
MASTERS OF VETERINARY PUBLIC HEALTH MANAGEMENT RESEARCH THESES

2007

Prevalence of White Spot Syndrome Virus (WSSV) infection in shrimp, *Penaeus monodon*, aquaculture in Aceh, Indonesia

Mr Hamish Aiken
Supervisor: Dr Michael Rimmer

The research project aims to provide baseline information on the level of WSSV present in shrimp broodstock and shrimp postlarvae in Aceh Indonesia.



Risk factors, etiology and antibiotic resistance patterns associated with urinary tract infections diagnosed at a veterinary teaching hospital

Marianne Ash
Supervisor: Associate Professor Lynn Guptill

This project aims to (a) determine the distribution of microbes isolated from the urinary tract of dogs and cats at the Purdue University Teaching Hospital (PUVTH) from 2003 – 2006; (b) compare the antibiotic resistance patterns of the UTI isolates over time and (c) identify potential risk factors for MCR infections using data abstracted from medical records



A preliminary study investigating the risks of communicable disease transmission and the movement of poultry exhibited at Agricultural Shows in NSW

Francette Geraghty
Supervisor: Dr Iain East

With poultry from multiple sources and close contact between the public and poultry in Agricultural show settings, this presents risks for spreading disease. This project outlines the results of two questionnaires conducted face-to-face with 105 poultry exhibitors in NSW. Poultry exhibitors represent a group that little is formally known about. Exhibitors show heterogeneous travel networks that cross state borders and cut extensively across the most populous eastern half of NSW. Traceability and biosecurity issues of concern were identified and recommendations to decrease risks and improve the viability of Agricultural Shows are made. Data will also contribute to modeling of emerging diseases in Australia's poultry industry.



Using a cumulative sum control chart to detect events that increase Mortality in Alberta Broiler flocks

Delores Peters
Supervisor: Dr John Berezowski

Alberta Agriculture and Food is implementing a syndromic surveillance system using many inputs, including daily mortality records from broiler chicken flocks. During the normal production cycle there is considerable variation of expected daily mortalities. Unexpected mortalities may be caused by disease and therefore be indicative of a disease outbreak.



The Cumulative Sum Control chart is a statistical method developed to monitor uniform industrial processes. It was adapted to variable broiler mortalities by calculating a different CuSum constant (k) for each day of the broiler production cycle. The difference between the observed daily value and the daily constant was cumulatively summed and compared to the reference level (h). When the cumulative sum is greater than the reference level, a signal is generated.

The Cumulative Sum Control chart agreed with producer records of disease 86.1% of the time. Of those records that disagreed, 4.3% were considered to be false positive, 6.5% false negatives and 17.3% were indeterminate, requiring further investigation.

A study of polyvalent snake antivenom titres, glutathione peroxidases and plasma cortisol levels in two horse breeds supplemented with selenium and vitamin E injections during repeated plasmapheresis collection cycles

John Phelps
Supervisor: Dr Rajiv Jayasena



The project investigated factors that may affect the immune response of horses that are used in the production of therapeutic antibodies for use in humans and animals. The results indicate that horse breed can be a strong determinant of antibody responses to venom immunization. Interactions between the neuroendocrine and antioxidant stress systems have a likely impact on antivenom response levels.

Factors governing livestock ownership in Auckland using spatial analytical techniques and validation through a school based observational study

Chris Morley
Supervisors: Dr Jenny-Ann Toribio and Dr Eric Neumann



The New Zealand livestock industry and government regulatory bodies have reliable data of the location, type and size of commercial livestock producers across the country. However, there is limited data pertaining to back-yard livestock ownership. This project aims to obtain accurate and reliable data, down to GIS mesh-block land parcels, which will be extremely valuable for planning surveillance and incursion response for endemic and exotic disease.

Assessing the impact of dog bites in Hong Kong

Geraldine Luk
Supervisor: Dr Jenny-Ann Toribio



There are about 1000-2000 reported cases of dog bites in Hong Kong every year and it is required by law that all dogs over 5 months be licensed, vaccinated and kept under control in public spaces. This project aims to describe the incidence and risk factors for dog bite in Hong Kong, describing the dog, owner and victim characteristics associated with dog bites.

2006

Assessing Health Risks to both Animals and Humans along the Market Chain Given an HPAI Scenario in the Philippines

Ms Carolyn Benigno
Supervisor: Ray Webb

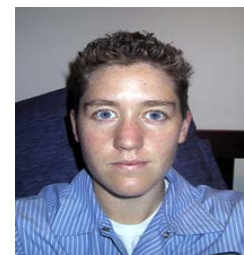


The live bird market has been identified as a possible point of HPAI spread. The characteristics of a live bird market specifically in Asia where there is a mix of poultry species sold, hygiene conditions are not up to standards, and that the bulk of the small holder produce pass through informal markets make it conducive for virus spread from animal to animal and possibly from animals to humans.

The Philippines remains to be a country at risk. With a large smallholder poultry sector and passing mainly through informal live bird markets, the market chain was traced and critical points for possible entry of H5N1 virus were identified. The critical points are as follows: the source of poultry and the biosecurity measures in place at the source of poultry stocks, number of times poultry stocks are sourced and then transported to the market area, the location and condition of the holding facility of poultry stock, the action taken when live chickens and dressed chickens are left after a market day, the method of slaughter and cleaning the dressed chickens and offals, the waste disposal and the protection of the workers involved in the buying, slaughtering and selling of poultry.

A Descriptive Analysis of Livestock Movements in South-Eastern Australia

Mr Jaimie Frazer
Supervisor: Sam Beckett



Livestock movements are an important mechanism of disease spread. However, livestock movement patterns, and the drivers behind them, differ substantially between production regions. When studying disease at a regional level, these patterns and drivers must be understood.

Investigation of factors affecting reactor rates during bovine tuberculosis testing in the Kimberley region of Western Australia

Mr Jim Kerr
Supervisor: Tony Martin



The 1984-1997 BTEC (Brucellosis and Tuberculosis Eradication Campaign) database for the Kimberley region of Western Australia (WA) was analysed to assess bovine reactor rates for tuberculin testing during this period. Possible associations between reactor rates and the recorded database variables of *month* (of testing), *mob-size*, and *vet* (operator performing the test) were investigated.

The overall reactor rate for the period was 1.6 reactors per 1000 head tested, which was significantly ($p < 0.001$) than the 'expected' minimum rate of 12 reactors per 1000 head tested, derived from published tuberculin test specificity estimates. Observed reactor rates didn't decrease significantly as tuberculosis prevalence declined.

Reactor rates appeared to vary significantly according to which *vet* performed the test (Chi-squared test, $p < 0.001$). Although reactor rates differed significantly for some *months* of the year (Chi-squared test, $p < 0.001$), the hypothesis that they would decline late in the dry season was not strongly supported by the results of the data analysis. Reactor rates were negatively correlated with increasingly *mob-size*,

although the effect was only significant during the 1980's ($r=-0.68$; $p<0.001$).

It is recommended that more detailed investigation of the effect of month, mob-size and vet on reactor rates be undertaken using a statistical model with less sensitivity to outlier observations and a better ability to account for possible confounding, interaction and clustering in the data.

The results may have significance for those planning and managing future animal health programs in northern Australia.

Calculation of minimum specificity from infection rates in reactors to an ELISA for bovine Johne's disease used in a test and cull program

Mr Iain McLaren
Supervisor: Tristan Jubb

ELISA test data from the 2004-2005 Victorian bovine Johne's Disease (paratuberculosis) Test and Control Program was collected and verified in a custom-built database, then analysed using logistic regression to determine (i) infection rates in the animals positively and (ii) the minimum specificity of the ELISA.

The testing data included histology and tissue culture results from reactors followed up at slaughter. The ELISA test under evaluation was an absorbed ELISA manufactured by the Pourquier Institute.



Over all, 82.27% of reactors were infected and the minimum specificity was 99.73%. Although few reactors are likely to have been unnecessarily, the very low sensitivity of the test probably limits any real progress in controlling the disease through culling.

A cross-sectional study to determine the prevalence of Bovine Johne's Disease in dairy cattle herds in New Zealand

Ms Karen Nicoll
Supervisor: Robert Sanson

With the growing evidence of a causal link of *Mycobacterium avium* subspecies paratuberculosis to Crohne's Disease, attention is now focusing on steps that New Zealand may need to put in place to deal with the issue. In New Zealand up until the present there has been no strong call to eradicate Johne's Disease other than on the basis of being a disease of economic significance for livestock. As a consequence of the history of the development of Johne's Disease in New Zealand, the prevalence in the New Zealand diary herds is currently unknown.



Establishing the current prevalence of Johne's Disease in the New Zealand diary industry could greatly assist future decisions on the development and implementation of any disease control programmes that might be introduced. This cross-sectional study to determine the herd prevalence of Johne's Disease in dairy cattle herds in New Zealand is aimed to address the situation of the current lack of knowledge about the true herd prevalence.

The study includes a stratified random-sampling plan to select diary herds in the 5 main diary regions in New Zealand using AgriBase for the sampling frame. The sampling rate is based on estimates of the expected average herd prevalence and the herd sensitivity and specificity of pooled faecal culture. Sampling will be from a minimum of 97% of the diary cows in the milking herd >2 years old. Faecal samples will be age stratified at a pool ratio of 5:1, and the culture method proposed is BACTEC liquid culture for 8 weeks. The survey will also include the use of a simple questionnaire for the collection of information relevant to the faecal sampling of Johne's Disease on the selected farms.

Persistence of antibody levels of poultry vaccinated against H5N1 highly pathogenic avian influenza in Hong Kong

Mr Eric Tai

Supervisor: Trevor Ellis



Since 1997, strains of H5N1 HPAI viruses have evolved that have the ability to be directly transmitted from infected poultry to humans and in some cases cause disease and death in humans. Most of the human cases to date have been directly linked to close contact with infected poultry or poultry products, so by preventing infection in poultry the risk of infection in humans will be greatly reduced and this in turn will reduce the possibility of an influenza pandemic arising from the H5N1 HPAI virus. Together with enhanced biosecurity measures and an active surveillance and monitoring program, vaccination has been a vital part of this prevention program against outbreaks of H5N1 HPAI in chicken in Hong Kong. Many evaluation studies on the commercial H5 vaccines have focused on commercial broilers, which have a relatively short lifespan compared with layers or broiler breeders. The vaccination schedules often focus on protection of younger chickens without giving recommendations on schedules of booster vaccination for older birds. This research report is targeted at determining the duration and level of persistence of antibody following vaccination with the H5 vaccines so that sound recommendations can be made on vaccination schedules for older layer or broiler breeder chickens and backyard chickens.

A survey design to determine the serogroup prevalence of *Dichelobacter nodosus* isolated from virulent footrot in sheep flocks of New South Wales

Ms Helen Walker

Supervisor: Om Dhungyel



Virulent footrot (*Dichelobacter nodosus*) is widely recognized as a disease with major economic impact on sheep flocks worldwide. Traditional control and eradication programmes are resource intensive and cannot be applied to all farming enterprises.

A novel control method using specific monovalent and bivalent vaccination programmes was found in Asia to result in successful control of the disease where traditional control methods had failed. Research on the advantages and disadvantages of introducing such vaccination programmes in Australia is currently being conducted.

As an adjunct to this research, this thesis proposes a survey design that establishes the serogroup prevalence of footrot in New South Wales. In addition, the thesis proposes an update and improvement of the last (1983) major Australian serogroup prevalence study. The thesis:

- presents a comprehensive and critical review of the literature;
 - proposes a mixture of systematic random sampling and convenience sampling as the most appropriate methodology for conducting a serogroup prevalence of footrot survey in NSW;
 - proposes a practical and effective method for collecting the data needed for the survey, supported by data especially obtained for this thesis regarding which NSW flocks are currently known to have clinical footrot;
 - develops a data management system, checked using mock-input data;
 - discusses the strengths and weaknesses of the proposals based on what is known from the literature; and
 - makes recommendations as to how the proposed survey and data collection tasks could be implemented.
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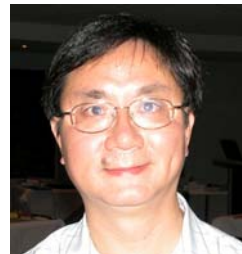
2005

A critical review on the role of chytrid fungus in causing global amphibian decline

Mr Wing Ka Au

Supervisor: Professor Richard Whittington

The main task of the project was to critically review the epidemiological evidence based on literatures for the involvement of the chytrid fungus in global amphibian decline. The recent decline appearing simultaneously in various continents has raised the alarm of the breaking down of environmental shield and may also threaten the survival of other species including food animals and humans. Understanding the cause is important because early preventative measures can be taken to secure the environmental protection in which veterinary public health is closely associated. It is important to find out what has and what has not been done and whether the conclusions are valid so that a series of recommendations for future work to look for the real cause can be concluded from the review.



The caprine brucellosis situation in Swaziland - a review of previous studies, clinical and laboratory records

Mr Roland Xolani Dlamini

Supervisor: Dr Nick Malikides

Swaziland experienced its first ever outbreak of *Brucella melitensis* infection in goats in 1995. Brucellosis is a disease of serious public health importance and causes Malta fever in humans. To date there have been three independent prevalence studies in: 1995, 1999 and 2003, and no specific intervention. This project was a retrospective desktop study to review the results from the seroprevalence studies, clinical and laboratory records to predict the most likely present brucellosis situation in small ruminants and suggest reasonable control/eradication measures. The objectives were: to critically evaluate previous sero-prevalence studies, paying particular attention to sampling methodologies and analysis; to collect, compile and analyze anecdotal evidence of small ruminant brucellosis from clinical and laboratory records; to predict the most likely brucellosis situation in small ruminants; and, to propose cost effective control/eradication strategies.



Contrary to expectations, the prevalence of brucellosis rose briefly following its introduction and thereafter decreased sharply. Based on prevalence, the 1999 survey divided the country into three zones: Endemic zone; Propagation front; and, Free zone.

In 2003 no such pattern of prevalence was found. At this time there were very few positive flocks even in the previously endemic zone. What is interesting is that both studies used a two-stage cluster sampling method; dip tanks were primary sampling units and flocks were secondary sampling units. Also no evidence could be found that *B. melitensis* Rev 1 vaccine had been used at any time in the country. South Africa, which experienced a similar outbreak at the same time, found that the disease spread slowly in local goats even though the conditions were ideal for rapid spread and this could not be explained (Emslie et al 2002). There was no correlation between abortion storms and melitensis sero-positivity.

An analysis of the effects of an intensive spay/neuter program on classical animal control activities and the stray pet animal population

Mr Allan Drusys

Supervisor: Dr Janet Foley



The negative impacts of stray animals in the United States, as elsewhere, are manifold and significant. Not only do stray dogs and cats pose the greatest risks for the introduction and dissemination of terrestrial rabies virus into the urban environment, they represent an ever present threat to public health as carriers of other zoonotic diseases. Furthermore, the negative environmental impacts of feral cats through wildlife predation can not be understated. The traditional approach to stray pet management, consisting primarily of a trap, impound and euthanize policy, has not provided a long term, cost-effective mechanism to reduce the stray population. The recent popularity of trap/neuter/release (TNR) strategies involving feral cats were successful on a limited scale but did little to address the concerns of wildlife predation.

An animal control management software application, Chameleon®, and a spay/neuter program were developed at one of the largest animal control agencies in the U.S. with the aim of making policy and management decisions factually based and justifiable in the emotional atmosphere of the animal welfare and public policy arena. The dataset of impound and outcome cases from 2000 to the present was extracted from Chameleon® through a combination of Excel® and Crystal Reports® applications. Program activities increased by 15% during the period. The numbers of live and dead pets decreased, while the opossum numbers remained stable over the same period. Using this dataset, a comparison to the human demographic profile needs to be drawn to provide insights into the significance of the analysis.

A model for foot and mouth disease in the Kimberley pastoral region

Mr Ben Madin

Supervisor: Dr Graeme Garner



Foot and Mouth Disease (FMD) is one of the biggest risks for the Australian livestock industry. Effectively managing an outbreak is critical to governments, industry and the community. During the 2002 Fire and Emergency Services Authority exercise in the Kimberley region it became apparent that resources were going to become exhausted very quickly in a large outbreak, and effective management of resources is essential. Department of Agriculture, Fisheries and Forestry (DAFF) has developed a sophisticated simulation model for studying potential spread and control of FMD. 'AusSpread' integrates Monte-Carlo modelling with spatial analysis tools, to provide spatial representations of outbreak scenarios. It is designed to use readily available data sources – and being regionally-based, data has to be collected for relevant regions under study.

The aim of this project was to collect data to develop a region-specific FMD model for the Kimberley, and required the collection of data on topography, cadastral information (property boundaries), animal numbers, and methods of spread - especially animal movements. In the Kimberley nearly all between-property animal movements are by road train, so collection of data on movements and for what purpose allowed model parameters to be developed. Sampling was by a modified stratified procedure, using shires as the first level, to ensure that the variation across the region and by season was accounted for to some extent, then judgment sampling based on who is likely to bother filling in a survey. The project provided a useful background for planning for future exercises – particularly as it is likely that the model could realistically use the same parameters in regions across Northern Australia.

Biosecurity Risk Profile of foot and mouth disease spread through New Zealand livestock saleyards

Ms Andrea Murray
Supervisor : Dr Robert Sanson



At livestock saleyards, animals, people and vehicles from various source farms congregate before dispersal to various destination farms. The effects of infected animals moving through livestock saleyards were illustrated in the United Kingdom and Dutch foot and mouth disease (FMD) outbreaks of 2001 (Gibbens et al. 2001, Bouma et al. 2003). This project will determine catchment and dispersion parameters, and parameters for the mixing or splitting of lines through sales, for selected saleyards. The outcomes will be a better understanding of risks associated with saleyards and the determination of parameters to be used in models of the spread of FMD. The strengths of the proposed project are the support of government and industry (all major stakeholders), better understanding of the role of livestock saleyards in the spread of FMD and other contagious diseases, and determination of parameters to assist in modelling spread. The weaknesses are that the livestock saleyards and associated industries are in a constant state of change in terms of number of saleyards and stock and station companies servicing them, causing parameters of catchment and dispersion to fluctuate, and dependence on data provided by a third party (a stock and station company).

Epidemiology and control of bovine Johne's disease in a beef cattle herd

Ms Catherine Taragel
Supervisor: Dr Evan Sergeant



The prevalence of bovine Johne's disease (BJD) in beef cattle within Australia is low compared to dairy cattle and there is less known about the epidemiology of the disease. Information on the effectiveness of a control program within a beef herd will assist in the development of policy in this area. Similarly, information concerning the dam in transmission of the disease in this more extensively managed environment (compared to dairy) will assist with risk assessment and policy making in BJD control in beef cattle herds.

A database will be developed in epi-info to store data and assist in its management and analysis.

An assessment will be made of the true prevalence and distribution of BJD over time in an extensively grazed beef cattle herd undergoing a test and cull program in a temperate environment. This may help in determining what impact this has had on the herd and whether eradication or control of the disease is feasible or practical. The presence of dam, calf and age data may enable analysis to be undertaken to assess the importance of the dam in disease transmission in an extensively grazed beef herd and also any impact of age of dam when detected to determine which of her calves to cull.

Comparison of Rose Bengal Plate Agglutination Test and Allergic Skin Test in detection of *Brucella suis* in adult pigs in commercial farms in French Polynesia

Ms Valerie Antras
Supervisor: Dr Jenny-Ann Toribio



Porcine brucellosis is a zoonotic disease listed by the OIE that impacts the health and productivity of pigs in infected countries. The disease is caused by *Brucella suis* and is responsible for abortion in infected sows and an abortion epidemic in newly infected pig herds. *B. suis* biovar 1 is present throughout the whole pacific region whereas biovar 2 is dominant in Europe and biovars 1 and 3 in North and South America. Following a survey conducted in 1998, the 23 commercial pig herds of French Polynesia have been monitored for brucellosis and six identified as infected. The problem of availability of diagnostic tools and lack of knowledge about test characteristics was recognized during this period of surveillance. This study was designed to generate the data regarding sensitivity (Se) and specificity (Sp) of the Rose Bengal Agglutination and Allergic Skin tests. Among 23 farms, three infected and three uninfected enterprises were selected purposively. 142 adult animals were recruited in infected farms where the disease is endemic and 226 in uninfected farms as a reference population. In absence of a gold standard method for identifying infected animals, "TAGS", a model based on maximum likelihood estimates was used to compare the results of parallel testing in the infected population and the reference uninfected population, and generate the test characteristics estimates with 95% confidence intervals: Rose Bengal Agglutination Test Se = 66.67% [0.5986 ; 0.7695] and Sp = 1 [1 ; 1]; Allergic Skin Test Se = 57.45% [0.5062 ; 0.6744] and Sp = 99.12% [0.9779 ; 1]; combination of both tests in parallel Se = 85.52% [0.7937 ; 0.9105] and Sp = 99.12% [0.9779 ; 1].

These characteristics will be used for the design of surveillance programs and elaboration of control strategies. The insufficient sensitivity will rule out a test and slaughter strategy. Research in future should address the characteristics of the test in replacement gilts and in the non-commercial herd which constitutes both a very different population and a threat for human health.

Maternal vaccination strategies as an aid to the control of Glassers disease in weaner pigs

Ms Katherine Clift
Supervisor: Dr Trish Holyoake

The efficacy of maternal vaccination on the performance (growth rate, mortality rate and treatment rate) of four to ten-week-old weaner pigs was assessed using a commercial vaccine (Fort Dodge HPS) and an autogenous vaccine for *Haemophilus parasuis*. The trial was stratified by sow parity and weaner gender. Maternal vaccination did not significantly affect any of the measured variables. There were no significant differences detected between the progeny of vaccinated dams and the control progeny. Sow progeny performed significantly better than gilt progeny in all of the assessed variables. There were no consistent differences in the performance (weight gain, mortality and treatment rate) of entire male and female weaner pigs.



Assessment of the level of microbiological contamination of mutton carcasses produced for the United States and non-United States markets using generic *Escherichia coli*, *Salmonella* and total viable count results

Mr Anand Deo

Supervisor: Dr Jabbar Hashim Tarish



The objective of the ESAM program is to ensure microbiological consistency of meat produced at all export abattoirs through national benchmarking and prescribed testing criteria. The aim of this project was to assess the level of mutton carcass contamination/hygiene, at Australian meat export plants supplying US and non-US markets. The data were compared with results from the previous Australian studies. ESAM data were used from seven plants within each cohort to assess the level of *E. coli*, *Salmonella* and total viable count (TVC) contamination. Pooled variance *t* test analysis for differences in the two means (of positive samples) for *E. coli* did not show any statistically significant difference between the US and non-US cohorts, but the mean TVC results showed the non-US cohort to be significantly higher ($P < 0.05$) than the US cohort. Trend analysis of data from 1994 to 2003 showed that the microbiological status of Australian mutton has improved significantly with negative linear trend lines seen in all 3 categories (*Salmonella*, *E. coli* & TVC). This study (2003) showed that for the tests conducted, the microbiological contamination of Australian mutton was low, however, significant differences were seen between different export plants. Given the high level of non-compliance testing ratios for *Salmonella* and *E. coli*, it would be prudent to reassess the enforcement of the ESAM program. The microbiological contamination of Australian mutton was low (within the set performance standards) demonstrating AQIS standards to be effective in meeting objectives. The high quality of Australian mutton appears to meet the standards and requirements of our overseas trading partners. On non-US plants the TVC results were significantly higher. However, since testing is not compulsory, it would be necessary to conduct further studies to confirm these results.

Distribution of bovine Johne's disease in the Casino Rural Lands Protection Board

Mr Paul Freeman

Supervisor: Dr David Jordan



This study describes aspects of the epidemiology of bovine paratuberculosis, which is caused by *Mycobacterium paratuberculosis* (*Map*), in cattle herds in the Casino RLPB, a subtropical area in NSW in the period 1971 to 2004. A general literature review of bovine paratuberculosis was undertaken, initially at the global level, and then progressively focused at the national, state, and finally the subtropical level in order to identify possible influences on the disease patterns in the study area. Of 78 herds (44 beef, 34 dairy) in the Casino RLPB with a history of *Map* infection it was found that 56.4% (70.5, beef; 32.4 dairy) have eradicated *Map* infection. Following the introduction of infection, an average of 6.9 years was required to diagnose the presence of *Map* and an average of 4.4 years to eradicate the organism. Disease investigations accounted for 73% of *Map* herd detections with the remainder resulting from surveys, accreditation tests and tracings. In those herds where transmission to homebred animals had occurred, detection of *Map* and eradication took about 5 times longer than herds where transmission was not observed. In 72 herds an introduced animal was the source of infection. Two herds contracted the infection due to sharing of yards and the source of infection was not determined in 4 herds. For beef herds with *Map*, 92.8% of infected introductions were sourced locally while for dairy herds 34.5% introduced infected animals were from Victoria. Two herds introduced infection from BJD protected zones in NSW. Straying, contaminated feed or effluent were not identified as sources of infection suggesting the risk posed to neighbours by infected herds is low. The time taken to detect and eradicate *Map* infection was shorter in recent years and the influences of technical, social, political and economic factors on these trends were discussed with an emphasis on their impact in a subtropical region.

Risk-based determination of animal disease priorities for the national animal health system

Ms Peta Hitchens

Supervisor: Dr Robert Keogh

This dissertation details development of a risk-based animal disease prioritisation model that aims to address one aspect of a critical success factor identified at Animal Health Australia's National Animal Health Consultative Group meeting in September 2003. Prior to work reported here, there has been no consistent means of prioritising emerging, exotic or endemic animal disease risks for the purposes of assessing the feasibility of implementing an animal disease management program. The first stage of the study was to



conduct a Delphi survey of Animal Health Australia's Members to determine the criteria they perceive as important when prioritising animal disease programs. The second stage was to analyse the survey responses by identifying those criteria most important to form the basis of the model. The primary criteria identified for inclusion in the model were epidemiology, likelihood of achieving program outcomes, nature of contribution, public health and social impact, economic impact, stakeholder commitment and cost benefit analysis. It is intended that the model will be perceived as a fair, transparent and consistent approach for determining priorities and risk ratings for animal diseases and their management programs. Refinement of the model and risk assessment process will be necessary to achieve stakeholder acceptance.

The effect of exposure of lambs to pasture contaminated with varying levels of *Mycobacterium avium* subsp *paratuberculosis* on the development of ovine Johne's disease in Australia

Ms Jane Littlejohn

Supervisor: Dr Jenny-Ann Toribio

Grazing strategies are promoted as disease management tools for ovine Johne's Disease (OJD). The effect on OJD development in 528 lambs in the Southern Highlands of NSW, of grazing pasture with high, medium and low levels of contamination with *Mycobacterium avium* subsp. *paratuberculosis*, both before and after weaning, was studied by multiple linear and logistic regression. Test parameters compared were PCR/REA, histopathology (including the Perez lesion score) and gross lesion assessment used to diagnose OJD. The association between grazing strategies and the OJD rate, mortality rate, body weight, wool weight and estimated age at death was not conclusive. Perez type 3B and 3a lesions predicted reduced body weights by 3.6 and 3.53 kg respectively. Conversely lesion types 3c, 1 and 2 predicted body weights 5, 4 and 1.9 kg higher, respectively. Sheep with lesion type 3b died an average of 6 months earlier than sheep with other lesion types. Using the Perez score which includes lesions without acid fast bacteria as a positive diagnosis, increased the sensitivity in this study group to 52.22% but decreased specificity to 97.54%. The study suggested that the lesion type might be able to be used as a flock indicator of potential losses from mortality and reduced body weight.



Descriptive analysis of 32 ovine Johne's disease infected flock profiles performed between 2000 and 2004 in NSW, Australia

Ms Luzia Rast

Supervisor: Dr Barbara Maloney



OJD was first detected in Australia in 1980 in the central tablelands of NSW. Since then it has gradually spread. Local, regional and, since 1998, national control programs were initially underpinned by quarantine on individual (suspect or infected) properties. Movement restrictions were later removed as it was realized that a better understanding was needed on how OJD established in a flock, how disease spread over time and if certain management practices could prevent disease progressing throughout a flock. To achieve this, a procedure called 'infected flock profiling' (IFP) was implemented in 32 infected flocks in NSW between 2000 and 2004. The aim was to develop specific property disease control programs. This study compared and analysed the 32 flock profiles with an aim to identify common risk factors that contributed to different disease patterns. There were large variations in available data quality and quantity from individual flock profiles. The main reason for limited data from IFPs were: 1. lack of resources to implement a management structure that ensured a consistent approach to IFPs including monitoring and evaluating progress and collation of results; 2. no predetermined clear criteria and objectives for IFPs; 3. insufficient consideration of impending national program changes, leading to a time period of only 2-3 years for IFPs, too short for a disease that spreads very slowly. Recommendations to address these shortcomings were made.

West Nile virus surveillance in wild birds in Australia

Mr Rob Williams

Supervisor: Dr Peter Black



West Nile Virus (WNV) is a virus of public health significance that does not occur in Australia. It is unclear how WNV would behave in Australia, given the different ecological factors that exist when compared with other countries. The purpose of this project was to identify elements of a surveillance system involving wild birds to detect an incursion of WNV into Australia. The project was primarily a literature review of WNV surveillance in other countries, especially North America and Europe. Key conclusions were that a WNV surveillance system should complement existing systems that are monitoring other flaviviruses and a cost-benefit analysis would assist its establishment. Other key conclusions included: the potential epidemiological behaviour of WNV, especially virulent strains, and its interaction with Kunjun virus in wildlife is a key area for consideration for future preparedness work; the ability to differentiate between Kunjun virus and WNV using serology is an urgent priority for Australia; and surveillance in wild birds should be geographically targeted to reflect the highest risk areas for an incursion, such as urban areas around major international airports. Finally any surveillance system established should be cost effective and measured against performance criteria to assess its capabilities.

A cross sectional study of canine leptospirosis in mainland Australia

Mr Raphael Zwijnenberg
Supervisor: Dr Jenny-Ann Toribio



Leptospirosis is of significant public health concern. A cross sectional study of canine leptospirosis was conducted in animal welfare populations of dogs with the objectives to determine the prevalence in the state of Queensland and the detection of disease presence in all other states and territories except for Tasmania and the ACT. In Queensland, the sample size was calculated using the standard formula to estimate proportions. For the other states and territories, sample sizes were determined according to Freecalc software in Survey Toolbox (Cameron, 2004). In Queensland, a seroprevalence of 2.4% was measured with a 96% level of confidence, while in all other states and territories except for South Australia the disease was detected with a higher prevalence than the originally estimated 0.5%. The highest prevalence in the sampled populations was found in NSW (3.2%). Significant associations were demonstrated between a relatively young age group (1 - <3 years) and seroprevalence as well as dogs located in NSW and seroprevalence. These findings demonstrate that leptospirosis in Australia is more prevalent than generally thought by veterinarians. Veterinarians in Australia should consider the significance of these findings and disease prevention by measures including more efficient rodent control and vaccination. These findings confirm under-diagnosing and under reporting of this zoonotic disease in Australia.