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.
A critical review on the role of chrytid 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 chrytid 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 sero-prevalence 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.