providing animal health services (national, regional, provincial, municipal and barangay or village). As the project progressed, priorities included ensuring quality surveillance intelligence for the livestock sector, resourcing and training of local staff to developing animal health capacity across all levels of government, increasing the numbers of outbreaks where laboratory samples were collected, ensuring reports from investigating officers were more timely and generated useful epidemiological information, plus establishing a comprehensive stakeholder database to assist project communications and constantly reinforce the key messages of the national program.

Peter Windsor (formerly Harper) replaced Paul Freeman as the FAO VFO in Bicol in May 1998 and completed his mission in December 1999. Peter was responsible for improving the regional delivery of the four components of the NPCE strategy in the Bicol surveillance zone, including: quarantine and animal movement controls; strategic vaccination; surveillance and disease investigation; and enhanced public awareness with ‘school on the air’ (SOA) radio programs. The SOA were an extremely popular means of engaging rural communities in adult

learning, with participants enrolled in a 6 week course and 'graduating' in formal ceremonies with recognition by provincial governors and other officials. This enabled biosecurity messages to be embedded, such as the importance of cooking meat scraps and juices prior to feeding them as swill to household pigs ('a house is not a home without a healthy pig'), plus extensions tools were promulgated (e.g.T Shirts and stickers with 'FMD Free, The Way To Be'). Other initiatives included 'Negative FMD Reporting' to provide evidence of absence of FMD and a monthly newsletter 'The Bicol Express' that assisted communications; both encouraged competition between the provinces and districts to remain and prove FMD-freedom. Although the numbers of outbreaks declined after the Bicol office was established, evaluation of serological responses by ELISA in porcine vaccinates suggested low levels of immune protection, perhaps unsurprisingly given the poor restraint used in giving the 'speed shot' by local authorities, although recent observations that ELISA is less effective in detecting post-vaccination antibodies in pigs than in cattle may also be of relevance (Alasdair King, *pers com*). Further, a two stage random sampling survey identified evidence of undetected infection. A review of the program suggested that the decline and cessation of outbreaks was more likely a result of animal movement controls, improved surveillance and emergency response activities, and in particular, a reduction in FMD-risk behaviours by livestock owners and traders. This was attributable to enhanced public awareness of biosecurity measures by traders, livestock industry personnel and both commercial and smallholder farmers in the SOA (Windsor et al, 2011).[4] In addition to the considerable efforts to change risk behaviours of smallholders by improved knowledge of biosecurity, intensive serological studies and disease investigations, plus sharing of lessons from FMD outbreaks examined in Albay province in 1999, enabled improved understanding of FMD risk factors and more effective containment interventions (Windsor et al, 2011).[4]

Peter returned to NSW Agriculture in 2000, joining the Faculty of Veterinary Science at the University of Sydney in 2002. He has continued work of relevance to FMD control from 2005 until the present, initiating several ACIAR projects on capacity building of livestock health and production services in the GMS, particularly in Cambodia and Lao PDR. These projects have examined FMD epidemiology, control,

economics, and biosecurity of TADs, resulting in numerous publications (Rast et al, 2010; Nampanya et al, 2012, 2013a, 2013b, 2014, 2015; Young et al, 2012, 2013a, 2014).[8,9,10,11,12,13,14,15,16,17] Peter instigated and led a workshop in Cambodia that pulled together the results from 3 separate ACIAR projects on cattle health, production and marketing, as ACIAR Proceedings 138 (Young et al, 2013b).[16] He continues to supervise postgraduate students as an Emeritus Professor, is engaged in consultancies of relevance to FMD control for OIE and Asian Development Bank (ADB), and has developed several new ACIAR projects for the GMS commencing in 2015.

Developing FMD control capacities in Asia from 1983–2015, including the SEAFMD - SEACFMD campaign

ACIAR and AusAID and DFAT funded FMD projects have been important in ensuring that available information to guide decisions on FMD control and eradication strategies in the region is evidence based. There has been a critical need to improve diagnostic and epidemiological information for FMD control[18] (Khounsy et al, 2008), although in recent years, the importance of studies of health economics and social science to inform vaccination and extension strategies has been emerging, particularly in generating ideas on how to improve regional biosecurity (Windsor, 2011; Young et al, 2013).[3,x] ACIAR Program Managers responsible for animal health have all contributed to FMD research since the Centre was established in 1983, including John Copland, Denis Hoffmann, **Peter Rolfe** and Doug Gray. Currently, **Mike Nunn** has this important role. ACIAR has produced numerous publications of relevance to FMD control with the most recent focus on the GMS in Proceedings 137 (Adams et al, 2012) and 138 (Young et al, 2013).[19,x]

John Copland was an ACIAR program manager responsible for livestock research for many years until his retirement in 2005, developing collaborative projects of mutual benefit to Australia and countries in Asia. The first ACIAR FMD project was for improved FMD laboratory diagnosis in Thailand with the CSIRO Australian Animal Health Laboratory (AAHL) commencing in 1983 followed by the Thai epidemiology project (both described below). John determined the national priorities for FMD in Asian countries and their capacity for research, development and delivery of outcomes, managed project

designs, helped identify people and partners and potential benefits, assisted project participants in monitoring and evaluating projects, and facilitated adoption of the outputs, providing beneficial impacts in the Asian region and Australia. The ACIAR FMD projects in Thailand involved Australian scientists working alongside Thai scientists as Australia was in a unique situation with having a high security laboratory designed to allow work on live FMD virus (FMDV) at AAHL, but a livestock industry that would not approve the importation of live FMD virus. This resulted in challenges for developing FMD diagnostic tests, conducting epidemiological studies and gaining FMD experience in the field and laboratory. The ACIAR projects provided the framework for AAHL to locate senior scientists in Thailand and funding for FMD research, validating an improved diagnostic test at AAHL that did not use live virus. The significance of this test emerged when the Queensland Minister of Agriculture at the time, had suspected FMD diagnosed on his farm and was placed in total quarantine. Samples sent to AAHL, where the new test had just been established, were found to be negative, enabling release of the Minister's farm from quarantine, much to his delight, as the alternative was to send it to the World Reference Laboratory for FMD at Pirbright UK and remain under quarantine restrictions for an extended period. This incident assisted ACIAR in gaining approval for Queensland staff to work in Asia as until the 'FMD scare', he was most reluctant to permit his staff go outside the State, changing his mind once seeing the benefits of international collaboration.

Tony Forman from AAHL and Bill Geering from ABAH (with Ian Robinson, an agricultural economist from the Queensland Department of Primary Industries (QDPI) conducted a mission in 1983 to Indonesia, Singapore, Malaysia, Thailand and the Philippines on behalf of AIDAB (at the request of the ASEAN Coordinating Group on Livestock) to investigate whether a program should be commenced that would eradicate FMD from ASEAN countries and what was the optimal role for Australia in supporting such an initiative. FMD had recently been eradicated from Indonesia with Australian assistance, Singapore was free of the disease and Malaysia was possibly also free, following widespread vaccination. All other ASEAN countries were endemically infected, as

were those countries outside the region but with contiguous land borders. The team concluded that eradication of FMD from Thailand was not achievable in the short-term because of constraints on local technical capacity, lack of epidemiological data, and a limited ability to control livestock movement both within and between neighbouring countries. However, the team observed that in the Philippines, the geographical distribution of FMD had become markedly reduced and although control of livestock movements within the country was poor, there was very limited importation of livestock. If initial epidemiological investigations to define the disease status confirmed these observations, eradication was considered a realistic goal that would also be economically beneficial. Recommendations from this mission included:

- Support of FMD control in Singapore, Malaysia, Thailand and the Philippines, initially for four years;
- Assistance with developing national diagnostic capabilities in all countries;
- Establishing epidemiological capacity, improving vaccine quality and as FMD control was improved, strengthening of a designated disease-free zone in the south of Thailand; and
- Undertaking epidemiological studies in the Philippines, followed by systematic eradication.

About two-thirds of the funding was to go to the Philippines. Unfortunately, AIDAB was seeking a project with more even support to each of the countries and although the proposal was accepted by the ASEAN Coordinating Group on Livestock, it was not pursued by AIDAB at the time.However, the initiative did progress and in 1994, Tony Forman visited the Philippines on behalf of the AIDAB to undertake a pre-feasibility study for FMD eradication. Unlike the previous mission, this had a national focus and was partly in recognition of the trade benefits to Australia of fostering livestock production in the Philippines, involving importation of young cattle from northern Australia to be intensively grown and fattened for local markets (as "Australian beef"). Tony concluded that the goal was achievable and recommended that AIDAB support the initiative. At that time, the capacity of the Philippine Animal Health Centre for diagnosis of FMD

and other major diseases was occurring, enabling improved epidemiological knowledge. This involved **Peter Roeder** (previously of AAHL) and subsequently **Geoff Gard** and was supported by FAO.

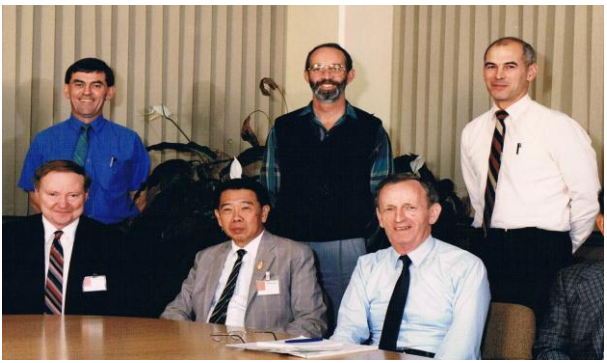

Figure 3. Back LtoR: Laurie Gleeson, Harvey Westbury, Tony Forman Front: John Copland, Tim Bhannasiri, Bill Snowdon in Thailand 1988.

Harvey Westbury was the foundation project manager stationed at the Northern Veterinary Diagnostic and Research Centre (NVDRC) in the province of Lampang in Thailand in 1986 for the first two years of an AAHL-led project, financed jointly by AAHL, ACIAR and the Thai Department of Livestock Development (DLD). The project aimed to rigorously assess the new virus-capture FMD ELISA developed in Pirbright, a test that would detect the virus as well as type the captured virus, as either A, O, C, Asia 1 or one of the 3 SAT types. As the test had only undergone small scale evaluation at Pirbright, it was not yet accepted by the FMD fraternity and OIE. The project aimed to validate the new test, assist the Thai Department of Livestock Development (DLD) to establish a virology laboratory in Lampang, and provide opportunities for AAHL staff to gain experience with FMD. The Australian and Thai teams established a functioning virology laboratory able to use the range of FMD diagnostic techniques available at that time, including a cell-culture laboratory for virus isolation attempts. The Thai staff received training in running a virus diagnostic laboratory handling a large number of FMD diagnostic specimens from far-flung parts of northern Thailand, leading to validation of the virus capture ELSA as an important technique to detect and type a virus involved in

FMD outbreaks. Harvey then arranged transfer of the laboratory systems and the FMD ELISA to Thailand's central FMD laboratory at Pak Chong. **Laurie Gleeson** and other veterinarians from AAHL took over the management for remaining years of the project.

A further ACIAR funded project at NVRDC followed the Thai-Australian FMD project, headed by **Chris Baldock** (deceased) on FMD epidemiology, with AAHL staff in Thailand involved in laboratory diagnosis supporting the project. This continued a nine year period during which DLD veterinarians and scientists learnt an immense amount about animal disease diagnosis and control. In the early 1990's ACIAR approached AAHL to undertake a similar project to the Thai-Australia FMD project in Lao PDR, but also involving China. Harvey scoped and ran this project from AAHL and although there were similarities between the Thai and Lao projects, laboratory technology had accelerated into molecular microbiology by this stage and the newer FMDV test systems needed to be evaluated. The plan was to use 'appropriate" technology for Lao PDR such as the FMD ELISA, assessing newer molecular techniques in China at the Yunnan Tropical and Sub-Tropical Animal Virus Disease Laboratory in Kunming. Staff from Kunming, had visited AAHL a number of times on reconnaissance missions and were sufficiently impressed to lobby ACIAR for inclusion in the Lao project. AAHL was probably the first 'western' animal health institution to be invited into China to study FMD. The project assisted the Lao PDR animal health system to dramatically improve their understanding of control of major animal TADs. Molecular techniques for FMD diagnosis were assessed in China and eventually PCR for detection of FMD virus was transferred to Lao PDR. Although the Chinese were wary of sharing too much information about FMD in China, the project slowly built confidence between the participants. Laurie Gleeson eventually assumed leadership of the project until completion in 2005.

Laurie Gleeson was the in-country project leader of the Thai Australian FMD project between October 1987 and October 1990, working at Lampang with Thai colleagues on FMD investigations and associated laboratory work and contributing to the work at Pak Chong, including a comprehensive analysis of the field viruses at the time and the alignment

with the vaccines in use. From November 1990 until October 1992, he led the project from Geelong and in September 1993 he was the principal technical organiser of a successful conference on FMD in SE-Asia held in Lampang (Copland et al, 1994).[20] In September 1994, Laurie accompanied Tony Forman and Philip Young on a mission with local veterinary personnel, examining the feasibility of a project to eradicate FMD from the Philippines. By then FMD had largely disappeared from livestock other than pigs and serotypes A and C were no longer detectable, enabling the main focus of control efforts to focus on type O in pigs. However this mission coincided with the introduction of the swine-adapted O strain of FMD and the emergence of the major epidemic described, forcing realignment of FMD control project to control of FMD on Luzon and prevention of further southern spread and work with FAO to finalise the design of the project (working at that time with Peter Roeder). A five-year project was proposed, costing about AUD 12.5 million in Government of Australia support, with Government of Philippines support of AUD 6 million. The project was to support current FMD control activities, undertake epidemiological studies and plan strategic vaccination to lead to the eradication of FMD. Ultimately, this program was funded and implemented by FAO, with several Australian veterinarians participating (as previously described), commencing on the Bicol Peninsula of Luzon and leading to successful FMD eradication.

At about that time Laurie was also involved with IAEA (International Atomic Energy Agency) focussed on a technical cooperation programme on FMD in SE Asia, to develop the regional FMD reference laboratory. From October 1997 until October 2001, Laurie was the first appointed Regional Coordinator (RC) of the OIE SEAFMD control program in the regional coordination unit (RCU) in Bangkok. This entailed:

- Organising the first of annual and subsequent meetings of the OIE sub-commission;
- Establishing a network of countries providing good information on FMD outbreaks;
- Commencing the zonal concept for control of FMD (MTM zone on the Malaysia Peninsula);
- Conducting field investigations of FMD especially in Lao PDR;
- Commencing the FMD mapping website (with the assistance of Angus Cameron);

- Preparing the project document for the second phase of AusAID funding for SEAFMD;
- Organising technical workshops in support of the program;
- Assisting the establishment of FMD diagnostic capacity with support from the IAEA; and
- Supporting the role of the FMD Regional Reference Laboratory.

Following his position in SEAFMD, Laurie was the project Leader in 2003 through 2005 of the Lao-Australian Animal Health Research Project from 2003-2005. This project focused on swine fever at the village level while also maintaining local FMD diagnostic capacity, supplying sera for validation of the 3ABC ELISA (Conlan et al, 2008).[21] He continued his involvement with the IAEA FMD technical cooperation program providing to support Pak Chong laboratory to fill its role as a reference laboratory. In 2005, he started to prepare for ASEAN participation by seeking support for the FMD regional laboratory to achieve ISO certification.

John Edwards was the second Regional Coordinator for the OIE SEAFMD Campaign (2001-2004), working closely with eight ASEAN Countries to progress their formal management processes and commitment including national FMD plans, introducing progressive zoning in the Malaysia-Thailand-Myanmar (MTM) Region. Other initiatives were:

- Establishing sub-regional groups for zoning and animal movement management,
- Initiating steps to involve China in the regional secondment program,
- Recruiting an ASEAN national as Regional Coordinator (Ronel Abila) and
- Planning for sustainability of the program by engaging with ASEAN.

Following his return to Perth as Dean of the School of Veterinary and Biomedical Sciences at Murdoch University from 2004-2009, John developed collaborations and linkages between Murdoch University, the Australian Biosecurity CRC, ACIAR, DAFF, WRL Pirbright, FAO, OIE, ADB and Asian countries to provide support for 13 postgraduate students to do research of relevance to FMD control in Southeast Asia

(Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines and Thailand), Bhutan and China, including a collaborative ACIAR project to study livestock movements in Cambodia and Lao PDR and their role in the transmission of FMD.
From 2010-2012, as Director of One Health Solutions, John provided consultancy services relevant to FMD, One Health, epidemiology capacity building and emerging infectious diseases in Bhutan, Cambodia, China, Lao PDR, Malaysia, Mongolia and Singapore, while continuing to supervise postgraduate students as an Emeritus Professor with Murdoch University. Currently, John is Team Leader of the FAO ECTAD program in China, from 2012–2015. An important role has been facilitating bilateral and multilateral collaborations on the control of TADs-FMD that include China-Mongolia-Russia, China-Vietnam and China-Lao-Myanmar. A significant part of his work in China involves epidemiology capacity building and the national epidemiology network is already making a significant contribution to China's national priority disease control programs.

Angus Cameron has provided extensive support for the development of basic epidemiology and surveillance skills throughout ASEAN, with special emphasis on Thailand (1994-96) and Laos (1996-98) and the Philippines (1998-2000) where he contributed to the AusAID-FAO FMD eradication campaign, working with Ray Webb, Peter Windsor and **Chris Baldock** (deceased), in contributing to the design of a two-stage random sampling serosurvey that identified residual infection that was not detected through opportunistic sampling and negative incident reporting (Windsor et al, 2011).[4] Angus has continued training programs in epidemiology and surveillance for ASEAN and all of its individual countries (all except Brunei) through AusAID, ACIAR and other projects (1998-2015) and considers the Philippines FMD eradication as the biggest regional achievement in FMD during his working life. The contributions of Chris Baldock and Angus Cameron over many years has led to a fundamental shift in disease control programs in many countries in the region as the early and mid-career professionals that were trained in the early years are now in leadership and decision-making positions, using their 'epi' thinking to improve disease control approaches in many different countries.

Chris Hawkins was the project leader for the ACIAR project 'Understanding Livestock Movement and the Risk of Spread of Transboundary Animal Diseases' (AH/2006/025) from 2006 to 2012. The project examined livestock movements in the Cambodia/Lao region (impacting on the neighbouring countries of Thailand, China, and Vietnam), assessing the risk of spread primarily of FMD and means of managing that risk. This project determined the drivers for livestock movement within and across national borders, particularly in Cambodia, observing the volatility of movement pathways and that trade routes, while carrying many thousands of stock in one month, may have very few the next. The variability is influenced by changes in money exchange rates, season, and other drivers. It was identified that up to 45% of traders had traded FMD infected cattle because of the significant price benefits for doing so, and that producers were not highly motivated by FMD as it rarely kills animals, unlike haemorrhagic septicaemia. While FMD is an inconvenience, it's seen as manageable. Major gaps in livestock disease reporting that prevent action against FMD were identified, as were breakdowns in biosecurity, with poor recognition of the principles of disease transmission, and revealed a conflict of interest in village animal health workers, who supplement their income from the sale of medicines. Of concern was that political will to address FMD is insufficient as other issues take a higher priority and consume staff time. There is also a conflict of interest here, with FMD project funds supplementing staff resources and incomes. The project provided training to regional animal health staff in data collation, recording, and reporting using regional computing facilities and developed educational resources for livestock traders, village animal health workers, and producers to enhance livestock biosecurity at each industry level. Of additional concern was the identification of poor FMD vaccination strategies, with lack of vaccine, inadequate vaccine coverage within a population, poor vaccination technique, and questionable maintenance of the vaccine cold chain.

Jim Kerr was the project manager for the ACIAR animal movement project that aimed to understand livestock movement and the risk of spread of TADs, working with Chris Hawkins, **Malcolm Anderson, Kate Blaszac** and **Ben Madin**. He currently works in an ACIAR project on domestic and international market development for high-value cattle and beef in South-East Cambodia. The first project mapped and

quantified livestock trade pathways in Cambodia and Laos, including international trade routes from Myanmar and Thailand through Laos and Cambodia to Vietnam and China (all illegal, but sanctioned). Ongoing work aims to identify:

- Trends in livestock trade that have disease risk implications (e.g. increasing importation by Vietnam of young Cambodian cattle for fattening, as opposed to importing adult cattle for immediate slaughter);
- Livestock trader practices that contribute to FMD spread throughout the GMS;
- The high risk practices and customs by farmers and Village Animal Health Workers (VAHWs) that spread FMD during outbreaks; and
- The simple educational material required for farmers, VAHWs and livestock traders to improve biosecurity practices throughout the cattle market chain.

Figure 4. Laos inception workshop February 2015: LtoR Sonevilay Nanpaanya, Peter Windsor, Syseng Khounsy, Russell Bush, James Young.

James Young joined the Sydney University Mekong Livestock Research (MLR) team in 2011 as a project officer and part-time PhD student working on FMD epidemiology and economics, initially in support of **Luzia Rast.** Luzia spent almost 2 years in Laos and conducted field based FMD work alongside her PhD studies on

parasitism (Rast et al, 2010).[8] Jim then became the sole project officer when Luzia left USYD to join CSU. Jim had a major role in coordinating the papers for ACIAR Proceedings 138[16] (Young et al, 2013b) and has successfully documented numerous studies of relevance to TAD control including estimates of the financial impacts of FMD (Young et al, 2012, 2013a, 2014).[14,15,17] Jim also developed a website for managing MLR information: http://mekonglivestock.wordpress.com

Peter Black of the Australian Department of Agriculture (ADA) and **Steve Dunn** of NSW Agriculture received EXANDIS funding to visit FMD infection sites in northern Thailand in 1992 with **Paul Cleland** who was the epidemiology leader for an ACIAR project on FMD. This project identified risk factors for FMD including co-grazing and sharing of water sources at the village level (Chamnanpood et al, 1995; Cleland et al, 1995).[22,23] They were involved in FMD outbreak investigations, conducted questionnaires and assisted in data entry and analysis, plus examined FMD diagnostic procedures in the Lampang laboratory that was receiving support from AAHL involving **Bill Doughty** and **Trevor Ellis** from Western Australia. In 2003, Peter Black assisted the OIE RCU in Bangkok on surveillance design for the Myanmar-Thailand– Malaysia (MTM) zone, one of the focus areas of the SEAFMD program. Peter visited all three countries gathering information on populations at risk, outbreak histories (serotypes, dynamics), veterinary service structures, quarantine station locations and policies and informal animal movements between the three countries (informal), reporting on surveillance options and sharing his report with **David Banks** (deceased) for his subsequent risk assessment work for OIE. This work led to involvement in SEAFMD meetings and planning in most years from 2004-13, plus his contribution to revision of the SEACFMD 2016-2020 Roadmap with the change in approach from zones per se to control at source and hotspots along the trade routes. Peter Black's contributions also included having the OIE RCU formally recognize and consider the socioeconomic issues and drivers through the 'foresight' process; helping design of the current AusAID STANDZ program for OIE in 2011; and ensuring that the Australian CVO, currently **Mark Schipp**, is on the steering committee of the broader Australian funded program 'Stop Transboundary Animal Diseases and Zoonoses' (STANDZ) in addition to Membership of the SEACFMD Advisory Committee. **Sam Hamilton** has provided more

recent support to regional FMD control programs by representing ADA.

Figure 5. Australian Veterinarians at 21st SEACFMD Meeting in Manilla March 2015. LtoR K Kukreja, S Hamilton,C Miller, G Murray, P Widders, S Seneque, P Windsor & J Young.

Gardner Murray was appointed as the Australian delegate to OIE in 1983, successfully initiating the SEAFMD (with Dr Ozawa of Japan) and driving its development. As OIE became increasingly interested in FMD in South East Asia, a Sub-Commission was formed to plan disease control and Gardner pressed for a RCU office in Bangkok, obtained funds from AusAID and other sources in 1997 to support activities and provide a strategic framework that could inform and guide all stakeholders in their FMD work. Thus began the SEAFMD campaign, comprising Thailand, Malaysia, Philippines, Myanmar, Cambodia, Laos PDR and Vietnam, with Indonesia joining in 2001. With the growing importance of SEAFMD, the People's Republic of China, Singapore and Brunei joined in 2010 and the expanded program was re-named the SEACFMD with a 'roadmap' developed to prevent, control and reduce the incidence of FMD by 2020 and to maintain FMD free status in countries or zones free of the disease. The Program is complex and ambitious and success depends on political, financial, and stake-holder

support, with OIE providing coordination, strategic direction and a standards mechanism as countries manage their own national programs. Gardner has remained intimately involved in these developments and continues his many years of effective promotion of Australian support for regional FMD control.

Figure 6. SEACFMD Meeting Bangkok February 2015. RCU staff and Colleagues with Gardner Murray, (centre) Phil Widders, Karan Kukreja and Corrisa Miller

John Stratton commenced postgraduate studies at Sydney University in late 1997, on FMD in Cambodia, aligned with an ACIAR project on cattle led by Peter Windsor. His work included interviewing and training 445 VAHWs across Cambodia on FMD control and conducted FMD vaccination field trials, influencing Cambodian veterinary and para-veterinary staff at all levels on FMD control strategies. He then worked with OIE as manager of the Program for Strengthening Veterinary Services in SE Asia (PSVS) in 2009-10 and was involved in SEACFMD program, assisting development of a SE Asian FMD Vaccination Strategy. Whilst working full time for the ADA, John has an ongoing role as OIE PSVS consultant, contributing to PSVS missions in Myanmar, Indonesia, Vietnam and Thailand that have provided insights into the quality of veterinary services and how they may be improved, based on international standards. John contributed to OIE PSVS pathway document that supports continuous improvement in veterinary services, now adopted by the OIE as global policy.

Karan Kureja has worked in the OIE RCU in Bangkok for the past 3 years and been responsible for many roles in support of SEACFMD, including arranging the regular meetings of the numerous collaborators and assisting the development of new projects. This included progression of a project proposal for ACIAR on regional biosecurity, following initial scoping work by **Nigel Perkins** of Ausvet Services and contributions from **Andrew Davis** from AAHL who was posted at the RCU for a period. Karan has recently been joined by **Phil Widders** and **Corissa Miller** as new employees of the RCU (now SRR SEA) and have progressed the revised SEACFMD Roadmap for Phase 5 of the campaign from 2016-2020.

Sacha Seneque has spent the past 20 years involved in FMD vaccine supply, vaccination strategies and practices, in his role for the leading regional FMD vaccine supplier (Merial). Initially, Sacha facilitated emergency vaccine supply for field use in the face of the O 'Cathay' topotype incursion in the Philippines in 1995 and Taiwan in 1997. He subsequently assisted the introduction of more targeted vaccine strain formulations developed from local outbreak isolates (Type O Taw 97 & O Phil 98) to obtain optimal efficacy against this new 'swine-adapted' topotype that became endemic in the GMS. He has continued to address regional needs for increased FMD vaccine supply capacity and the flexibility necessary that supports national vaccination and extension initiatives, plus the significant emergency vaccine demand surges that arise due to unexpected outbreaks. Sacha has also engaged in the development and implementation of several public-private collaborations in Vietnam from 1997 and Korea from 2012, ensuring appropriate step-wise technology transfer and quality assurance programs that enable bulk vaccine supply and local formulation partnerships to be established. These techno-commercial partnerships offer sustainable cost-effective supply and sourcing of larger quantities of high quality vaccines, with development of local industrial value-added capabilities and vaccine ownership. Now responsible for veterinary public health activities of Merial across the wider Asian, Middle East, African and Eastern European regions, Sacha remains engaged with numerous national government authorities, international organisations (OIE & FAO), as

well as multiple industry partners and other stakeholders involved in TAD control, animal health, welfare and food security.

Conclusions

Since 1974 when an Australian interdepartmental team was sent to Indonesia to examine the feasibility of a project of eradication of FMD by vaccination of large ruminants, Australian veterinarians have worked closely with their in-country colleagues in numerous countries in SE Asia to control and eradicate regional Transmissible Animal Diseases. Although the initial prospects of success of the program in Indonesia were considered to be low, and similar sentiments were expressed in the early Philippines eradication program, both projects proved to be extremely successful, with eradication declared in 1984 in Indonesia and the Philippines in 2012. The apparent sustainability of investments in FMD eradication in Indonesia and the Philippines has been remarkable, particularly with the current re-emergence of serious outbreaks of FMD in many countries in the region. Both Indonesia and the Philippines share the advantage of Australia in their island geography that enhances border protection through control of sea transport of animals and product, although FMD is well known to be also transmitted by animal products transported by air services, so effective TAD surveillance remains critical.

The programs have made enormous contributions to improved disease control capacity, particularly through training activities. Young in-country personnel, who were trained in these two countries, now hold leadership positions and provide more scientifically rigorous influence on animal health programs not only in their respective countries, but also in international agencies (e.g. OIE and FAO). Australian veterinarians have made important contributions to this capacity building and can be proud of their contributions to the success of the FMD eradication campaigns. This success provided encouragement for the hugely challenging prospect of control and eventual eradication of FMD in the Greater Mekong Sub-Region. Work commenced in Thailand by upgrading diagnostic capacities and improving knowledge of the epidemiology of FMD outbreaks in SE Asia, achieving improved surveillance and reporting. This work was then extended to other countries and Laos in particular, facilitated by development of the

SEAFMD program which then expanded to become the SEACFMD program, supported by the STANDZ initiative. More recent work has focused on FMD risk management, effectiveness of strategic vaccination, development of biosecurity extension programs and economic analysis.

In the Greater Mekong Sub-Region and beyond, there exist distinct differences in the disease control capacities of the member countries and achieving more effective control of Transmissible Animal Diseases in some places requires generational change and many other issues to be overcome. In particular, informal animal movement across the GMS presents an enormous challenge for countries aiming to control FMD, with eradication now considered unachievable by 2020 and uncertainty on the prospects of complete eradication being achievable in the medium term. There are a number of reasons for this, including:

- Porous international borders with 'informal' international trade 'facilitated' rather than regulated
- Lack of established industry stakeholders driving partnerships to share leadership with government
- Deficiencies in veterinary services capacities to deliver timely surveillance and reporting
- Lack of emergency disease response conceptual framework and capacity for TADs
- Lack of access and difficulties of administration of appropriate vaccines to current field isolates
- Reliance on vaccination strategies and a 'top-down' institutional approach
- Low farmer awareness and knowledge of biosecurity the socioeconomic impacts of FMD

Despite these challenges, many Australian veterinarians have persisted in their commitment to working with their SE Asian colleagues to assist TAD control in the GMS and beyond. Support for these efforts through provision of funding for programs by the numerous Australian livestock industry stakeholders is to be encouraged.

Acknowledgements

Provision of information on FMD experiences by those who made contributions is much appreciated, as was advice from Dr Mike Nunn. Special thanks to Helen Scott-Orr who provided an enjoyable discussion including mutual memories of Professor Bain, a rather inspirational individual.

References

1. Fisher, JR. Foot-and-mouth disease in Australia. *Aust Vet J* 1984 **61**:158-161.
2. ABARES. Potential socioeconomic impacts of an outbreak of foot-and-mouth disease in Australia. *Australian Department of Agriculture Research Report* 2013 13.11. www.apo.org.au
3. Windsor PA. Review: perspectives on Australian animal health aid projects. Editor invited paper. *Transb Emerg Dis* 2011 **58**:375–386.
4. Windsor PA, PG Freeman, R Abila, C Benigno, V Nim & A Cameron. Control and eradication of Foot and Mouth Disease in the Bicol surveillance buffer zone in the Philippines. *Transb Emerg Dis* 2011 **58**:421-433.
5. Bain RVS. The foot and mouth disease control and eradication project in Indonesia, 1974-1981. *Report for the Australian Development Assistance Bureau. Australia, Department of Foreign Affairs* 1982.
6. Gee RW. Pigs and foot-and-mouth disease - déjà vu. *Aust Vet J* 1995 **72**:238.
7. Randolph, TF, BD Perry, CC Benigno, IJ Santos, AL Agbayani, P Coleman, R Webb & LJ Gleeson. The economic impact of foot and mouth disease control and eradication in the Philippines. Rev. Sci. Tech. 2002 **21**:645–661.
8. Rast, L, PA Windsor & S Khounsy. Limiting the impact of Foot and Mouth Disease in Northern Lao People's Democratic Republic by Vaccination: A Case Study. *Transb Emerg Dis* 2010 **57**:147-53.
9. Nampanya S, J Richards, S Khounsy, P Inthavong, M Yang, L Rast & PA Windsor. Investigation of foot and mouth disease hotspots in northern Lao PDR. *Transb Emerg Dis* 2012 **60**:315-329.
10. Nampanya S, S Khounsy, JR Young, A Phonvisay, RD Bush & PA Windsor. Financial impact of Foot and Mouth Disease on large ruminant smallholder farmers in the Upper Mekong Subregion. *Transb Emerg Dis* 2013a doi: 10.1111/tbed.12183.
11. Nampanya S, S Khounsy, L Rast, PA Windsor. Promoting transboundary animal disease risk management via a multiple health and husbandry intervention strategy in upland Lao PDR. *Trop An Health Prod* 2014 **46**:439-46.
12. Nampanya S, S Khounsy, R Abila, C Dy, PA Windsor. Household financial status and gender perspectives in determining the financial impact of Foot and Mouth Disease in Lao PDR. *Transb Emerg Dis* 2014 doi:10.1111/tbed.12281.
13. Nampanya, S. Khounsy, JR Young, RD Bush & PA Windsor. Financial impacts of Foot and Mouth Disease at village and national levels in Lao PDR. *Trans Emerg Dis* 2015 doi:10.1111/tbed.12319.
14. Young JR, S Sothoeun, CJ Andrews, LA Henry, PA Windsor 2012. Assessment of financial impact of Foot and Mouth Disease on smallholder cattle farmers in southern Cambodia. *Transb. Emerg. Dis*. **60**:166-174
15. Young JR, S Evans-Kocinski, RD Bush & PA Windsor. Improving smallholder farmer biosecurity in the Mekong region through change management. *Transb. Emerg* Dis 2013a doi: 10.1111/tbed.12181
16. Young JR, L Rast, S Sothoeun & PA Windsor. Cattle Health Production and Trade in Cambodia. *ACIAR Proceedings* 2013b 138.

17. Young JR, S Suon, S Nampanya, PA Windsor & RD Bush. Benefit-Cost analysis of Foot and Mouth Disease control of large ruminants in Cambodia. *Trans Emerg Dis* 2014 doi:10.1111/tbed.12292.
18. Khounsy S, JV Conlan, LJ Gleeson, HA Westbury, A Colling, DJ Paton, NJ Knowles, NP Ferris & SD Blacksell. Foot and mouth disease in the Lao People's Democratic Republic: I. A review of recent outbreaks and lessons from control programs. *Rev Sci Tech Off Int Epiz* 2008 **27**:839–849
19. Adams LB, GD Gray & G Murray, Eds. Animal biosecurity in the Mekong: future directions for research and development. *ACIAR Proceedings* 2012 137.
20. Copland JW, LJ Gleeson, and C Chamnanpood. Diagnosis and Epidemiology of Foot-and-Mouth Disease in Southeast Asia. *ACIAR Proceedings* 1994 51.
21. Conlan JV, SD Blacksell, CJ Morrissy & A Colling. Management of classical swine fever and foot-and-mouth disease in Lao PDR. *ACIAR Proceedings* 2008 128.
22. Chamnanpood P, PC Cleland, FC Baldock & LJ Gleeson. The minor role of pigs in outbreaks of FMD of northern Thailand. *Aust Vet J* 1995 **72**:142.
23. Cleland P, P Chamnapood, FC Baldock & LJ Gleeson. An investigation of 11 outbreaks of foot-and-mouth disease in villages in northern Thailand. *Prev Vet Med* 1995 **22:**293–302.