COMPLETED PROJECTS
Summary

Bovine Johne’s disease (BJD), caused by *Mycobacterium avium* subsp. *paratuberculosis* is a significant issue for the dairy industry in south eastern Australia and a sporadic problem in beef cattle. Efforts to reduce the within-herd prevalence of BJD within the dairy industry have been quite successful using conventional technologies, and concomitant efforts to prevent spread to the beef cattle sector also appear to be well accepted by the industry. A vaccine for BJD may soon be available; this is likely to be a valuable tool to reduce prevalence in heavily infected dairy herds.

Internationally, BJD is considered to be a significant threat to the livestock sector. Several studies have confirmed direct economic loss, but a greater threat exists because of a perceived link with Crohns disease in humans, and the need to apply the precautionary principle in order to ensure future market access for livestock products. Public health authorities in many developed countries have adopted a neutral position on the possible link between *M. paratuberculosis* originating in livestock and the occurrence of the organism and disease in humans. However there are large research programs on BJD in the EU/Europe, Japan and North America and smaller research programs in many other places. For market access insurance, Australia needs to be engaged with R&D at an international level. Currently there is very little active research on BJD in Australia. A very large research program on ovine Johne’s disease (OJD) (National OJD Control and Evaluation Program) has been completed and has led to substantial capacity in this field of research that can now be applied to BJD.

This project addresses substantial opportunities:

- Australia is in a good position to capitalise on research advance in BJD that will come from the EU and North America because of close scientific and professional collaboration and interactions through the International Association for Paratuberculosis (IAP) and the Johne’s Disease Integrated Program (JDIP). Australia can expect to obtain greater understanding of the causative bacterium and its evolutionary background, and better herd diagnostic tools, for example environmental sampling. These advances will become available without direct investment, but may be limited in extent or applicability in the Australian context.
- Australia currently has a large research program on pathogenesis and early detection of OJD (MLA project OJD.031). This project has resulted in collaborative ties with researchers in Scandanavia (BJD), New Zealand (JD in sheep and deer) and Japan (BJD). The techniques and infection models developed through the project are directly applicable to BJD research.

Source of funding

Meat & Livestock Australia

Project timeframe

January 2008 – June 2011
Ovine Johnes Disease – Applications of basic research on enhanced diagnosis and prevention
MLA P.PSH.0311

FA&VPH Staff

Professor Richard Whittington  Dr Douglas Begg
Dr Kumi de Silva  Dr Karren Plain
Dr Auriol Williams  Ms Adelyn Bolithon
Ms Nicole Carter  Mr Craig Kristo
Mrs Rebecca Maurer  Mr Ankit Srivastava
Mr Nobel Toribio  Mrs Anna Waldron
Mrs Ann-Michele Whittington

PhD Student

Ms Satoko Kawaji, Mrs Kate Bower, Mr RB Gurung,
Ms Shyamala Thirunavukkarasu

National Collaborators

Dr Ian Marsh, NSW Department Industry & Investment,
Elizabeth Macarthur Agricultural Institute

International Collaborators

Dr Jayne Hope, Compton Institute, UK
Dr Gregers Jungerson, Danish Veterinary Laboratory
Dr Yasuyuki Mori, National Animal Health Institute, Japan
Dr Torsten Eckstein, Colorado State University

Summary

Ovine Johnes’ disease (OJD) is caused by Mycobacterium avium subsp. paratuberculosis (MAP) remains a significant issue for sheep industries throughout southern Australia. It can be responsible for significant losses if left uncontrolled. Vaccination to reduce the prevalence of clinical disease within infected flocks has been very successful, with widespread adoption by affected producers. In addition, vaccination is used to improve flock status in a risk based trading scheme. However, vaccination does not prevent infection, and rates of shedding of MAP remain high on several properties where the vaccine has been used, there are injection site reactions in sheep and occupational health and safety risks for producers. Furthermore, some producers have ceased to vaccinate due to reductions in flock mortality rates, high cost of vaccine and reduced farm incomes due to the drought. In addition, producers in some regions where OJD is uncommon or absent continue to exclude sheep from endemic regions, which is impacting on trading options of producers. Food safety is also a concern. Although controversial and still unproven, MAP has been proposed as a potential cause of Crohns Disease in humans.

Internationally, JD is considered to be a significant threat to the livestock sector, regardless of the species affected. Public health authorities in many develop countries have adopted a neutral position on the possible link between MAP originating in livestock and the occurrence of the organism and disease in humans. Nevertheless, animal health authorities in many countries have introduced, or plan to introduce control programs for JD. These will depend on research programs on JD in the EU/Europe, Japan and North America and smaller research programs in many other places. These countries are trading partners and/or competitors of the Australian red meat industries. For market access insurance, Australia needs to be engaged with R&D at an international standard. Currently there is very little basic research on JD in Australia other than that in a recently completed MLA project, OJD.031. That research program led to a substantial Australian capacity in this field of research. The research needs for OJD are complementary to those of BJD. This project is a program of basic and applied research that aims to develop new diagnostic tests for OJD and, through a program of basic research on the pathogenesis of the disease, increase understanding of the immune response to infection, dormancy of the bacterium and how this relates to chronic infection and transmission of the bacterium.

Source of funding  Meat & Livestock Australia

Project timeframe  January 2008 – June 2011
Evaluation of the effectiveness of Gudair™ vaccination for the control of OJD in flocks vaccinating for at least five years MLA P.PSH.0309

FA&VPH Staff
Professor Peter Windsor
Professor Richard Whittington
Mrs Anna Waldron

National Collaborators
Dr Jeff Eppleston,
Central Tablelands Livestock Health & Pesticides Authority
Dr Evan Sergeant, AusVet Animal Health Services

Summary
Ovine Johne’s disease (OJD) caused by Mycobacterium avium subsp. paratuberculosis (MAP) is a major issue for the sheep industries of southern Australia, causing significant on-farm losses, division within the industry, plus potential public health concerns. Control of OJD in Australia now depends heavily on use of Gudair™ vaccine to control on-farm losses and to reduce the risk of disease spread. Research undertaken during the six-year National Ovine Johne’s Disease Program (NOJDP) demonstrated that the current vaccine is highly effective in reducing mortalities due to OJD and shedding of organisms, but some sheep still develop severe clinical disease, shed heavily and die. This research supported the registration of the vaccine for use in sheep in Australia, and it is now widely used as a disease control and risk management tool.

However, the original vaccine evaluation was undertaken in a single generation of vaccinated lambs in three heavily infected flocks in the central tablelands area of NSW, under conditions of very high challenge. This has given rise to speculation that:

- Efficacy of the vaccine might have been underestimated because of the high-challenge situation in the trial flocks; and
- The vaccine may be more effective in lower-prevalence flocks than was observed in the high-prevalence trial flocks.
- Although modelling suggests that long-term use of vaccine will provide highly effective control and suppression of shedding, even in heavily infected flocks, this has never been verified experimentally. This has important implications for the value attributed to flock-vaccination in any flock-assurance scheme, as highlighted in recent discussions for continuation of the national program.

Further research on vaccine efficacy is well advanced, in a longitudinal study of shedding from three generations of sheep vaccinated as lambs (MLA project OJD.033). However, as this project is limited to only 12 flocks in central NSW and final results are not expected until early 2009, there is a need for a broader study on the impact of vaccination on shedding rates in flocks of varying initial prevalence. As recent results from OJD.033 have indicated that the profound decrease in shedding over time may not be achieved in all participating flocks, the reasons for this need to be investigated. In addition, investigations in a greater number of flocks to support this project and to provide an earlier indication of longer-term effects of vaccination in flocks of known infection and vaccination history, is needed.

The purpose of the project is to evaluate the effectiveness of Gudair™ vaccine in reducing OJD prevalence and bacterial shedding in a range of flocks of known OJD prevalence, at about five years after the commencement of vaccination.

Source of funding
Meat & Livestock Australia

Project timeframe
January 2008 – January 2010
Summary

Ovine Johne’s disease is a chronic and intractable problem. Spread of the disease has continued despite stringent regulatory measures, and in the absence of compensation for affected producers has led to severe division within the industry. Vaccination and risk-based trading have been accepted as an interim approach to limit further spread of the disease. There is clearly an urgent need for better diagnostic tests. The main requirement is for a test that can detect infection in young sheep before the onset of faecal shedding. The test needs to be sensitive, specific, accurate, cost effective and able to distinguish an active infection from one that has died out. New automated technology platforms will be needed if tests are to have wide application in the sheep industries.

None of the work on OJD to date has included basic research. However, the need for this has been recognised and there are opportunities to take advantage of new technologies. Consequently the aims of this program were to research fundamental aspects of OJD including host-pathogen interactions at the cellular level. Proteomics, genomics and advanced immunology techniques were applied to *in vivo* and *in vitro* models to study the early stages of infection and contrast these with events later in the disease process. The aim was to discover new pathways for disease development and expression that can be exploited later for development of diagnostics, vaccines and chemotherapeutics. Significant progress was made, with three patents pending, a new direct faecal test developed, a panel of antigens for immunodiagnosis awaiting evaluation and many host genes discovered that are involved in early pathogenesis. This project will extend into two new projects to validate technology and extend the findings to cattle.

Source of Funding

Meat and Livestock Australia

Project timeframe

Changes in within-flock prevalence of *Mycobacterium paratuberculosis* shedding following vaccination with Gudair in high and low prevalence flocks  MLA OJD.033

FA&VPH Staff
Professor Peter Windsor
Professor Richard Whittington

National Collaborators
Dr Jeff Eppleston,
Central Tablelands Livestock Health & Pesticides Authority
Dr Evan Sergeant, AusVet Animal Health Services

Summary
The purpose of the project is to validate the widespread use of Gudair® vaccine for the reduction of bacterial shedding in medium/high prevalence flocks and the prevention of increased shedding in low prevalence flocks. The major outcome from the project will be to allow producers to predict the infectivity of flocks over time following the commencement of a vaccination program.

There is much producer interest, both at an individual and industry level, in the use of Gudair® vaccine to control the impact of OJD in flocks varying in disease prevalence from very low to very high. This project will observe changes over time in the prevalence of mycobacterial shedding following the commencement of a Gudair® vaccination program in flocks varying in initial OJD prevalence. Up to four flocks, each with high, medium or low OJD prevalence at the commencement of a vaccination program will be sampled over a six-year period to estimate changes in the prevalence of shedding as the proportion of vaccinates in the flock increases.

The relevant industry questions being addressed in this project are as follows:
- how long will it take for a vaccination program to reduce mycobacterial shedding to a level where safe trade in low risk sheep can occur?
- can the disease be eradicated by long-term vaccination?
- how effective will vaccination be in low prevalence flocks in the control zone?
- will vaccination prevent the increase in losses commonly seen in long-term infected flocks?
- can healthy sheep be vaccinated on arrival at an infected property so that infection and shedding is prevented?

Source of funding
Meat and Livestock Australia

Project timeframe
January 2003 – March 2009
Eradicating footrot by specific vaccination  AWI EC511

FA&VPH Staff  
Professor Richard Whittington  
Dr Om Dhungyel  
Mrs Natalie Schiller  
Mrs Rebecca Maurer

PhD Student  
Mrs Vidya Bhardwaj

National Collaborators  
Emeritus Professor John Egerton  
Dr Jeff Eppleston, Central Tablelands Rural Lands Protection Board  
Dr John Seaman, NSW Department of Primary Industries  
Dr Alison Lee, Department of Primary Industries, Victoria  
Dr Neil Buchanan, Department of Primary Industries and Resources, South Australia  
Dr Mick Middleton and Dr Cameron Bell, Tasmanian Department of Primary Industries, Water and Environment

Summary  
Footrot is caused by the bacterium *Dichelobacter nodosus*, a parasite of the feet. This bacterium is unable to survive off the foot for more than one week. Eradication of footrot is therefore possible if all sheep with footrot are removed from a flock. Current techniques to achieve this are labour intensive, expensive and often take several years to achieve eradication. Vaccination is an alternative approach.

Current footrot vaccines contain ten strains of bacteria to provide coverage of the major *D. nodosus* serogroups. These vaccines offer only temporary (12 weeks) protection against footrot, so they are used in control campaigns, rather than for eradication. It has been demonstrated that eradication of footrot using vaccines is possible if the vaccines only target one or two groups of the bacterium at a time because immunity is long-lasting. This project will evaluate this approach under Australian conditions.

Objectives of the project:
1. Produce specific footrot vaccines for local (Australian) strains of the footrot bacterium.
2. Evaluate the use of these targeted footrot vaccines using one or two different antigens per vaccination in the eradication of virulent footrot in Australian sheep.
3. Demonstrate the use of these vaccines to remove virulent footrot on 12 commercial farms across areas of high footrot prevalence in southeast Australia.
4. Evaluate the minimum interval between vaccination with different vaccines to deliver an accelerated eradication program (less than twelve months between different vaccines).
5. Enable application for a minor use permit from the Australian Pesticides and Veterinary Medicines Authority (APVMA) to allow the use of these vaccines on-farm and also aid transfer of the vaccine to commercial production facilities.

Source of funding  
Australian Wool Innovation

Project timeframe  
July 2005 - June 2010
The role of *Dichelobacter nodosus* genes in pathogenesis of footrot in sheep

**FA&VPH Staff**
Professor Richard Whittington  
Dr Om Dhungyel  
Mr Craig Kristo

**National Collaborators**
Dr Leslie Reddacliff,  
NSW Department of Industry & Investment,  
Elizabeth Macarthur Agricultural Institute  
Professor Julian Rood*, Monash University

**Summary**

Ovine footrot is a highly infectious bacterial disease that is of major ongoing concern to the Australian wool industry, causing significant economic losses as a result of its effect on wool production, farm management, animal welfare and the cost of control and treatment programs. The causative bacterium is *Dichelobacter nodosus*.

The overall objective of this research is to develop improved methods for the control and treatment of ovine footrot. The specific research aims are:

1. To identify *D. nodosus* genes that are differentially expressed in the virulent footrot lesion.
2. To determine the role of differentially expressed genes in the disease process.
3. To determine the value of whole genome based microarrays for the epidemiological analysis and diagnosis of field isolates of *D. nodosus*.
4. To identify surface or secreted *D. nodosus* antigens that induce the production of bactericidal antibodies in sheep.
5. To determine the vaccine potential of *D. nodosus* antigens that are either essential for the disease process or induce the production of bactericidal antibodies.

The successful completion of the project should lead to the subsequent commercial development of a protective footrot vaccine, with significant cost savings to wool producers and the Australian wool industry. It will also lead to a greater understanding of the epidemiology of footrot infections and may result in the development of improved methods for the laboratory diagnosis of ovine footrot.

This research program represents the pre-commercialisation phase of the development of a new generation of footrot vaccines. The successful identification of candidate antigens that can be used to develop a protective footrot vaccine will be subject to the uncertainty of dealing with a variable biological system.

**Source of funding**
Australian Research Council, Centre for Structural and Functional Microbial Genomics

**Project timeframe**
February 2005 – December 2010

* Principal investigator
Revisting the Mulesing Operation AWI EC830

FA&VPH Staff
Dr Katrina Bosward
Professor Paul Canfield
Associate Professor Geraldine Hunt

PhD Student
Ms Michelle Lepherd

Summary
Mulesing was introduced to the Australian sheep industry by J.H.W. Mules in 1931 as a measure for the prevention of blowfly strike in sheep, and in particular, the Merino. The wrinkliness and wooliness of the Merino sheep breech makes it highly susceptible to urine and faecal staining, leading to a high risk of blowfly strike. Mulesing involves the removal of skin from around the breech and tail to decrease wrinkles and increase the size of the bare area around the perineum. The result is a significant reduction in staining, with the area drier and less attractive to blowflies. Mulesing prevents the debilitating illness and death that occurs due to blowfly strike, however, it is acknowledged that sheep suffer short-term stress and pain since the operation is performed without analgesia or anaesthesia.

This project is one of a suite of AWI projects aimed at assisting Australian wool growers to find humane alternatives to mulesing. The primary objectives of the project include putting the mules operation on an evidence-based, scientific and quantitative footing as a foundation for investigating, devising and comparing alternative procedures. Initially, the Faculty team studied the conformation of the breech, and assessed patterns for applying chemical or other non-surgical alternatives to mulesing. Subsequently, a significant portion of this project has focussed on the local and systemic affects of mulesing and mulesing alternatives. Wound healing that occurs with the traditional mulesing operation as well as that with the proposed mulesing alternatives has been examined from the gross to the ultrastructural level, with immunohistochemical studies providing an assessment of wound contraction. In addition, the systemic response to mulesing and mulesing alternatives has been studied utilising haematology, biochemistry and acute phase protein measurements to document the acute phase response that occurs following treatment. Together, these findings have allowed the documentation of the wound healing and acute phase response that occurs with mulesing as it is currently performed, and to make comparisons with proposed mulesing alternatives allowing for a more humane method of altering the breech conformation to be developed.

Source of Funding
Australian Wool Innovation

Timeframe
June 2005 – December 2008
Analysis of critical genes in the sheep/Haemonchus relationship

FA&VPH Staff
Professor Nicholas Sangster
Associate Professor David Emery
Dr Tony Rowe

National Collaborators
The SGP includes scientists from:
CSIRO Livestock Industries,
University of Melbourne
and the University of Sydney

Summary
This project dovetails in with our existing project on the sheep/Haemonchus relationship. The emphasis in this new project is to add value by carrying out DNA microarray experiments to identify sets of sheep genes which are up or down regulated during critical events in establishing immunity to Haemonchus. Further work to validate these genes will be performed using quantitative PCR and immunocytochemistry. The aim is to identify genes which may act as future markers for selection of sheep able to mount effective immune responses to worms.

Source of Funding
Meat and Livestock Australia
Australian Wool Innovation

Project timespan
May 2004 – April 2007

Linked Project  Characterisation of critical genes in the sheep/Haemonchus relationship

Source of Funding
Meat and Livestock Australia and Australian Wool Innovation within the Sheep Genomics Project (SGP)

Project timeframe
Studies of the Epidemiology and Risk Factors Involved in the Pathogenesis of Acorn Calf Disease in Australia MLA B.AHE.0004

FA&VPH Staff
Dr Jenny-Ann Toribio
Professor Peter Windsor

PhD Student
Mr Peter White

Summary
This project is being undertaken to improve the understanding of the epidemiology of the acorn calf disease syndrome, particularly its geographic and temporal distribution, and risk factors associated with disease occurrence.

The project will involve a nationwide survey of public and private veterinarians who have been involved in rural practice for the past five years requesting information about affected calves that meet the case definition for acorn calf disease and about cases that resembled acorn calf disease including: number affected, clinical signs, gross pathology, location, date and breed. The survey will provide, for the past five years: a crude estimate of the annual prevalence of acorn calves in Australia; and, a description of the spatial-temporal distribution of acorn calves.

A retrospective examination will also be undertaken of case records of previous outbreaks in Australia. This study will provide confirmation of the annual prevalence of confirmed cases of acorn disease in Australia; spatial-temporal distribution of confirmed cases; and, information about potential risk factors common among confirmed cases.

A case-control study will be done on properties with confirmed cases of acorn calf disease since 2003 to identify case and control herds on each affected property, and at least one neighbouring property as a control property. Face-to-face questionnaires will be administered with the owner/manager of each affected and control property to collect information about each property and its management during the gestation period of affected calves. Risk factors associated with the occurrence of acorn calf disease will be identified.

Source of funding
Meat & Livestock Australia Limited

Project timeframe
April 2007 – September 2010
Susceptibility of previously untested Basin fish species to EHN Virus, and the epidemiology of EHN Virus in the wild MD743

FA&VPH Staff  
Professor Richard Whittington  
Dr Joy Becker  
Mrs Alison Tweedie  
Mrs Rebecca Maurer  
Mr Jesse McIvor

PhD Student  
Ms Anneke Rimmer

National Collaborators  
Dr Dean Gilligan & Mr Martin Asmus  
NSW Department of Industry & Investment, Narrandera Fisheries Centre

Summary  
Epizootic Haematopoietic Necrosis Virus (EHNV) is a serious threat to a number of native fish species in the Murray-Darling Basin. This virus, unique to Australia, was first isolated in 1985 in Redfin perch. It is characterised by sudden high mortalities of fish. On autopsy, the fish display necrosis of the renal haematopoietic tissue, liver, spleen and pancreas. Experimental work demonstrated that a number of native species were susceptible to the disease, including the threatened Macquarie perch and Silver perch, as well as mountain galaxias. The virus has been recorded from Victoria, NSW and the ACT. The spread of EHNV has been aided by its relative resistance. It can be readily transmitted from one location to another on nets, fishing lines, boats and other equipment. It was found that the virus retains its infectivity after being stored dry for 113 days. Once EHNV has entered a water body it is considered impossible to eradicate.

Objectives:
- to validate earlier findings of susceptibility of native fish to EHNV
- to determine the susceptibility of infection by EHNV of a range of previously untested fish species in the Murray-Darling Basin
- to investigate the epidemiology of EHNV in wild populations of priority fish species
- to develop a test to determine exposure of wild populations of priority fish species to EHNV
- to identify the extent to which EHNV is a risk to native fish in the MDB

Anticipated outcomes:
- improved knowledge of the susceptibility of fish in the Basin to EHNV
- improved capacity for management of EHNV in the Basin
- improved management of redfin perch in the Basin
- improved human capacity for aquatic health issues in the Basin

Source of funding  
Murray-Darling Basin Authority

Project timeframe  
November 2006 – June 2011
Biotechnology and epidemiology to control nodavirus in barramundi aquaculture

FA&VPH Staff  
Professor Richard Whittington

PhD Student  
Mr Paul Hick

National Collaborators  
Mr Glenn Schipp, Darwin Aquaculture Centre  
Mr Craig Foster, Marine Harvest Ltd  
Ms Lorna Melville and Dr John Humphrey, Berrimah Veterinary Laboratory

Summary  
Production of farmed barramundi has increased by more than 1200% in the Northern Territory since 2001 but is threatened by nodavirus infection.

To achieve growth targets for barramundi aquaculture in northern Australia the University of Sydney and the three industry partners will collaborate to:
1. Control nodavirus infection
2. Develop new technologies to detect nodavirus using immunoassay and surface enhanced laser desorption ionisation mass spectrometry (SELDI)
3. Develop an integrated disease control strategy based on epidemiological survey data, and ensure that it is practical and able to be widely adopted.

Control of nodavirus infection is required also to meet the national goal to boost aquaculture production to $2.5 billion by 2010. This project meets two designated national research priorities: frontier technologies for building and transforming Australian industries and protecting Australia from invasive diseases and pests. It will develop biotechnological and epidemiological tools to control nodavirus, improve biosecurity of finfish in the wild and on farms in Northern Territory, Queensland, Victoria, New South Wales, South Australia and underpin growth of the barramundi aquaculture industry in regional areas. The benefit will be increased employment and investment with economic and social returns. This project has support from all States and Territories.

Source of Funding  
Australian Research Council Linkage Grant

Project timeframe  
January 2006 – December 2008
Aquatic Animal Health Subprogram: Optimisation of PCR tests for diagnosis of megalocytivirus (gourami iridovirus) and cyprinid herpesvirus 2 (goldfish herpesvirus) FRDC 2007/007

FA&VPH Staff
Professor Richard Whittington
Dr Joy Becker
Dr Michelle Dennis
Mr Matthew Landos

National collaborators
Dr Brian Jones, Fisheries Department Western Australia
Dr Mark Crane, CSIRO

Summary
This project was developed in order to meet a gap in diagnostic capability in Australia for the megalocytivirus group of iridoviruses and cyprinid herpesviruses. Megalocytiviruses cause killing diseases that have devastated aquaculture enterprises particularly in Asia. Cyprinid herpesviruses are also significant, the focus of this project is CHV-2, which infects goldfish and may not be present in Australia. The urgency to do this work was highlighted by a megalocytivirus disease outbreak in Murray cod in Victoria in 2003, and by the discovery in 2004 that imported ornamental fish harboured the viruses that killed Murray cod. In addition there is a need for a targeted surveillance program to determine whether CyHV-2 is present in both domestic goldfish breeding populations and imported goldfish.

The importation of several species of gouramis into Australia in the ornamental fish trade is associated with a high risk of introduction of viruses in the Megalocytivirus genus (Family iridovirae), specifically Gourami iridovirus (GIV). Valid tests for these viruses do not yet exist in Australia. Rapid assays to distinguish these viruses from internationally notifiable agents such as Red Sea Bream Iridovirus (RSIV) are not available either, so there are risks to international trade through inaccurate diagnosis of GIV.

Goldfish are the most popular ornamental fish species in Australia. There has been a viable domestic production industry for more than 50 years. This production has supplied wholesalers, and in the case of many smaller operators, supplied direct to retail shops or the public through markets. In the last 10 years imported goldfish numbers have continue to grow, in part, due to their competitive price. The imported goldfish have been subjected to the AQIS requirements for import certification and a 3 week holding period before release. In the past 6 – 7 years anecdotal evidence suggests mortality rates of domestically produced goldfish increase when these fish are mixed in retail shops with imported goldfish. This scenario has been described and followed up with histological and electron microscopy examinations in NSW and WA. These investigations have revealed pathology consistent with CyHV-2. It has been suggested that the imported goldfish are carrying latent CyHV-2 infections and that domestic breeding stock in closed facilities remain free from this disease agent hence naïve and highly susceptible when exposed.

This project aims to provide the diagnostic capability and a sampling regime to further investigate these concerns. Specific objectives include:
• To optimise PCR for detection of megalocytivirus
• To optimise a PCR for detection of CyHV-2 in goldfish
• To transfer technology to diagnostic laboratories in Australia

Each of the aquatic animal health diagnostic laboratories in Australia has expressed a need for diagnostic capacity. End-users indicating need for the project data include regulatory agencies (AQIS, Biosecurity Australia), governmental diagnostic laboratories in the States and aquatic animal health network.

Source of Funding
Fisheries Research and Development Corporation

Project timeframe
October 2007 – September 2008
## Improving compliance of legislative and industry requirements among pig producers ABCRC AL.108R

**Farm Animal Health**  
Dr Marta Hernandez Jover  
Ms Sharon Roche

**National Collaborators**  
Dr Trish Holyoake, NSW Department of Industry & Investment  
Mr Tony Abel and Mr Bill Salter, Australian Pork Limited

### Summary

The goal of the project is to initiate a program to benchmark and increase compliance among pig producers with legislative and industry requirements.

**Key deliverables for the project:**

- Compile a registry of “non-compliant” producer in PigPass Database;
- Obtain demographic details of these producers (size, motivation for growing pigs, marketing, preferred communication methodologies) to assist with future targeted communications;
- Benchmarking on tattoo and PigPass NVD compliance and QA uptake, swill feeding and biosecurity awareness/implementation at the start and the end of the project to measure the effectiveness of extension undertaken;
- An improved compliance with legislation relating to swill feeding, post farm gate pig identification, exotic disease recognition and the Model Code of Practice for Animals-Pigs;
- An improved compliance with industry requirements relating to PigPass NVD completion and adoption of quality assurance systems;
- A model for industry (saleyard and domestic abattoir)-driven extension to improve compliance among their suppliers; and
- Information on barriers to adhering to the legislation and industry requirements listed above

**Source of funding**  
Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease

**Project timeframe**  
May 2009 – October 2010
Improving reproductive performance during seasonal infertility: Identification of “at risk” sows and the role of oocyte quality

FA&VPH Staff
Dr Trish Holyoake,
Commenced in 2008 with NSW Department of Industry & Investment
Dr Chris Grupen, Reprogen, Faculty of Veterinary Science

National Collaborators
Pork CRC
QAF Meat Industries
CHM Alliance
Australian Pork Farms

PhD Student
Mr Michael Bertoldo

Summary
During seasonal infertility (SI), farrowing rate typically declines between 5 and 15%. The major components of the proposed project address the outcomes of a Seasonal Infertility Workshop (2006) to (1) “Identify risk factors associated with SI from existing databases” and (2) “Determine if oocyte quality and ovarian characteristics in gilts and sows is poorer in summer and autumn than at other times of the year.” To achieve these outcomes, we will work closely with three major pork production groups: PIC/CHM, QAF and APF.

Project Deliverables:
1. Early identification of “at-risk” sows for mid- to late-term pregnancy loss during seasonal infertility.
2. Identification of micro-environmental (pen specific) factors that contribute to mid- to late-term pregnancy loss during seasonal infertility.
3. An understanding of the role of oocyte quality during seasonal infertility.
4. Data to support the theory that pheromones are involved in pregnancy loss during seasonal infertility.
5. An understanding of the role of stress and metabolic state of sows as contributors to mid-to-late term pregnancy loss in SI.

Source of funding
Pork CRC

Project timeframe
March 2007 – March 2010
Reduction of antibiotic usage in pig herds: controlling *Lawsonia intracellularis* by vaccination, housing and hygiene

**FA&VPH Staff**
Dr Trish Holyoake  
Associate Professor David Emery

**National Collaborators**
Dr Alison Collins, Elizabeth Macarthur Agricultural Institute,  
NSW Department of Primary Industries  
Boehringer Ingelheim Pty Ltd, Australia

**Student**
Ms Megan Donahoo

**Summary**

Proliferative enteritis (PE) is a major disease in the global pig industry. It is caused by *Lawsonia intracellularis* and is currently prevented by feeding pigs antibiotics. The project will provide two scientists (APAIs) with training in epidemiology and immunology applicable to livestock industries and biosecurity. The ultimate aim of the project is to reduce antibiotic use on pig farms to make the pork industry in Australia more globally competitive, and to benefit human health by reducing the risk of amplifying strains of antibiotic-resistant bacteria.

There are three complementary streams of the research plan. The first stream will provide essential research to maximise the adoption of a commercial vaccine (Enterisol® Ileitis, Boehringer Ingelheim) as an alternative to antibiotics to control PE. Experiments will be undertaken to improve the efficacy of Enterisol® to control PE under Australian pig management systems and to induce immunity to Australian field isolates of *Lawsonia intracellularis* (LI). In particular, we will:

- measure the protective efficacy and the immune response of vaccinated pigs against Australian LI isolates;
- increase the ability of the vaccine strain of LI to induce an effective immune response in vaccinated pigs by modifying its administration (extending the “antibiotic-free” window);
- identify the antibiotics that do not interfere with the vaccine strain of LI’s ability to infect pigs, hence allowing producers to continue to medicate in the face of concurrent disease while they vaccinate against LI;
- establish the feasibility of vaccinating pre-weaning as an alternative to post-weaning as a way of avoiding the inherent post-weaning problems of concurrent medication and ease of administering vaccine through bulk water-delivery systems;
- elucidate immune “markers” of protection to provide the commercial partner, veterinarians and pig producers world-wide with an objective measure of vaccine efficacy.

The second stream will compare the infection dynamics of LI in pigs reared in “traditional” concrete-based housing and in increasingly popular, welfare-friendly, bedded housing, so management strategies can be developed to control PE in these systems, as an adjunct to vaccination.

The third stream will provide accurate and definitive data on the impact of PE on the pig industry in Australia, including the seroprevalence of LI infection on farms in Australia, the cost of antibiotics used to control PE and direct measures of the effect of LI infection on pigs’ carcass composition using a CT scanner. This data will provide accurate information on the impact of LI infection on the use of antibiotics and the profitability of the Australian pig industry and so supply the rationale to vaccinate and/or modify management to reduce antibiotic use.

**Source of Funding**
Australian Research Council Linkage Grant  
Boehringer Ingelheim Pty Ltd, Australia

**Project timeframe**
February 2006 – December 2008
Peri-urban and remote regional surveillance for biosecurity within the pig industry in eastern Australia

FA&VPH Staff
Dr Trish Holyoake
Dr Jenny-Ann Toribio
Dr Marta Hernandez-Jover

PhD Student
Mrs Nicole Schembri

National Collaborators
Department of Agriculture, Fisheries and Forestry
NSW Department of Primary Industries
Victorian Department of Primary Industries
Queensland Department of Primary Industries
SA Department of Primary Industries & Resources
WA Department of Agriculture
Rural Lands Protection Boards of NSW
QAF Meat Industries
Australian Pork Ltd

Summary
Preliminary studies have found disturbing gaps in our ability to identify and monitor pig health in a significant sector of the pig-rearing community in Australia – the small-scale pig producers in peri-urban and regional areas. Currently pigs raised in small-scale enterprises pose a high risk to Australia’s animal health industries due to our lack of knowledge about their movements, health and management practices implemented in these herds.

In this project we will develop systems to minimise the risk of exotic disease occurring in Australia by targeting this sub-population of the pig-rearing community. In particular work will focus on:

- Identification of the locations and practices of peri-urban pig producers
- Improved methods for tracking pig movements
- Mechanisms for health surveillance
- Improved extension in relation to disease detection and swill feeding

Funding
Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease

Project timeframe
February 2005 – August 2008
Specialised management of gilts and their progeny

FA&VPH Staff
Dr Trish Holyoake

National Collaborators
QAF Meat Industries

PhD Student
Ms Yvette Miller

Summary
This project seeks to address two problems. The first is the broad issue of a shortage of veterinarians with pig-specialist skills in Australia. There are few veterinarians entering the industry, despite many opportunities available to them working with commercial farms, educational institutions, pharmaceutical companies and regulatory organisations.

The second problem this project seeks to address is the relatively poor health and performance of gilt progeny relative to sow progeny. Gilts are completely different animals than mature sows and can act as a health destabilising factor in herds. Overseas, producers are segregating gilt progeny and sow progeny to:
1. stabilise PRRS in the progeny, to the extent that PRRS does not occur clinically in the mature sow herd; and
2. manage Mycoplasma pneumonia.

On farms that segregate progeny, vaccines are only used in gilt progeny. Segregation has resulted in a 3 fold decrease in pneumonic lung lesions at processing in P2 progeny (35% incidence of lesions in P1 progeny vs 12% in the progeny of mature sows). On farms where only sow progeny are housed, nursery drug costs are less than half that of gilts ($1.85US/pig vs $0.72US/pig).

The proposed project seeks to:
1. provide extensive training for a post-graduate veterinarian in pig health and production to provide for succession in the Australian pig industry
2. improve the pre-weaning growth performance of gilt progeny using supplemental milk
3. identify risk factors that explain why gilt progeny perform poorly, relative to sow progeny
4. develop management strategies to control the risk factors and hence improve their performance

Source of Funding
Australian Pork Ltd
QAF Meat Industries

Project timeframe
Improving the performance of gilts and their progeny: the role of immunity

FA&VPH Staff
Dr Trish Holyoake

National Collaborators
Pork CRC
QAF Meat Industries
NSW Department of Primary Industries

PhD Student
Ms Yvette Miller

Summary
Preliminary research provides strong evidence to indicate that immune differences may be crucial to the health and observed growth differences of gilt and sow progeny. The deliverables of this project include:

- An Australian data set demonstrating that gilt progeny reared on sows can perform equally in terms of growth performance to slaughter relative to sow progeny.
- Identification of immune and/or nutritional/orexigenic parameters in colostrum and/or milk from sows that are likely to be responsible for providing this subsequent growth performance advantage to their progeny-relative to gilt colostrum and/or milk.
- Evidence to support or disprove the hypothesis that any differences in the passive immunity provided to the progeny of sows relative to gilts is the result of a difference in their innate immunity and/or a difference in how they respond to active immune system challenge.
- Determination of any differences in the immune response of the progeny themselves to a novel antigenic challenge (tetanus toxoid).

Outcomes from the project will lead to recommendations for on-farm management strategies, commercial opportunities for pharmaceutical and nutrition companies and links into other Pork CRC research.

Source of Funding
Pork CRC

Project timeframe
July 2007 – June 2008
Management strategies to improving the performance of gilt progeny

FA&VPH Staff                       Dr Trish Holyoake

National Collaborators              Pork CRC
                                            QAF Meat Industries
                                            NSW Department of Primary Industries

PhD Student                        Ms Yvette Miller

Summary
The project seeks to develop intervention strategies to improve the growth performance of gilt progeny. The first experimental stream will provide data to support or discount the feeding of supplementary milk to the progeny of gilts prior to weaning at two seasonal extremes (summer and winter) as an aid to improving their growth performance. This study will also provide baseline information on birth weight, growth parameters (weight gain, feed efficiency, morbidities, mortalities, carcass variation) and milk production and intake differences between the two sub-populations that will assist us to understand why there are the growth performance differences and determine how we might manipulate these differences to improve growth performance in the future. As a sideline, it may also assist us to improve sow longevity, through improved farrowing house management.

The outcomes of the second experimental stream will include:

- Determining the importance of PE as a performance limiting factor on farms.
- Provide baseline information that would support the decision on whether to vaccinate gilts and/or sows prior to farrowing against PE.
- Provide information that would support or disprove the medication of sows around the time of farrowing to reduce the transmission of LI infection to progeny.
- Determine if there is a need to vaccinate both gilt and sow progeny against LI infection to prevent PE.
- Measure the relative infection rates of gilt and sow progeny as a guide to potential benefits from rearing the two sub-populations separately.

Source of Funding                   Pork CRC

Project timeframe                   July 2007 – June 2008
Campylobacter jejuni through the food chain: from range through processing

FA&VPH Staff
Professor Michael Ward
Dr Priti Goswami

PhD Students
Ms Sarah-Jane Wilson
Mr Tenzin

Summary
Campylobacter jejuni is the leading cause of bacterial gastroenteritis in the United States, with an estimated cost of treatment and loss of productivity exceeding $1 billion annually. Earlier epidemiologic case-studies linked campylobacteriosis to the handling and consumption of contaminated poultry. However, studies indicate that the prevalence of C. jejuni contamination in poultry samples has decreased over time, and campylobacteriosis from the consumption of poultry products has also declined. Nevertheless, C. jejuni continues to be a substantial health burden, being second in 2006 to Salmonella (14.81/100,000) in total food-borne cases in the US. This indicates that other sources for C. jejuni contamination are present in the food chain.

Beef products have had a major role in C. jejuni outbreaks in the US over the past five years. The Foodborne Outbreak Response and Surveillance Unit of the Centers for Disease Control (CDC) reported five confirmed outbreaks of campylobacteriosis due to ground beef or ground beef products since 1999, which have affected 199 individuals. A C. jejuni prevalence of 57 to 73% in feedlot cattle has been estimated, based on fecal samples. However, the prevalence of C. jejuni on carcass meat is unclear. Preliminary data has shown C. jejuni in 94% of the carcasses sampled along the ventral midline cut. This region is frequently trimmed and sent to the grinders for the production of ground beef. Findings suggest that C. jejuni isolates recovered from cattle are pathogenic to man. Based on preliminary data, it is hypothesized that virulent C. jejuni are introduced into ground beef from trimmings, and that the C. jejuni-contaminated trimmings pose a serious risk factor for consumers.

This hypothesis is being tested by sampling feedlot cattle from range to processing, isolating C. jejuni from cattle beginning at the range, at the feedlot, and right through to the production of fine ground beef. In addition, environmental samples are being obtained from birds residing at the feedlot, feed, feed bunks, watering units, and the floor of pens designated for the holding of the calves. At the processing stage, carcasses are being sampled using both the USDA-APHIS and ventral midline methods, in order to evaluate differences. Isolates obtained from these samples are being examined for genotypic differences, antibiotic resistance, and virulence traits. A temporal increase in C. jejuni prevalence through the feedlot cattle production cycle, and phenotypic and genotypic consistencies between environmental, cattle and meat isolates will allow hypothesis testing.

The specific aims of this project are:
1. isolation of C. jejuni from the feedlot environment and beef cattle from range to slaughter;
2. determine the genetic diversity of C. jejuni isolates; and
3. assess the antibiotic susceptibilities and virulence properties of bovine C. jejuni isolates.

Source of funding
United States Cooperative State Research, Education and Extension Service
- Food Safety and Epidemiology Program

Project timeframe
September 2008 – August 2011
Review of arbovirus surveillance needs and the National Arbovirus Monitoring Program (NAMP)

FA&VPH Staff
Professor Michael Ward
Dr Marta Hernandez Jover

Summary
The Terms of Reference for the review:
- Identify and describe the future national arbovirus surveillance needs in Australia and near northern Asian and Pacific neighbours for agriculture, public health (zoonotic arboviruses) and the environment and the benefits of a future national surveillance program to address these needs:
- Assess the contemporary relevance of the four objectives of the NAMP and the appropriateness of the NAMP to deliver on future national needs (identified in TOR 1 above);
- Recommend an evaluation method applicable to NAMP and other targeted national animal disease surveillance programs;
- Evaluate the effectiveness, including the cost effectiveness, of the current NAMP activities in meeting each of its four objectives by applying the recommended evaluation method (identified in TOR above). Provide practical recommendations to address any shortfalls or needs for refinement of the NAMP;
- Identify and describe current and potential collaborations in arbovirus surveillance with public health and environment agencies and identify efficiencies for livestock arbovirus monitoring;
- Identify and describe arbovirus surveillance research needs for agriculture;
- Provide a view on the NAMP contribution to, and consistency with, the National Animal Health Surveillance Strategy (NAHSS)

Source of funding
Animal Health Australia

Project timeframe
October 2008 – April 2009
Assessment of the risks to animal biosecurity associated with small landholders ABCRC 3.086R

FA&VPH Staff
Dr Marta Hernandez Jover
Dr Jenny-Ann Toribio
Dr Trish Holyoake

National Collaborators
Dr Tony Martin, Project Leader
Department of Agriculture & Fisheries Western Australia (DAFWA)
Dr Danny Roberts, DAFWA
Dr Neil Guise, DAFWA
Dr Nina Kung, Queensland Department of Primary Industries & Fisheries
Dr Sandy McKenzie, Queensland DPI&F
Dr Patricia Swift, Queensland DPI&F
Dr David Pitt, Queensland DPI&F

Summary
It is commonly said that “peri-urban small landholders” or “hobby farmers” pose biosecurity threats to mainstream livestock production in Australia. Just what these threats might be, and their magnitude and significance within the arena of Australian animal biosecurity, have not been defined. In recent years the increasing numbers of “lifestyle farmers” and small landholders have been studied by various researchers aiming to define who they are, what motivates them, and their Biosecurity-related and other attitudes and practices. This project aims to build on this work, and to identify a series of animal Biosecurity risks associated with small landholders around Australia. The magnitude of these risks will be assessed both in absolute terms and relative to the magnitude of equivalent risks not involving small landholders. The project this sets out to determine whether, for selected threats to Australian livestock (such as epidemics of exotic disease), small landholders add significantly to the risks.

The project will tap into existing knowledge of small landholders by holding a project planning workshop in conjunction with the National Small Landholder Extension Forum to be held in April 2008. From the planning workshop a series of risk assessments (RAs) will be designed, and these will be carried out in NSW, WA and possible Queensland. Consistency and collaboration will be assured through a series of project meetings. Two of the RAs will build directly on the recently completed University of Sydney ABCRC project on surveillance in peri-urban pigs in eastern Australia.

Outcomes of the project will be reports of the RAs, which end-users may then take to inform policy decisions on prioritisation and resource allocation in the areas of animal biosecurity and small landholder engagement. Risk analysis also involves risk management and risk communication, and this project will identify appropriate potential risk mitigation opportunities, and in partnership with the National Small Landholder Extension Network will lay the groundwork for any necessary communication programs.

Source of funding
Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease

Project timeframe
October 2007 – September 2009
Live bird market research

FA&VPH Staff
Dr Marta Hernandez Jover
Professor Michael Ward
Dr Jenny-Ann Toribio
Mrs Nicole Schembri

Summary
Live bird markets in overseas countries (e.g., Asia and United States) have been implicated in the spread of low pathogenicity (LP) and highly pathogenic (HP) avian influenza viruses and other infectious diseases of birds. Little is known about live bird markets and sales in Australia, and the Biosecurity risks associated with them.

A Biosecurity Consultative Group (BCG), comprising representatives of the Department of Agriculture, Fisheries and Forestry (DAFF), Animal Health Australia (AHA) and poultry industry sectors, was formed as a result of a resolution from the 2007 Government-Industry Avian Influenza Forum. At a meeting of the BCG in February 2008, poultry industry representatives identified live bird markets and bird sales as posing a possible Biosecurity risk to commercial poultry producers. This project is a part of a broader commitment by DAFF to assist the poultry industries in documenting and enhancing their Biosecurity systems.

Objectives
1. Identify the locations of the major live bird markets in Australia in relation to the location of the major commercial poultry-producing areas
2. Describe the characteristics of the sale of live birds at the markets, including:
   a. number and types of poultry presented for sale
   b. method of sale
   c. type of vendors involved: commercial producers, hobby farmers, poultry fanciers etc
   d. type of housing of birds at the live market
3. Describe parameters related to Biosecurity:
   a. cleaning and disinfection of housing and market venue
   b. traceability system used for birds presented for sale
   c. register and identification of vendors and buyers
   d. location of vendors
   e. destination of birds post-sale and proportions: processors, hobby farmer, private slaughter, returning to property of origin etc
4. Describe links between the live bird markets and commercial poultry companies or processors (including ducks and game bird companies/processors), such as delivery vehicles, personnel, equipment (e.g., crates/cages/pallets) etc.

Source of funding
Australian Government Department of Agriculture, Fisheries and Forestry

Project timeframe
August 2008 – January 2009
The project is to understand the behaviours and attitudes of poultry exhibitors, and to determine the most efficient and effective way of communicating with them and influencing their behaviour to improve biosecurity practices.

The objectives of the project:
- Identify the number of poultry exhibitors per state/territory and the proportion of those registered with a poultry club, state organisation or Exhibition Stud Poultry Australia; and,
- Describe the characteristics of the poultry exhibitors including (but not limited to):
  - number of times they exhibit, sell or purchase birds per year;
  - sources and destination of birds;
  - value exhibitors place on their birds;
  - understanding of and commitment to biosecurity;
  - biosecurity practices undertaken;
  - knowledge of endemic and exotic poultry diseases;
  - bird health concerns in relation to poultry shows;
  - communication networks, trusted sources of information and attitudes towards government;
  - preferred extension materials and methods for delivering extension.

The number of poultry exhibitors per state/territory will be identified by contacting Exhibition Stud Poultry Australia, the state associations and the major poultry clubs to identify the number of exhibitors registered within their organisations. The total number of poultry exhibitors will be estimated from consultation with these organisations and poultry experts, and extrapolation from the poultry exhibitors’ data collected in this study to provide an estimate of the proportion of poultry exhibitors registered with their representative body.

**Source of Funding**  
Commonwealth Department of Agricultural Fisheries and Forestry

**Time frame**  
February 2011 – September 2011
Epidemiological investigations into the 2007 equine influenza outbreak RIRDC PRJ-004314

Farm Animal Health Staff Dr Navneet Dhand
                            Professor Michael Ward
                            Dr Jenny-Ann Toribio

PhD Students Ms Kathrin Schemann
                Mr Simon Firestone

National Collaborators Dr Nina Kung, Queensland Department of Primary Industries
                        Dr Paul Freeman, NSW Department of Industry & Investment
                        Dr Barbara Moloney, NSW Department of Industry & Investment

Summary
The first ever outbreak of Equine Influenza (EI) in Australia in 2007 resulted in considerable economic losses and hardship throughout the horse industry, particularly the racing and breeding sectors. Taking advantage of the knowledge and experience gained from controlling this incursion, we plan to conduct a thorough review of the temporal and spatial distribution of EI and the mechanisms that facilitated (or halted) the spread of the infection. By blending cutting edge technologies with the classical epidemiologic techniques and by combining the power of mathematical simulation models with the real outbreak data, we aim to refine guidelines to assist disease control authorities make informed decisions in the event of a future incursion of EI in Australia. Detailed analysis of the spread of EI may also yield critical insights into the ecology and transmission of influenza viruses in general in naïve populations.

The project aims to answer many crucial questions about the 2007 equine influenza outbreak such as: How did EI spread among the Australian horse population and across state boundaries? What factors facilitated its spread and how its spread could have been better controlled? Answering these questions will provide critical insights into the spread of contagious viral diseases in naïve animal populations under Australian conditions. These aims will be achieved through 3 specific objectives:

1. Critical evaluation of the features of the 2007 EI epidemic;
2. Investigation of the spread of EI virus (EIV) under Australian conditions; and
3. Evaluation of the effectiveness of biosecurity measures in preventing the spread of EI.

Source of funding Rural Industries Research & Development Corporation

Project timeframe October 2008 – October 2011
Building capacity to model emerging disease threats in the intensive livestock industries

FA&VPH Staff
Dr Jenny-Ann Toribio

PhD student
Mr Sam Hamilton

National Collaborators
Dr Graeme Garner and
Dr Mike Nunn
Department of Agriculture, Fisheries and Forestry

Summary
Emerging infectious diseases have the potential to cause significant impacts on animal health, public health, the economy and/or the environment. A good understanding of the epidemiology and likely spread of these diseases, should they be introduced to Australia, is a necessary component of effective preparedness and response planning. At present there is a shortage of people in Australia with skills to undertake comprehensive epidemiological modelling of animal and human diseases.

This project offers the opportunity to develop advanced skills in disease modelling through the development of a stochastic spatial simulation model for a disease of concern to the Australian intensive livestock industries. Diseases that pose a serious threat include Newcastle disease and highly pathogenic avian influenza for the poultry industry and classical swine fever for the pig industry. Disease modelling, by evaluating the behaviour of an exotic disease under Australian conditions and the effect of alternate control strategies, is recognised as an important tool to support Australia’s preparedness for a disease incursion. This project, working with government and industry, will develop a new model of the spread of highly pathogenic avian influenza within the Australian intensive livestock population to address issues associated with assessing the extent, impact and control of disease outbreaks. This model will be used to enhance national disease planning and will provide technical underpinning for Australia’s outbreak management policies.

Source of Funding
Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease

Project timeframe
February 2005 – February 2008
Attitudes to animals and empathy to others of clients of the Society for the Prevention of Cruelty to Animals Veterinary Clinic in Hong Kong

**FA&VPH Staff**
Dr Robert Dixon (Deceased)
Dr Lun Li (Faculty Associate)

**Student**
Ms Annabel Sutch

**International Collaborator**
Dr Michael Bradley, SPCA Hospital, Hong Kong

**Summary**
This project aims to explore existing attitudes to animal welfare in and the empathy to others of veterinary clients of the SPCA’s veterinary hospitals in Hong Kong. Mainland China is undergoing major changes with increasing affluence and education of the population. Pet ownership is also increasing in Mainland China and this may be a reflection of social change. Hong Kong has been relatively prosperous and educated for a number of decades and pet ownership has also been relatively high. Despite such changes there has been little study of community attitudes to animals in either Mainland or Hong Kong China.

It is important to explore attitudes to animals of Chinese veterinary clients. Current animal practices in China include acts such as skinning animals alive, and insufficient space, food, or water for caged animals at markets. This contrasts with pet animals which can be as well looked after as pets in Australia. China itself has an edict for a Harmonious Society not only between people but also between humans and animals. Changes in such attitudes may be the harbinger of, or driver for policy and cultural change regarding the welfare of animals in Mainland China.

**Project timeframe**
February 2008- December 2008

Attitudes of Chinese Veterinary and Non-Veterinary University Students towards the Ethical Treatment and Welfare of Animals

**FA&VPH Staff**
Dr Robert Dixon (Deceased)
Dr Lun Li (Faculty Associate)

**International Collaborators**
Staff of the School of Veterinary Science,
Shanxi Agricultural University China

**Summary**
This project aims to explore existing attitudes to animal welfare in veterinary students and non-veterinary students at Shanxi Agricultural University, China. This is being done in order to prepare new culturally appropriate animal welfare education resources for introduction into the University’s Veterinary Curriculum, the first inclusion of the study of animal welfare in any University Veterinary Curriculum in China. Graduating veterinarians will then be better prepared to improve animal welfare standards in China, a direction sanctioned by the Central Government of China.

**Project timeframe**
June 2008- June 2009
Adopting a strategic and practical approach to the problem of unwanted animals in rural communities: a study of the Companion Animal Welfare Scheme (CAWS)

**FA&VPH Staff**  
Dr Robert Dixon (Deceased)

**BSc(Vet) Student**  
Ms Megan Prendergast

**National Collaborators**  
Dr Mark Lawrie, RSPCA NSW

**Summary**  
Companion Animal Welfare Schemes are community based and means-tested cat and dog desexing programs that are run by the RSPCA and co-funded by local government and philanthropic organisations. They target rural areas of social disadvantage and aim to improve the health and welfare of companion animals through desexing and education programs. This project will assess the effectiveness of these programs using a number of measures. These will include data of the number of animals treated, household census of animals, the reduction in the numbers of animals presented at local animal pounds and the changes in owner attitudes toward the health and welfare of their pets. The outcomes will have impact on policy and managerial systems for both government and non-government organisations.

**Source of Funding**  
RSPCA NSW

**Time frame**  
January 2007- November 2007

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**Healthy Dogs, Healthy Communities: The impact of education about dog health on human health outcomes**

**FA&VPH Staff**  
Dr Robert Dixon (Deceased)  
Dr Graeme Brown

**Students**  
Ms Sophie Constable  
Ms Jade Norris  
Ms Layla Schrieber

**National Collaborators**  
Ms Julia Hardaker, Animal Management in Rural and Remote Communities  
Ms Verna Simpson, Humane Society International

**Summary**  
The project will explore the impact that education about dog health and welfare will have on the human health burden in 2 remote Aboriginal Communities in the Northern Territory, one in the desert, the other in the tropics. The change in human clinical data, especially those associated with zoonoses will be measured over time, before and after the introduction of a culturally relevant education program. Disease surveys of dogs will be undertaken twice a year to assess the background level of disease over a period of three years.

**Source of funding**  
Humane Society International

**Project timeframe**  
June 2007- June 2010
Healthy Dogs, Healthy Communities: evaluating the impact of new interdisciplinary interventions to enhance dog health and welfare in remote indigenous communities

FA&VPH Staff
Dr Robert Dixon (Deceased)
Dr Jenny-Ann Toribio
Dr Graeme Brown

PhD Students
Ms Sophie Constable
Ms Jade Norris

Masters Student
Ms Layla Schrieber

National Collaborators
Dr Richard Malik, Faculty of Veterinary Science
Dr Roselyn Dixon, Faculty of Education, University of Wollongong
Dr Shelley Walton, Menzies School of Health Research, Darwin

Summary
This project, which focuses on the dog, also recognises that the dog harbours a number of diseases that can infect humans. It examines the relationships between culturally-appropriate education, dog health and welfare, and human health and welfare in Indigenous communities. The project will document the health and welfare of dogs, institute dog health programs and use these data in an educational intervention to improve the health and welfare outcomes of dogs in these communities.

It aims to demonstrate that the improvement of the health and welfare of dogs through sustainable dog health programs is directly due to the specifically-designed educational intervention and that the improvement of dog health and welfare will also impact on human health and welfare in Indigenous communities. Dog health programs will indirectly improve the expectations, standards and self-worth of many Indigenous Australians. As a consequence, the national benefits include the development of environmentally sustainable Indigenous communities, and the strengthening of Australia's social and economic fabric especially in rural and remote areas.

Source of funding
Australian Research Council Linkage Grant
Animal Management in Rural and Remote Indigenous Communities
RSPCA NSW
Warlukurlangu Artists Aboriginal Association
IDEXX Laboratories Australia

Project timeframe
January 2007- December 2009
Advanced surveillance systems - electronic data collection and decision support

FA&VPH Staff
Dr Jenny-Ann Toribio
Associate Professor Peter Thomson

National Collaborators
Dr Angus Cameron and Dr Chris Baldock (Deceased)
AusVet Animal Health Services

PhD Student
Mr Richard Shephard

Summary
Under-reporting of disease events in farm animals has been identified in numerous studies and is a significant gap in Australia’s national surveillance processes in that it becomes difficult to generate information to support claims of freedom from disease and reduces our capacity for early detection of emerging disease problems. The main sources of animal health surveillance information are veterinary laboratories, but these sources have been declining and represent only a small proportion of animal disease events and provide virtually no information on the health status of livestock in the remote pastoral regions of northern Australia which are the main supply areas of our beef exports. This project is a collaboration between researchers and industry to develop tools that assist with the collection of animal disease information using electronic systems based on a pilot project involving beef producers in northern Queensland. The outcome will assist producers and disease managers in collecting and analysing information on disease in Australian livestock and providing evidence for regional freedom from disease.

Electronic data capture can be achieved either by using a web-based data submission system (providing real-time access to a centralised database and allowing instant analysis), or by the use of hand held computing devices. In this current project both systems will be developed in a staged fashion. A web-based system will be followed by a hand-held device for data entry. A central component of each system is the Bovine Syndromic Surveillance System (BOSSS) a tool to assist farmers identify disease problems. This artificial intelligence system controls flow of information about individual diseases, disease investigation and control based on examination of reported signs, and will promote the capture of negative sign data (ie signs that are definitely not present). It provides producers with information about the most likely diseases that can explain reported signs and undertakes a differential examination of these listed signs by questioning the user about the presence (or absence) of key differential signs. The data are entered into a syndromic database that includes negative signs and has enhanced ability to differentiate disease and investigate potential exotic disease events.

This project will result in:
- An internet-based animal health information system enabling data entry, data analysis and reporting as a syndrome surveillance system for use by producers in remote areas.
- User-friendly computer-assisted diagnostic aids to help producers in remote areas.
- Software to be used on hand held devices which permits data entry and access to computer-assisted diagnostic aids in the field.
- Software and simple methods to transfer data from hand held devices to a centralised database for more sophisticated analysis of aggregated data as part of Australia’s overall disease surveillance system for cattle.

Source of Funding
Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease

Project timeframe
February 2004 – March 2007
OTHER COMPLETED PROJECTS

Lameness in sheep and other ruminants in Bhutan
National survey of the prevalence of footrot and development of specific footrot vaccine for Bhutan

Farm Animal Health Staff: Emeritus Professor John Egerton
                           Dr Om Dhungyel

International Collaborators: Department of Livestock Services, Royal Government of Bhutan

Source of Funding: Australian Centre for International Agricultural Research
                    Royal Government of Bhutan

Project timeframe: June 1999 – July 2002

Management of footrot in small ruminants in the hill districts of Nepal and Control of footrot in small ruminants in Nepal – vaccination and serosurveillance

Farm Animal Health Staff: Emeritus Professor John Egerton
                           Dr Om Dhungyel
                           Professor Richard Whittington

International Collaborators: Overseas Development Administration, Government of U K
                            Lumle Agricultural Research Centre, Royal Government of Nepal.

Source of Funding: Australian Centre for International Agricultural Research (ACIAR)
                   Overseas Development Administration, UK
                   Royal Government of Nepal

Project timeframe: July 1993 – June 1999

Exposure Factors – OJD Infection & Clinical Disease (OJD.002)

FA&VPH Staff: Professor Richard Whittington
               Dr Om Dhungyel
               Ms Anna Waldron

PhD Students: Ms Helen McGregor
              Mr Sanjeev Gumber

National Collaborators: Professor Kym Abbott, Charles Sturt University
                       Novartis Australia Ltd
                       Merial Australia Pty Ltd

Source of Funding: Meat and Livestock Australia

Project timeframe: September 1999 – December 2004
Effects of whole-flock vaccination for OJD  MLA OJD.015

FA&VPH Staff  Professor Peter Windsor  Professor Richard Whittington  Dr Om Dhungyel
PhD Student  Ms Helen McGregor
Source of Funding  Meat and Livestock Australia
Project timeframe  September 2000 – June 2004

Development of diagnostic and reference reagents for epizootic haematopoietic necrosis virus of finfish  FRDC 2003/621

FA&VPH Staff  Professor Richard Whittington  Ms Kylie Deece
National collaborators  Australian Animal Health Laboratory, CSIRO
Source of Funding  Fisheries Research and Development Corporation
Project timeframe  March 2003 – August 2004

A study of the biological and economic impacts of OJD in affected sheep flocks in NSW MLA OJD.023

FA&VPH Staff  Dr Jenny-Ann Toribio  Professor Peter Windsor
PhD Student  Mr Russell Bush
Source of Funding  Meat and Livestock Australia
Project timeframe  September 2001 – October 2005

Epidemiology of ovine Johne’s disease – pasture contamination level, age susceptibility and diagnostic tests  MLA OJD.028

FA&VPH Staff  Professor Richard Whittington  Dr Om Dhungyel  Mrs Anna Waldron  Ms Natalie Schiller  Ms Angela Reeves
PhD Students  Ms Helen McGregor  Mr Sanjeev Gumber
National collaborators  Australian Animal Health Laboratory, CSIRO
Source of Funding  Meat and Livestock Australia Limited
Project timeframe  November 2001 – June 2005
Identification of risk factors for OJD-infection level in sheep flocks  MLA OJD.038

FA&VPH Staff  Dr Jenny-Ann Toribio
               Professor Richard Whittington
PhD Student  Mr Navneet Dhand
National collaborators  Dr Jeff Eppleston, Central Tablelands Rural Lands Protection Board
                       Dr Evan Sergeant, AusVet Animal Health Services
Source of Funding  Meat and Livestock Australia
Project timeframe  January 2004 – June 2005

Neuromuscular physiology of nematode parasites of sheep

FA&VPH Staff  Professor Nick Sangster
International collaborators  Dr Janina Demeler
                           Dr Arbeit Fellow (University of Hannover)
Source of Funding  Australian Research Council
                    Pfizer Australia
Project timeframe  August 2003 – August 2005

Pilchard herpesvirus infection in wild pilchards  FRDC 2002/044

FA&VPH Staff  Professor Richard Whittington
National collaborators  Dr Brian Jones*,
                       Fisheries Department Western Australia
                       Ms Melanie Crockford
                       CSIRO Australian Animal Health Laboratory
                       *Principal investigator
Source of Funding  Fisheries Research and Development Corporation
Project timeframe  December 2002 – December 2005

Enhancing the contribution of livestock within smallholder mixed farming systems in the Philippines - The Leyte Livestock Improvement Program (LLIP)

FA&VPH Staff  Dr Jenny-Ann Toribio
National collaborators  Dr Richard Clark – Project leader - Queensland DPI
                       Dr Fay Rola-Rubzen – Curtin University
                       Dr Bob Pym – University of Queensland
International collaborators  Dr Alberto Taveros – Project Leader
                            Dr Agnes Taveros, Dr Eugene Lañada, Dr Fe Gabunada
                            Leyte State University
Source of Funding  Australian Centre for International Agricultural Research (ACIAR)
Project timeframe  February 2000 – December 2005
An epidemiology and pathobiology, training and research unit at the University of Sydney MLA AHW.007

FA&VPH Staff
Professor Richard Whittington
Dr Jenny-Ann Toribio
Dr Nick Malikides
Ms Hannah Forsyth
Mrs Anna Waldron
Ms Marion Saddington

National Collaborators
Australian Biosecurity CRC

International collaborators
Professor Ian Gardner, University of California Davis

Source of Funding
Meat and Livestock Australia Limited

Project timeframe
February 2002 – January 2006

Enabling technologies of RNAi and cell culture for internal parasites of sheep MLA AHW.032

FA&VPH Staff
Professor Nick Sangster

Postdoctoral Fellow
Dr Michelle Power

Technical Officer
Ms Krishanthi Gunarathnam

Source of Funding
Meat and Livestock Australia
Australian Wool Innovation

Project timeframe
February 2004 – February 2006

Aquatic Animal Health Subprogram: Current and future needs for aquatic animal health training and for systems for merit-based accreditation and competency assessments FRDC 2005/641

FA&VPH Staff
Professor Richard Whittington
Mr Matt Landos
Mr Navneet Dhand

National collaborators
Dr Brian Jones*,
Fisheries Department Western Australia
*Principal investigator

Source of Funding
Fisheries Research and Development Corporation

Project timeframe
Aquatic Animal Health Subprogram: Establishment of a national aquatic animal health diagnostic network FRDC 2005/621

FA&VPH Staff
Professor Richard Whittington
Mr Matthew Landos
Mr Navneet Dhand

National collaborators
Dr Brian Jones,
Fisheries Department Western Australia
Dr Mark Crane
Australian Animal Health Laboratory, CSIRO

Source of Funding
Fisheries Research and Development Corporation

Project timeframe

Bovine Pink Eye

FA&VPH Staff
Associate Professor John House

National Collaborators
25 Veterinary Practices from around Australia

International Collaborators
Dr John Angelos
University of California, Davis

Masters Student
Mr Craig McConnell

Funding
Schering Plough Animal Health

Project timeframe
Due for completion - January 2006

Prevention and Treatment of Environmental Mastitis

FA&VPH Staff
Associate Professor John House

Masters Student
Ms Lucy Shum

Funding
Pfizer Animal Health

Project timeframe
January 2004 – December 2006

Dam mutants of Salmonella typhimurium as modified live vaccines in calves

FA&VPH Staff
Associate Professor John House

National Collaborators
Dr Keith Walker and Dr Michael Hornitzky
NSW Department of Primary Industry & Investment, Elizabeth Macarthur Agricultural Institute

International Collaborators
Dr Michael Mahan and Mr Doug Heihoff
University of California, Santa Barbara

BSc (Hons) Student
Ms Jennie Mohler

Source of funding
United States Department of Agriculture
Investigations of Borna Disease Virus in Australia

FA&VPH Staff  Associate Professor Jennie Hodgson

National collaborators  Dr Robert Flower*
                      Ms Sandra Kamieh
                      North Shore Hospital
                      *Principal investigator

Source of Funding  Rural Industries Research and Development Corporation

Project timeframe  February 2003 – January 2006

Exploring animal welfare education materials currently available to primary, secondary and tertiary students

Farm Animal Health Staff  Dr Robert Dixon (Deceased)

Source of Funding  Meat and Livestock Australia

Project timeframe  October 2005 – January 2006