

FACULTY REPORT

FARM ANIMAL and VETERINARY PUBLIC HEALTH

Introduction

We would like to present this annual report on research and post graduate activity in Farm Animal and Veterinary Public Health on behalf of the Faculty of Veterinary Science, and commend the commitment and activity of the large group of people who have contributed so much during the period 2004-2008.

Farm Animal and Veterinary Public Health encompasses both teaching and research, and links these to provide the greatest possible benefit for the community. The undergraduate teaching outcomes are to be covered in a separate report from the Learning and Teaching Committee, and this report focuses on the achievements in research, post graduate coursework and post graduate research. It covers a full five years, and our intention is to use this form of reporting so that interested people and prospective students gain a meaningful view of our activities over a reasonable time frame.

Academics and support staff in Farm Animal and Veterinary Public Health form a critical mass and are able to provide service to the community across many species, industries and scientific disciplines. We work extensively with collaborators from other institutions and the private sector both in Australia and overseas. We have a large network of contacts in government, industry, academia and business and strive to ensure that our work is relevant and meets current and future community need.

In this report we provide a brief biography for each member of academic staff, and a project outline for each of their research projects. Most have been funded through external competitive research grants, illustrating the calibre of the projects. We place high value on our post graduate students as they will be future leaders, and a summary of each of their projects is also included. Overall, there have been many scientific publications and conference proceedings from our work, a further measure of success, and these are listed in the report.

Farm Animal and Veterinary Public Health includes the traditional disciplines of veterinary medicine, epidemiology, state veterinary medicine, infectious diseases, pathology, public health, food security, animal welfare and disease control. Each of the traditional and some emerging farm animal species and industries is also included: sheep, cattle, other ruminants, pigs, chickens and aquatic animals. To cover so much the Faculty has made significant investments in staff and because of its commitment to the production animal industries, it will continue to play a key leadership role in ensuring animal health professionals have the skills needed to support and strengthen Australia's livestock industries and public health.

In 2007 the Faculty made two key academic staff appointments – both new positions funded by the University. The first is in Aquatic Animal Health and Production, a growing need for Australia to meet ambitious government and industry targets to create a \$2.5 billion aquaculture industry by 2010. The position will also enable the University to address sustainability and environmental issues associated with aquatic animal health, and create a specific unit of study in aquaculture for undergraduate students. In April 2007 we welcomed Dr Joy Becker from Canada to this new role.

The second new position is a Senior Lecturer in Veterinary Pathology, with an emphasis on farm animals. This is to meet urgent needs in training veterinary pathologists to underpin Australia's unique animal health reputation. Dr Michelle Dennis, a specialist veterinary pathologist from the United States joined the Faculty in November 2007 to develop new programs in pathology for both undergraduate and post graduate students, and lead new research programs in farm animal health.

The Faculty has identified an expanding range of opportunities available for veterinary graduates of the 21st century. From 2000, the Faculty moved strategically to rebuild its core teaching and research expertise and received strong industry support for this. With funding from Meat and Livestock Australia, a Chair in Farm Animal Health was created in 2002. This Chair is a key investment for the

Faculty and its industry partner, providing the leadership needed to push forward major research programs and stimulate the interest of undergraduate students in production animal veterinary science and public health. This has led to a rapidly expanding portfolio and so the Faculty began a vital new partnership with Meat and Livestock Australia to establish the new Chair in Veterinary Public Health and Food Safety in 2007. In addition, the growth of the research portfolio to include livestock welfare work and international projects in large ruminant health and production, led to the internal appointment of a Chair in Livestock Health and Production in 2008. These and other appointments are building our capacity for providing research solutions for the long-term viability and sustainability of the farm animal sector, plus protection of public health.

A selection of our significant achievements is outlined here and more details can be found in other sections of the report.

Sustainability, the environment and human health

It is impossible to divorce animal health, human health and environmental health and our projects increasingly link these fields into “one health” for which there is major international support through the OIE (World Organisation for Animal Health). One example is the extension of research on viral diseases of farmed and pet fish to explore possible impacts for threatened species conservation in the Murray Darling Basin, an area of over 1 million square kilometres. A second example is our work in the Northern Territory to reduce public health risks associated with diseases of dogs in indigenous communities. Dr Robert Dixon was successful in 2006 in obtaining an ARC Linkage grant focussing on zoonoses of the dog in northern Australia. This will enable improvements in public health in these communities, recognising that dogs harbour a number of diseases that affect humans. National benefits will include improving the social fabric in rural and remote areas.

Community Service and Outreach

The FAVPH group provides advice to animal health agencies. For example, during 2008 we have undertaken consultancies addressing Arbovirus Surveillance Needs and the National Animal Monitoring Program, and the Technical Merits of Introducing Mandatory Recording for Sheep and Goat Movements, National Accreditation of Laboratory Diagnostic Tests, Disease Spread Minimisation in Access to Farmland for National Infrastructure Engineering Works, and Risks of Disease Spread in Creation of Public Water Storages. Advice and support is also provided to industry organisations (for example, Meat and Livestock Australia), the NSW Department of Primary Industries and the NSW Livestock Health and Pest Authorities (formerly the Rural Lands Protection Boards).

Regional International Projects

The FAVPH group has been very successful in obtaining ACIAR (Australian Centre for International Agricultural Research) funding to conduct research projects to inform the development of the livestock industries and assist opportunities to address rural poverty in our region. Major projects in cattle and buffalo health and production are current in Laos and Cambodia (→) and our staff is also involved in projects in Indonesia, China and Pakistan.



Livestock Welfare

In response to the mulesing crisis that has divided the sheep industry, in 2007 we obtained ARC Linkage funds to develop practical solutions for delivery of analgesia for improved animal welfare during routine husbandry procedures involving surgery. This approach has been widely adopted for mulesing and our research is evaluating its application in other procedures including castration, tail docking, dehorning and ear knotching.

Training Programs

Our group has developed a collaborative training programme in Epidemiology and Public Health. During the past 12 months, short course training opportunities have been presented at the Camden Campus, on disease mapping, logistic regression model building for animal diseases, and import risk analysis and application of Bayesian methods in animal health. Besides our own Faculty, instructors also came from the United States and New Zealand. In total, over 60 participants from Federal and State Government agencies, universities and private consultancy received training.

Intensive training has also been provided by short-term programs of study. In October/November 2008, FAVPH hosted three veterinarians from the Government of Bangladesh for training in epidemiology methods, funded by the United Nations Food and Agriculture Organisation's avian influenza response strategy. On-site training in animal health has also been delivered recently at locations in Laos, Cambodia, Indonesia and Chile.

In 2008 we achieved Crawford funding to conduct a series of training programs in 2008-09 in large ruminant health and production for local livestock officers involved in a major livestock development project aimed at alleviation of rural poverty in northern Laos. Similar training has also been provided in livestock projects in Cambodia, China and Pakistan.

In 2009 we commenced a series of training programs in pathology and disease investigation with the NSW Department of Primary Industries and the NSW Livestock Health and Pest Authorities (formerly the Rural Lands Protection Boards) to improve the capacities of the new recruits to this important component of our animal disease surveillance system.

Veterinary Public Health Management Post Graduate Program

The Veterinary Public Health Management program was conceived in 2002, planned and developed very carefully to meet the needs of post graduate students, employers and the community. By 2007 there were 63 postgraduate students in the new program, which is designed to equip animal health professionals with technical and other skills needed to support the livestock sector and to become leaders. Leadership and project management are key components of the program which also covers epidemiology, food safety, risk analysis, surveillance, hazards to human and animal health, wildlife epidemiology and much more. International students enrich the program and extend the network of animal health professionals for the benefit of our industries. A unique feature of the program is its on-line classroom that enables students from remote areas to participate, and short residential workshops ensure that an academic community is established and students participate in a traditional face-to-face environment for key units of study in leadership and project management. Feedback from both students and employers has been very encouraging, and we are confident that the community is receiving long term benefits from the program. The program won a prestigious national education award in 2006.

Investment in infrastructure



The University of Sydney has made a strategic investment of \$2.1M to renovate the JL Shute Building at Camden to accommodate the new Farm Animal and Veterinary Public Health team together with researchers in technologies that underpin animal health and production. State of the art laboratories, including biosecurity laboratories for study of infectious diseases and molecular biology facilities were opened in October 2003. Further investments were made in new PC2 laboratories in 2007. Technology available includes flow cytometry, SELDI mass spectrometry, other proteomics technologies, quantitative real time PCR, laser capture microdissection, and more.

Major research program in Johne's Disease

In the most concerted effort yet to come to grips with a complex and frustrating disease, the Faculty has joined with Meat and Livestock Australia (MLA) to undertake intensive research into Johne's Disease (JD), a devastating and ultimately fatal disease of ruminants already entrenched in south eastern Australia. MLA provided a large grant to support research focused on the early diagnosis of infection in sheep. This was extended in 2007 and will also now address bovine Johne's disease. This complemented other grants to enable a comprehensive on-farm and laboratory-based research program. As this is such a complex and difficult disease, quarantine restrictions have failed to halt its spread, industry has been polarised in its views on control options and the newly released vaccine does not fully prevent infection in sheep. The lack of basic knowledge about the disease is hindering the design of improved tests, treatment and vaccines. The MLA grant has enabled a team of four leading post doctoral scientists and additional research students to be established to study the basics of Johne's infection. The latest genomics and proteomics technology were applied to the problem, and over three

years discoveries were made leading to new tests capable of detecting the infection much sooner; three patents are pending on new technologies as well. In addition, our group has a number of projects evaluating disease control options for OJD and in particular, establishing the efficacy of Gudair® vaccine. Introduction of the vaccine in 2002 has had a major impact on reducing mortality from the disease but current research has identified that the disease persists in some infected flocks, with important disease control policy implications.

Aquatic Animal Health

There is a national goal for Australia to increase aquaculture production three fold to \$2.5 billion by 2010. Leadership in teaching and research in aquatic animal health is on the Faculty's agenda with a vertically integrated program of study in the BVSc curriculum and a 6 cp unit in the BAnVetBioSc degree. This provides the background and motivation for students to continue in higher degree research pathways. Aquatic animal epidemiology is included as a unit of study in the Veterinary Public Health Management post graduate program and aquatic disease research was made available for the first time in 2004 to students in the BSc(vet) program, a one year full-time research stream within the BVSc curriculum.



The Faculty is well-connected to the aquatic animal industries through national and international research projects, participation in the National Aquatic Animal Health Technical Working Group which advises government and the Fisheries Research and Development Corporation Scientific Advisory Committee. The Faculty has the opportunity to make an increasing contribution to an often over-looked discipline within veterinary science and has appointed a new academic to do this. New research projects funded by Fisheries Research and Development Corporation, ACIAR and the Murray Darling Basin Authority commenced in 2007 and cover topics as diverse as best management practice in shrimp aquaculture through to environmental impacts of fish viruses in threatened species.

International reference laboratories

The Faculty has an internationally-recognised role in epidemiology and diagnosis of the notifiable viral disease of finfish, epizootic haematopoietic necrosis virus. The Faculty and the Australian Animal Health Laboratory host the World Organisation for Animal Health (Office International des Epizooties, OIE) Reference Laboratory for EHNV. This Laboratory provides research and a diagnostic referral service to the Australian industry, and ensures international diagnostic capabilities by providing technical advice, protocols and immunological and molecular biological reagents to laboratories worldwide. This supports international trade in aquatic animal products. Diseases such as EHNV present real challenges to both commercial fisheries and to the management of ecosystems worldwide. The Faculty was asked to lead a second international reference laboratory in 2009, for ranavirus. This group of pathogens is one of the causes of global amphibian declines. The reference laboratory will underpin conservation efforts for amphibians.

Australian Biosecurity Cooperative Research Centre

The Faculty of Veterinary Science is a supporting partner in the Australian Biosecurity CRC, which will provide solutions to the growing number of issues in emerging infectious diseases of animals and man. The AB-CRC is a truly collaborative venture with enormous potential. The outcome of the education and training program will be provision of a large number of trained researchers and a new set of training opportunities in epidemiology, risk analysis, emergency response and other disciplines that underpin biosecurity. The peri-urban disease surveillance team made substantial progress in 2007 in identifying the risks to animal production through emergency animal disease and we were pleased to welcome Dr Marta Hernandez Jover as Post Doctoral Fellow in this program.

University of Sydney Biosecurity Group

We commenced a new alliance in 2004 to address public health issues from both veterinary and human disciplines. An Interdisciplinary Network in Public Health grew out of the realisation that the Faculty of Veterinary Science and the School of Public Health in the Faculty of Medicine needed to build linkages, especially in the area of emerging infectious diseases. This idea has now extended to the creation of the University of Sydney Biosecurity Program, with funding support from the Vice

Chancellor. It has members from the Faculties of Medicine, Veterinary Science, Economics and Business and Agriculture Food and Natural Resources and has developed strong linkages with the National Centre for Bioscurity at the Australian National University.

Gut Immunobiology Research Team and Pig Health

Academic staff from the parasitology, Johne's disease and pig health research groups have formed a gut immunobiology team to advance studies on intractable problems – gastrointestinal nematodes, which have developed resistance to common anthelmintics, paratuberculosis and lawsonia. There are many parallels at immunological and pathophysiological levels. The gut immunobiology group is able to pool ideas, equipment, technology and physical resources to maximise the possibilities of finding solutions to these problems. Associate Professor David Emery leads this program on the Sydney campus. The pig health group led by Dr Trish Holyoake was recognised in 2005 with the award of a prestigious Australian Research Council Linkage Grant to evaluate vaccination against *Lawsonia intracellularis*, an important intestinal pathogen. Tackling this problem is made possible by the unique partnership with industry (Boehringer Ingelheim and NSW DPI) and the diverse skills in the Faculty in pig husbandry, epidemiology, gut immunobiology and infectious diseases. Other projects are related to biosecurity within the pig industry and form a part of a coherent national strategy to protect the livestock sector from emerging diseases.

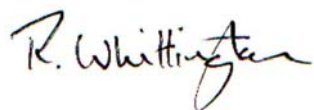
Capacity building in animal disease diagnosis

Australia faces an imminent shortage of expertise in animal health. In one project we found that 70% of experts in aquatic animal health in Australia are aged more than 50 years. There is a similar situation in terrestrial animal pathology. Furthermore, there is a shortage of people who can train the next generation. The Faculty of Veterinary Science is making an important contribution by establishing this strong program in Farm Animal and Veterinary Public Health to build scientific capacity. In addition, we are assisting Animal Health Australia by providing leadership through the National Animal Health Laboratory Strategy to develop a national training program in animal disease diagnosis. By the end of 2007 there was a commitment from all seven veterinary schools in Australia to form a consortium to meet this training need. The Australian Consortium for Animal Disease Diagnosis (ACADD) is now seeking Commonwealth funding to commence its activities.

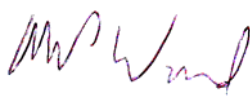
Rural and regional communities

The benefits of the research and post graduate activity covered in this five year report will accrue directly to rural communities and the wider community. The statistics on agricultural production are impressive: 17% of working Australians are employed directly and indirectly in farming, 50% of these in capital cities; farming contributes 12% of gross domestic product (\$72 billion), 24% of goods and services exports (\$26 billion), utilises 60% of the Australian landmass, and there have been productivity increases of 3 to 4% annually for 20 years.

We welcome feedback on any aspects of our program in Farm Animal and Veterinary Public Health.



Professor Richard Whittington
Chair Farm Animal Health



Professor Michael Ward
Chair Veterinary Public Health
& Food Safety



Professor Peter Windsor
Chair Livestock Health
& Production