

Research Projects

Current Research Projects available in the
School of Veterinary Science

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FUNDED PROJECTS

Use of naturally occurring canine brain tumours for the development of novel translational theranostics.

Brain cancer has one of the worst outcomes of any cancer with a very poor survival. Unfortunately this cancer is not limited to adults, brain cancer kills more children than any other disease and more people under 40 than any other cancer. Dogs also naturally develop brain cancer which shares the pathophysiological features, very limited treatment options, and poor prognosis of human brain cancer. An emerging treatment paradigm for brain tumours are theranostics, a diagnostic and therapeutic combined in a single molecule. The biodistribution and pharmacokinetics of the theranostic are measured using positron emission tomography (PET) scanning and used to calculate appropriate, patient specific therapeutic regimes.

The goals of this PhD project include 1/ developing a predictive model for brain cancer in dogs using literature, historical pathology and clinical data 2/ explore the use of novel biomarkers to develop cutting edge theranostics 3/ explore the clinical use of novel theranostics in canine patients diagnosed with brain cancer as a translational and comparative model for human disease. Techniques include clinical assessment, autopsy, histopathology, immunohistochemistry, data analysis and opportunities to participate in cutting edge medical imaging. The project is conducted in collaboration with CSIRO and AIBN.

This project would suit a veterinary surgeon registrable in Queensland with a strong interest in pathology and oncology. The project must be conducted as a full time PhD. Candidates must meet the UQ eligibility criteria for PhD studies and receive a competitive living allowance scholarship.

Contact: Expressions of interest can be emailed to Associate Professor Rachel Allavena at r.allavena@uq.edu.au



Targeting the egg – novel strategies towards ovicidal scabies therapeutics.

Skin infestations with the mite *Sarcoptes scabiei* are becoming increasingly prevalent and have been recognised as a primary risk factor for secondary bacterial skin infections in tropical settings worldwide, including Northern Australia's Aboriginal and Torres Strait Islander population. As resistance to current drugs is emerging there is a critical need for new therapies.

The Bacterial Pathogenesis and Scabies Laboratory at QIMR Berghofer investigate how parasitic scabies mites cause disease and how they promote serious downstream infections. Another focus point is the development of new treatments.

Most drugs currently in use have limited ovicidal activity, a major reason for treatment failures. Ivermectin and Permethrin are neuro-inhibitors targeting molecules involved in parasite mobility, but they have insufficient effect on the immobile egg stage. Eggs are protected by a dense egg shell, laid into the stratum corneum and separated by desquamation from the serum-containing lower epidermal layers, out of reach of host defence mechanisms and systemically administered drugs. This scenario underlines the importance of topical treatments that specifically target mite eggs.

The focus of this PhD project is to identify egg-specific drug targets, understand their biological roles, identify inhibitors and test them in vitro and in our porcine in vivo model.

Expected outcome: Fundamental knowledge about scabies mite embryogenesis and drug(s) that prevent egg hatching, to be developed as topical agent.

Subject categories:

Parasitology

Veterinary Medicine
Zoology / Animal Science
Molecular Biology
Biochemistry
Bioinformatics
Medical / Clinical Science
Microbiology

Contact: Dr Katja Fischer Katja.Fischer@qimrberghofer.edu.au ;

Contact patterns associated with pigs' social behaviours and their effects on the health and productivity of pen mates in commercial pig farms

Under natural or unconfined conditions pigs are known to be a socially active and manifest behavioural patterns (e.g. social nosing, nose, root and oral manipulation) in an organised social structure. Pigs' social structure and their ability to express some of their natural behaviours changes under confined or intensive production systems. To better understand how direct (e.g. active behaviours through social learning) and indirect (e.g. pigs encountering a wounded or damaged tail) pigs' behaviours impact of on the health and productivity of that pig and other pen mates by social interactions, information is needed on the type and magnitude of contacts between pigs. In this project we aim to: a) describe behaviours, health and productivity parameters of individual pigs housed together in pens with and without environmental enrichment and b) to quantify the effects of removing individual pigs on the social structure, behaviours, health and productivity parameters of individual pigs housed together in pens with and without environmental enrichment. The findings of this project will provide commercial pig producers with recommendation that enhance their decision making process when selecting pigs based on behavioural or social characteristics to improve on herd's genetic pool, health and productivity.

Contact: Dr John Alawneh, T +61 (07) 54601837; Email: j.alawneh@uq.edu.au Webpage: <http://researchers.uq.edu.au/researcher/2636>

Daily bulk milk data as a tool to monitor udder health and optimise productivity in SE Queensland dairy herds

The overall objective of this project is to identify and quantify any correlations found between change in the 'daily' (or more particularly a meaningful short-term average) bulk milk tank data (e.g. milk volume, milk solids, and milk somatic cell counts) of Australian dairy cows and their udder health, reproductive, and productive performance. The expected outcomes are (i) optimised treatment of raw bulk milk tank data and (ii) statistically verified and quantified relationships between (change in) bulk milk tank and any or all of: individual cow milk data, incidence risk of mastitis, calving to conception interval and reproductive performance. The rationale for the project is to provide SE Queensland dairy herd owners or managers with timely information about cows' udder health and to improve cows' reproductive and productive performance from data collected routinely at the farm gate, thereby increasing value to the owner and justifying investment in an intelligent management system incorporating daily bulk and individual cow milk data.

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Optimising live weight to monitor udder health and productivity in SE Queensland dairy herds

Over the last 30 years computer technologies have led to substantial improvements in the quantity and quality of information recorded on individual dairy farms. To date these developments have not yet delivered comprehensive systems that will allow the whole herd system to be monitored and managed. Commercially available walkover weighing scales can identify and record the live weight (LW) of dairy cattle as they enter or exit the dairy for milking. So too can modern milking parlours in relation to cow's milk production. An attractive feature of these systems is that it can be completely integrated into daily farming routine, and data generated can be turned into knowledge, further improving the objectivity of herd decision making.

The overall objective of this project is a) to quantify influence of exercise (specifically, the distance walked each day) on gut fill and its contribution to the variation in daily LW estimates; b) to identify and quantify any correlations found between change in the 'daily' (or more particularly a meaningful short-term average) individual (or bulk) milk and individual (or herd average) live weight data of dairy cows and their udder health

and productivity performance; c) to develop algorithms to scan to an individual cow's LW and daily individual (or bulk) milk data to detect deviations from what is 'normal' for that individual cow (or herd) to further improve the objectivity of herd decision making.

The rationale for the project is to provide SE Queensland dairy herd owners or managers with timely information about cows' udder health and to improve cows' reproductive and productive performance from data collected routinely at the farm gate, thereby increasing value to the owner and justifying investment in an intelligent management system incorporating daily bulk and individual cow milk data.

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Mapping genes for fertility in beef cattle

- The beef industry in northern Australia is comprised primarily of *Bos indicus* breeds and their crosses
- Reproductive rates of Brahman cattle are considerably lower than that of *Bos taurus* cattle
- Genome-wide association studies undertaken by the Beef CRC yielded several candidate regions for fertility traits in Brahman and composite cattle
- This project will investigate these regions more closely using 'fine-mapping' approaches to identify functional polymorphisms that contribute to these traits
- Suitable for a PhD project

Contact:

Supervisors: Dr Russell Lyons & Dr Marina Fortes r.lyons2@uq.edu.au / 07 5460 1974

PhD projects on nutritional and hormonal control of skeletal growth

We are looking for high achieving individuals to undertake post graduate study in the area of bone biology. These positions are primarily located within the School of Veterinary Science but join a collaborative group of scientists from the School of Agriculture and Food Sciences, the School of Biomedical Science and the Centre of Animal Science within the Queensland Alliance of Agriculture and Food Innovation. Access to equipment and facilities is available in all schools so that the student has access to the best facilities. The School of Veterinary Science is in its 76th year of operation and is one of eight schools within the UQ Faculty of Science. The School has almost 670 undergraduate and 85 Research Higher Degree students. The School of Veterinary Science has superb new facilities at the UQ Gatton Campus, providing the teaching, research and clinical infrastructure and resources to further develop its strong reputation as a leading provider of veterinary training, research and clinical care. The location of the positions will be determined by the project emphasis but it is anticipated that significant time will need to be spent on the Gatton campus with its excellent facilities. The Schools and their staff have a wide network of collaboration with industry and other research organisations. Being located in the sub-tropics and the Asia-Pacific region creates unique opportunities for research.

The Role

Our research aims to investigate mechanisms of bone growth and skeletal elongation in animals. The project is funded by Meat and Livestock Australia and has a good operational budget for the PG student to complete their work. This project will predominantly involve laboratory techniques including gene expression, immunohistochemistry, histomorphometry and hormone analysis to examine the factors that drive bone elongation during growth under a number of different nutritional treatments in cattle. The concepts have application to all animal species, including humans, and the skills acquired will position the person to move into research careers in medical science, veterinary science or agriculture. The project would not need to involve field work, but there is the opportunity to be involved in cattle field trials and sample collection if interested in this aspect of the research. The balance of laboratory and field work could be determined based on the skills and interest of successful candidates.

The Person

This role would suit a person with a degree in Science, Veterinary Science, Agriculture, Animal Science or similar disciplines. Candidates need to obtain an Australian Postgraduate Award (APA) or equivalent.

Operational funds for the project are assured. Prospective students will be provided with assistance to apply for either an APA or, for international students, an International Postgraduate Research Scholarship (IPRS). For further information on scholarships please refer to <http://www.uq.edu.au/grad-school/scholarships-and-fees>. Candidates should have an excellent GPA (>5.5 on the UQ 7.0 scale) and a First Class Honours degree or equivalent and need to be eligible for an Australian Postgraduate Award (APA) or equivalent. Basic experience in molecular biology, cell biology, biochemistry, endocrinology, and/or histology would be desirable but training would be provided. We are looking for individuals who are high achievers and would join an international team of researchers with experience in molecular biology, cell biology, endocrinology, histology, bone metabolism and animal nutrition.

Contact:

Dr Lisa Kidd BVSc MACVSc DipVetClinStds CertEO PhD
T +61 7 5460 1858 F +61 7 5460 1922 M 0438 714 876 E l.kidd@uq.edu.au

Effect of Bovine Viral Diarrhea Virus (BVDV) infection on bovine reproduction: from fertilization to early pregnancy

BVDV is prevalent in cattle throughout the world and perceived as one of the most important causes of reproductive losses in ruminants. However, many questions remain unanswered regarding: 1) mechanisms of transplacental transmission, virus spread within the foetus and the consequences of infection for target cells and 2) which is the role of spermatozoa in viral transmission, since bulls with BVDV are capable of shedding virus in the semen but it has never been determined whether the virus is within the spermatozoa, free within the seminal plasma or within the non-sperm cellular components. Using bovine pestivirus s. bovine viral diarrhoea virus (BVDV), an economically important agent, this proposal aims to address both issues and to investigate early events in the sperm-virus and blastocysts-virus interaction and the potential consequences for reproductive success of the dam.

If you are interested in this project or discuss it further, please contact:

Prof. Michael McGowan, m.mcgowan@uq.edu.au
A/Prof Chiara Palmieri, c.palmieri@uq.edu.au

Animal welfare and ethics

Prospective students are welcome to contact Clive Phillips about possible projects within the Centre for Animal Welfare and Ethics. Current main areas of interest are the effects of transport on sheep behaviour, attitudes to transport and slaughter, the development of welfare indices for captive animals and the teaching of animal ethics to university students.

The Centre for Animal Welfare and Ethics is working in China and other Asian countries to examine the best ways to improve the welfare of livestock, especially in the pig and poultry industries. Opportunities exist for students to join the project and work on both farming systems and transport and slaughter of livestock. Students should have an interest and preferably training in animal welfare, and either the social sciences or animal behaviour and physiology.

Contact:

Professor Clive Phillips
Tel. +61 7 5460 1158
E: c.phillips@uq.edu.au



UNFUNDED PROJECTS

Development of point-of-management (POM) tests for porcine respiratory diseases.

Early detection of disease is a significant method for reducing antimicrobial use as animals are able to be treated before the disease is established, treatment is more effective and the number of animals requiring treatment is reduced as the spread of the disease is prevented. Porcine respiratory disease pathogens including *Actinobacillus pleuropneumoniae* and *Mycoplasma hyopneumoniae* and secondary pathogens including *Haemophilus parasuis*, *Pasteurella multocida* and *Streptococcus suis* are current major drivers of antimicrobial use in the pig industry. For the detection of early disease easy accessible samples are needed. Saliva is an easy obtainable sample from a live pig making it an ideal diagnostic sample. Recent research has indicated that saliva is an ideal sample for viral and bacterial detection, as well as other indicators of disease. Therefore, this project aims to look at detecting levels of respiratory disease causing bacteria or their indicators in the saliva and developing on farm test to detect the onset of disease. The aim is to establish the baseline for disease indication in pig saliva. Once the baseline is established tests will be developed in the laboratory to determine this baseline. These test would then be further refined to allow point of management (POM) application (i.e. direct use on the farm). The ultimate aim is the development of POM tests for porcine respiratory diseases. Rapid POM quantitative diagnostic assays using saliva samples will be developed and evaluated using a detailed study design culminating in assessment of sensitivity and specificity relative to conventional diagnostic approach in piggeries with endemic respiratory disease.

Applicants should have an excellent GPA (>5.5 on the UQ 7.0 scale) and a First Class Honours degree or equivalent. Applicants need to be eligible to obtain an Australian Postgraduate Award (APA) or equivalent. For further information on scholarships please refer to <http://www.uq.edu.au/grad-school/scholarships-and-fees>

Contacts: Dr Justine Gibson; gibson.j@uq.edu.au and Dr Conny Turni; c.turni@uq.edu.au



Haemangiosarcoma

Haemangiosarcoma is a malignant cancer of the endothelial cells that line blood vessels. There is currently no curative treatment available, and it is difficult to diagnose before the cancer spreads to other organs. Haemangiosarcoma is highly prevalent in large dog breeds, such as Golden Retriever, Boxer, Labrador and German Shepherd Dogs, suggesting that genetic risk factors exist. This study aims to investigate the genetic cause of this cancer in dogs using a genome screen and sequencing approaches. It also aims to look at prevalence of the cancer in Brisbane dog breeds. Cancer tissue expression studies and a clinical trial evaluating the accuracy of a newly developed serum-based point of care diagnostic test is also involved. Interested people should have either a degree in molecular genetics or in Veterinary Science registrable in Australia. If you may be interested in this project and would like to apply for this position or discuss it further, please contact Dr Caroline O'Leary on 0417 080 987 or c.oleary@uq.edu.au

Canine lymphosarcoma study

This study is focused on developing superior, point of care diagnostic tests for dogs with lymphosarcoma. Lymphosarcoma is one of the most common malignant cancers in dogs, with untreated dogs commonly having a survival time of a few weeks, and dogs treated with chemotherapy often surviving less than 12 months. The Golden Retriever is especially susceptible to developing lymphoma, with a lifetime risk of 1:8. Histologic grade, immunophenotype, location of the cancer, clonality, clinical stage and substage have some prognostic value. However, developing an accurate diagnostic test that could identify the main clone cell type in lymphosarcoma and be used in the veterinary care setting would be very useful to improve diagnosis, measurement of treatment response rates and prognosis. The genes with altered usage patterns in lymphosarcoma will also be investigated. If you may be interested in this project or discuss it further, please contact Dr Caroline O'Leary on 0417 080 987 or c.oleary@uq.edu.au

Immune mediated blood cell disease

Immune attack focused on platelets and red blood cells is common in dogs. The immune attack maybe precipitated by a drug, cancer or an infection, however it may also occur in dogs in which no underlying cause can be found. In these dogs there may be an underlying genetic predisposition to developing these immune diseases. This study will investigate a genetic cause for these diseases using a GWAS and deep sequencing approaches. If you may be interested in this project or discuss it further, please contact Dr Caroline O'Leary on 0417 080 987 or c.oleary@uq.edu.au