2018 UQ Winter Research Scholarship Program
Research Projects offered by School of Veterinary Science

How to apply
The UQ Winter Research Scholarship Program is offered by the School of Veterinary Science and UQ Student Employability Centre during the winter vacation period (mid-June to mid-July). This document provides you with a list of available projects.

1) Browse the projects.
2) Contact a potential supervisor in the area of your interest, or the contact person listed, to discuss your interest to undertake their research project. Gain the research project supervisor’s tentative approval, and include this with your full UQ Summer Research Scholarship application.
3) Submit your application via CareerHub
**Sampling the extracellular matrix of the equine hoof lamellae using open-flow microperfusion**

Despite intensive research in recent years, the exact processes that cause laminitis in horses remain unclear. As a consequence, methods for successful treatment and prevention for this crippling disease remain elusive. From research performed in the past decade, laminitis has been divided into three distinct major forms: sepsis-associated, endocrinopathic, and supporting limb laminitis. Although each form potentially represents a unique disease pathway in terms of the causal mechanisms, all still share the same outcome: weakening of the connection between hoof and bone (i.e. the lamellar tissue), and characteristic, debilitating foot pain.

At the cellular level, the suspension of this bone (the distal phalanx –DP–) to the hoof, and therefore the entire weight of the horse, occurs within the hoof wall as a result of the adhesion of the epidermal lamellar basal epithelial cells –LBEC– (continuous with the hoof wall), to the underlying basement membrane –BM– (continuous with the extracellular matrix –ECM– of the lamellar dermis and attached to the DP). Furthermore, the structural integrity of the lamellar tissue is dependent on dynamically regulated LBEC adhesion complexes termed hemidesmosomes (HDs), which are continuous with LBEC cytoskeleton and provide the junction between the basal membrane of each LBEC and the underlying BM (primarily the laminin molecules) via its extracellular anchoring filaments. Due to the critical function of the lamellar tissue in supporting the entire weight of the horse, minor dysregulation of cell adhesion important in the suspension of the DP can quickly pass a threshold where the downward physical force from the weight of the horse results in separation of the epidermal and dermal lamellae and distal displacement of the DP within the hoof capsule. This in turn results in crippling lameness and unrelenting pain.

While failure of the LBEC adhesion to its underlying BM and ECM results in a crippling structural failure of the lamellar support in cases of laminitis, the main events which can lead to separation of the dermal and epidermal lamellae are thought to be 1) dysregulation of the cellular adhesion complexes or HDs responsible for adhesion of basal epithelial cells to the underlying matrix molecules, and 2) protease activation causing loss of integrity of ECM molecules that provide both structural stability to the lamellar dermis, and an attachment site for HDs of the LBECs. Though signalling cascades affecting HD stability in epithelial cells have been extensively studied in other species, major knowledge gaps about these signalling pathways in the lamellar tissue still remain.

Thus, elucidating the composition of the lamellar ECM in health is a key step in understanding the mechanisms that result in ECM dysregulation during disease. Open-Flow Microperfusion (OFM) is a recently developed, minimally invasive in-vivo sampling method that enables access to the entire biochemical information of the extracellular interstitial fluid compartment directly from the site/tissue of interest. It is a universal, continuous, sampling method with no nominal cut-off value, thus providing the opportunity to investigate all substances regardless of their physico-chemical properties. Various studies have shown that OFM can be used to successfully sample substances ranging from ions up to entire immune competent cells in different tissues. The OFM technique is based on the placement of a purposely designed probe with an outer diameter of 0.5 mm and a length of 4 – 15 mm into the tissue of interest. The probe features macroscopic openings that allow the exchange of substances between the ECM and a fluid that is perfused through the probe (the perfusate). There is a direct fluidic exchange between the perfusate pumped through the probe and the surrounding ECM, which provides a diluted but otherwise unchanged ECM interstitial fluid sample. In addition, the OFM method avoids perfusate
loss into the tissue and ensures stable sampling volumes, as the pump pushes the perfusate into the probe and pulls the OFM sample into a sampling vial.

The aim of this 6-week-long winter project is to modify and adapt a technique for microdialysis probe placement into the lamellar tissue (Figure 1), previously developed by the chief investigator, and standardise a technique for implantation of OFM probes in the lamellar tissue of horses in order to sample the lamellar ECM. Mid to long term goals are to characterise the molecular and biochemical composition of the lamellar ECM in health, in order to subsequently study molecular and biochemical events that take place during the development of the various forms laminitis in the horse.

**Expected outcomes** - The scholar will gain knowledge about equine physiology, equine distal limb anatomy, the pathophysiology of laminitis, and the ECM composition. He/She will also develop skills in the application of state of the art methods for ECM interstitial fluid sampling that can be applied in various research areas including molecular biology and pharmacology. In addition, the scholar will have the opportunity to participate (and potentially lead) the generation of a publication out of the data collected during this trial.

**Suitable for** - This project is open to applications from UQ enrolled students only with a background in biological or animal sciences, with experience in horse handling, and with an interest in equine diseases; preference should be given to 3-4 year BVSc students.

**Other important details** - For expression of interest and if you require further information, please contact me via email (c.medina@uq.edu.au) prior to submitting your application.
**Australian arbovirus replication in immunosuppressed rabbits: implications for role of feral rabbits as virus reservoirs for human and animal infections**

**Background:** European rabbits (*Oryctolagus cuniculus*) introduced to Australia have long been recognised as an invasive species. However, their precise role in amplifying and transmitting pathogens of medical and veterinary significance has not been studied extensively. We have shown that ~13% of feral rabbits are seropositive for the mosquito-borne virus, West Nile virus – Kunjin strain (WNV\textsubscript{KUN}), suggesting a potential a role of feral rabbits in the ecology of this medically and veterinary significant virus. We have also shown that WNV infection in immunocompetent European rabbits causes neither morbidity nor mortality, most likely due to the restriction of virus replication to the draining lymph nodes and limited dissemination systemically. However, the rabbit population in the wild likely comprises individuals of varying immune status. For example, rabbits infected with Myxoma virus are immunosuppressed, and this likely would affect the host-virus interaction and WNV\textsubscript{KUN} replication in such animals compared to immunocompetent European rabbits.

**Research Plan:** We will characterise the in vivo kinetics of WNV\textsubscript{KUN} replication in dexamethasone-induced immunosuppressed European rabbits, as a comparison to that of immunocompetent rabbits. As a RNA virus with error-prone replication, WNV can exist as a genetically diverse population of virus variants (quasispecies). Previous studies have shown that passages of WNV from mosquitoes to birds resulted in strong purifying selection, eliminating deleterious mutations in order to maintain virus population (quasispecies) fitness. We hypothesise that such selection process also occurs in mammals, in particular, European rabbits, due to the strong restriction on in vivo virus replication in immunocompetent rabbits. We also hypothesise that the complexity of WNV genetic diversity is dependent on the immune status and on the tissue type. We therefore propose to compare the dynamics of genetic diversity within WNV isolates from different tissue types and serum in rabbits with varying immune status. Deep sequencing technology, i.e. RNAseq, will be employed to identify variation in the WNV genome within tissue/serum isolates. This investigation will assess the role of the immune status in shaping the complexity of the WNV genomic diversity in vivo, and thus in influencing the efficiency of virus replication in vivo and potentially transmission to vectors.

**Expected outcomes** - The scholar will have the opportunity to gain experience in molecular biology, bioinformatics as well as analysis of immunological and pathological parameters in the experimental animals. The particular emphasis on one or more of these aspects will to some degree depend on progress of the project at the time the scholar starts involvement.

At the end of the project the scholar is expected to give an oral or poster presentation of the study outcomes.

**Suitable for** - This project is open to UQ-enrolled students with a microbiology/virology/immunology background.

**Other important details** - The project will be based mainly at the UQ Gatton Campus, although the bioinformatics part may be done at the St Lucia Campus.

For further information about the project, please contact Helle: h.bielefeldtohmann1@uq.edu.au
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<tr>
<th>Supervisor</th>
<th>Dr Allison Stewart</th>
<th>Duration: 4 weeks</th>
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**Contact Details:**
Email - [allison.stewart@uq.edu.au](mailto:allison.stewart@uq.edu.au)
Telephone – 07 5460 1799

**Determination of differences in cytological and microbiological sensitivities of surgical verses traumatic equine synovial infections.**

**Background:** Synovial structures frequently become septic in horses secondary to trauma and occasionally iatrogenically from a surgical site infection. The organisms and their respective antimicrobial sensitivities will be compared between the two causes. Correlations between organism and white blood cell counts will be determined.

**Hypothesis:** That nosocomial infections which occur secondary to iatrogenic surgical wound contamination will have a greater antimicrobial resistance pattern than wounds of traumatic origin.

A dataset incorporating 7 years of culture results has been completed for equine pathogens. A second spreadsheet that includes pertinent case information and cytological data has been commenced will need to be completed prior to statistical analysis. The successful applicant will update the datasets and then summarise the results after statistical analysis.

**Expected outcomes** - Skills gained include: data entry; analysis of medical records, cytological descriptions and microbiological culture and sensitivity results; data analysis. The aim is to prepare an abstract for presentation and a manuscript for publication. A written report will be required at the conclusion to the research period.

**Suitable for** - Open to veterinary students in the 3rd or 4th years of their degree. Meticulous data entry skills, hard working, excel experience, interest in statistics, epidemiology and equine practice.

**Other important details** - Please contact me prior to submission of an application; [Allison.stewart@uq.edu.au](mailto:Allison.stewart@uq.edu.au)
Investigation of the frequency of *Salmonella* spp and *Clostridium difficile* as aetiological agents associated with equine colitis

**Background**: Equine colitis can be caused by a variety of pathogens. The frequency of aetiologies affecting horses presenting to the University of Queensland has not been determined. Diagnosis is made by microbiologic culture and/or PCR. If both tests are performed, a comparison between the usefulness of each test will be determined. The percentage of open diagnoses will be determined despite appropriate testing.

**Hypothesis**: That PCR proves to be more sensitive in the identification of the cause of colitis and may be used to replace conventional microbiological culture. A dataset incorporating 7 years of culture and PCR results has been completed for equine pathogens. The successful applicant will update the datasets and then summarise the results after statistical analysis.

**Expected outcomes** - Skills gained include: data entry; analysis of medical records, microbiological culture and sensitivity results; data analysis. The aim is to prepare an abstract for presentation and a manuscript for publication. A written report will be required at the conclusion to the research period.

**Suitable for** - Open to veterinary students in the 3rd or 4th years of their degree. Meticulous data entry skills, hard working, excel experience, interest in statistics, epidemiology and equine practice.

**Other important details** - Please contact me prior to submission of an application; Allison.stewart@uq.edu.au
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<th><strong>Supervisor</strong></th>
<th>Dr Albert Sole-Guitart</th>
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| **Contact Details:** | Email – [a.guitart@uq.edu.au](mailto:a.guitart@uq.edu.au)  
Telephone – 07 535 15071 | |

**Retrospective study on risk factors and elimination rates due to lameness and metabolic issues in endurance horses in Australia.**

Using the data of several years collected by AERA (Australian Endurance Riding Association) in AERAspace data we will collect and perform the analysis all the information necessary from the rides, horse’s signalment, previous endurance competition record, specific ride characteristics, weight division and physical examination variables throughout the rides. The purpose of the study will be to analyze the information obtained from all these endurance rides and describe the observations throughout competition. An additional objective will be to identify risk factors that may be associated with elimination from competition for a specific reason (lameness or metabolic).

**Expected outcomes** - Scholar will gain skills in data collection and organization of data. Working together with equine surgeons and epidemiologic supervisors. The aim is to publish the study or studies. We encourage students to present the data at the end of the project.

**Suitable for** - This project is open to all the students. Particular interest in equine sports medicine and endurance competition is recommended but not necessary.

**Other important details** - Do not hesitate to contact me if you have any further questions or you want to know more details about this project.

Dr. Albert Sole, DVM, DACVS. Equine Surgeon  
[a.guitart@uq.edu.au](mailto:a.guitart@uq.edu.au)
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<th>Supervisor</th>
<th>Prof Clive Phillips</th>
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**Welfare of Cows in Gaushalas in India**

We are working on the welfare of cows in gaushalas in India. Gaushalas contain unwanted cows because slaughter is banned there. As a part of the project on the welfare assessment of cows in these gaushalas, we have interviewed 810 people (an almost equal number of men and women) living close to these gaushalas to ascertain their attitude towards these gaushalas and cow welfare in general. We need help with organising the data and analysing it.

**Expected outcomes** - Applicants will gain knowledge about the attitudes and culture of a country which has a unique answer to the prevention of animal wastage. They will also explore the determinants like gender, age, education level and religion towards cows in India. Applicants will gain data entry and statistics analytical skills to further generate publications from this research project.

**Suitable for** - The project is open to veterinary science, veterinary technology, animal science or zoology students with interest in animal welfare and ethics.

**Other important details** - For further queries please contact:

Prof. Clive Phillips  
Foundation Chair cum Director  
Centre for Animal Welfare & Ethics (CAWE)  
School of Veterinary Science,  
8134, Merv Young White House, UQ Gatton Campus  
Email: [c.phillips@uq.edu.au](mailto:c.phillips@uq.edu.au)
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| **Contact Details:** | Email – [c.phillips@uq.edu.au](mailto:c.phillips@uq.edu.au)  
Telephone – 07 54601 158 |

**Cattle behavioural responses to heat stress**

We are working on association of behavioural responses to the physiological parameters in beef cattle during excessive heat load. Therefore, the research plan is to develop better understanding of behavioural and physiological responses of beef cattle to excessive heat load.

**Expected outcomes** - Applicants will gain knowledge and skills about the non-invasive tools to assess behavioural responses, recording behavioural observations, and video digitisation skills. Applicants will gain data entry and statistics analytical skills to further generate publications from this research project. *The results of this study will be helpful to optimise conditions for animal welfare and to lower potential detrimental effects of heat load in beef cattle.*

**Suitable for** - The project is open to veterinary science, veterinary technology, animal science or zoology students with interest in animal welfare and ethics.

**Other important details** - For further queries please contact:

Prof. Clive Phillips  
Foundation Chair cum Director  
Centre for Animal Welfare & Ethics (CAWE)  
School of Veterinary Science,  
8134, Merv Young White House, UQ Gatton Campus  
Email: [c.phillips@uq.edu.au](mailto:c.phillips@uq.edu.au)
The effect of regional hypothermia on mechanical nociceptive thresholds in the distal forelimb of the horse.

**Aim:**
The purpose of this project is to study the effects of prolonged hypothermia on nerve transmission of the distal limb of horses and determine if this regional hypothermic technique may be clinically applicable as an analgesic for horses.

**Overview:**
A recent pilot study determined that regional hypothermia of the distal limb horses has the potential to decrease nerve transmission and provide analgesia to this area. It was found that as skin surface temperature decreased below 7°C there was a rapid increase in the reaction force required to elicit a response to a mechanical stimulus.

The study continues with this work and will be conducted at Pinjarra Hills Equine Research Unit and will involve working with horses from the University of Queensland teaching herd. The distal forelimbs of horses will be instrumented with non-invasive temperature probes and a pneumatic actuator which delivers a mechanical stimulus. The foreleg to be tested will be placed in a commercially made ice boot which is filled with water. The response to mechanical stimulation will be assessed as the water is cooled and once the target temperature is reached.

**Expected outcomes** - Scholars will gain skills in data collection and basic statistical analysis. There may be an opportunity to prepare a paper for publication and present the data at the end of the project. Through this process the scholar may gain and understanding of the physiology of pain and the effects of regional hypothermia on nerve transmission and regional blood flow. Familiarity with the use of Microsoft Excel will be gained following during data entry and statistical analysis.

**Suitable for** - The project is open to applications from students enrolled in any year of BVSc or BVetTech program. It would be particularly suited to students with a particular interest in veterinary anaesthesia or equine veterinary science.

**Other important details** - For further information please contact Dr Joanne Rainger on j.rainger@uq.edu.au or by phone on 07 54601788.
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<th>Supervisor</th>
<th>A/Prof Rachel Allavena</th>
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**Contact Details:**

- Email – r.allavena@uq.edu.au
- Telephone – 07 54601 826

**Histologic lesions of snake envenomation**

The project involves processing and assessing mouse tissues for lesions associated with envenomation of Australia’s deadliest snakes. Tissues are derived from a mouse model. The student will learn how to trim tissues, cut histologic sections and perform microscopic analysis and documentation of findings. The project would suit a student with a strong aptitude for light microscopy, and good knowledge of pathology and toxicology.

**Expected outcomes** - Scholars will learn the technical aspects of histopathology processing, as well as pathological analysis techniques using light microscopy. The data is expected to contribute to a publication. If time permits the student will be encouraged to write up results and assist with preparation of the manuscript.

**Suitable for** - Bachelor of veterinary science, Bachelor of Veterinary Technology or BSc students who have studied normal histology, pathology and toxicology.

**Other important details** - For further information please contact Rachel on r.allavena@uq.edu.au
**Canine eosinophilic meningitis in Queensland**

This project will seek to better understand the geographic range and significance of disease caused by the rat lungworms *Angiostrongylus cantonensis* and *A. mackerrasae* in Queensland. These parasites are responsible for a form of eosinophilic meningitis in humans and animals, including dogs and some native animals. The work will incorporate a survey of veterinary clinics in Queensland for notification of the disease.

**Suitable for** - This project is most suitable for students in veterinary science, veterinary technology, or science. Students should have interests in parasitology.

**Other important details** - For more information, please contact me by email: m.jones@uq.edu.au
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**Investigation into zoonotic diseases of humans**

You will work in collaboration with researchers from UQ School of Veterinary Science, Spatial Epidemiology Laboratory and UQ School of Medicine to investigate patterns of zoonotic disease severity in humans.

**Expected outcomes** - Scholars will gain skills in systematic review and survey design and will have an opportunity to generate publications from their research.

**Suitable for** - This project is open to UQ undergraduate student applications with experience in conducting systematic reviews of literature. This project is suited to students with a background in medicine, veterinary science/medicine, public health, epidemiology and zoonotic disease control.

**Other important details** - Prior to submitting an application please contact primary supervisor for further information: [r.magalhaes@uq.edu.au](mailto:r.magalhaes@uq.edu.au)
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**Geographical risk mapping of zoonotic diseases in livestock populations in China**

You will work in collaboration with researchers from UQ School of Veterinary Science, Spatial Epidemiology Laboratory and China Animal Health Epidemiology Centre to investigate geographical patterns of zoonotic disease in livestock species in China.

**Expected outcomes** - Scholars will gain skills in spatial analysis, including geographical information systems and disease clustering detection methods. The student will have an opportunity to generate publications from their research.

**Suitable for** - This project is open to UQ undergraduate student applications with a background in medicine, veterinary science/medicine, public health, epidemiology and zoonotic disease control.

**Other important details** - Prior to submitting an application please contact primary supervisor for further information: r.magalhaes@uq.edu.au